

THE LAWRENCE SURVEY

LAWRENCE, MASSACHUSETTS



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THE REPORT OF THE LAWRENCE SURVEY

STUDIES IN RELATION TO LAWRENCE, MASSA-
CHUSETTS, MADE IN 1911, UNDER THE ADVICE
OF FRANCIS H. MCLEAN BY ROBERT
E. TODD AND FRANK B. SANBORN
AT THE PROCUREMENT OF
THE TRUSTEES OF THE
WHITE FUND

LAWRENCE, MASSACHUSETTS

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THE REPORT OF THE LAWRENCE
SURVEY

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INTRODUCTION

By WILBUR E. ROWELL

The City of Lawrence is essentially an industrial community. It was intentionally created to be such a community. First came the recognition by a land surveyor of the water power existing here in the Merrimack river. Next was enlisted the interest of Boston merchants and manufacturers. In 1845 was begun the erection of a dam across the river. There was no village on the site of the present city. The power was developed and factories were built, and people came here to do the work of construction and operation. It is not exactly true to say that the manufacturers brought people here, either in the forties and fifties or in recent years. Opportunities were offered and people came. First came people of New England birth, and English and Scotch workers skilled in textiles; then came Irish, later French Canadians and Germans, and recently people from the Mediterranean shores and Eastern Europe.

It is to be noted that the impulse for growth has never come from within the city's own life; but always from abroad. Men living elsewhere have built mills in Lawrence, and a population has gathered and swelled in numbers to perform the labor of carrying on the industries. Accordingly, the traditions and resources of a self-contained, or self-sufficient society have never been available in the development of the city. Whatever community good has been achieved has been such as a society of working people could gain for themselves, under the favorable laws and customs of this Commonwealth. Whatever may be lacking is to some extent explained and excused by the same considerations.

Lawrence is like a great workshop, so to speak. It is not the trading centre of a surrounding territory; nor the social centre of outlying villages; nor the home of families who have won wealth or culture in past generations. Many a city of half its size does have all these characteristics; and it is obvious that they are important elements in the common welfare of such cities. Lawrence has always had the difficult problem of the conduct of manufactures in a manner to secure prosperity on the one hand

and the welfare of the working people on the other. The writer likes to think that his city is working out a typical modern problem for other communities as well as for itself; that our troubles and our shortcomings are not due to peculiar faults of our own, but belong to nearly every American industrial city; and that if one has faith in the future of our country as a whole, he is entitled to cherish the same faith in the worthy future of this city.

The following studies are intended as a partial self-examination, undertaken in the hope that better understanding may lead to better achievement. The idea had been in the minds of the trustees of the White Fund for some time when they found themselves able to secure the assistance of Mr. Francis H. McLean, then Field Secretary of the Charity Organization Department of the Russell Sage Foundation, now General Secretary of the National Association of Societies for Organizing Charity. Mr. McLean came to Lawrence in December, 1910, and laid down the plan of the Survey. Mr. Robert E. Todd was secured to conduct the examination of housing conditions. Mr. Todd brought to this work the results of much experience in similar investigations elsewhere, and an extremely wide and accurate knowledge of this particular subject. The health investigation was conducted by Mr. Frank B. Sanborn, Professor of Civil Engineering in Tufts College. Prof. Sanborn had given special attention to hydraulic and sanitary engineering, and had experience in similar investigations. Mr. Todd and Prof. Sanborn upon beginning their respective tasks were given full and independent control of the investigations which they conducted. The entire expense of the Survey has been paid by appropriations from the White Fund.

It remains to give a brief account of the White Fund. One of the men born on the farms that occupied the site of Lawrence was Daniel A. White. His birth was in the year of the Declaration of Independence. He was a graduate of Harvard College of the Class of 1797. He was a member of Congress, and later for many years judge of the Essex Probate Court. In 1852 he gave to trustees a considerable tract of land, of which the site of the present Public Library building is a part, to be sold so that the proceeds should provide a fund for the maintenance of a course

of lyceum lectures. It is interesting to notice that Judge White was seventy-six years old when he established this fund and that he had lived nearly all his life away from the town of his birth, being then a resident of Salem. It was according to the best New England traditions that he should feel a responsibility for the new city which was growing up about his birthplace, and should make a generous provision for its welfare. The fund much exceeded the needs of the lecture course; happily the founder foresaw this possibility, and the trust contains the broad power to use the fund "to promote the moral, intellectual and Christian advancement and instruction of the inhabitants of the town of Lawrence."

The trustees of the White Fund with their terms of service have been as follows:

CHARLES S. STORROW,	1852 - 1865
NATHANIEL G. WHITE,	1852 - 1886
HENRY K. OLIVER,	1852 - 1873
GEORGE D. CABOT,	1865 - 1898
JAMES H. EATON,	1873 - 1901
CHARLES U. BELL,	1887 -
WILBUR E. ROWELL,	1899 -
WALTER E. PARKER,	1901 -

The lecture course was begun in 1864. The introductory lecture was by Dr. James Walker, President of Harvard University; the other lecturers of that year were Rev. George Putnam, Richard H. Dana, Jr., Rev. Joseph P. Thompson, Ralph Waldo Emerson, and Oliver Wendell Holmes. While it is to be feared that not every course has reached that standard, it is true that eminent men have been heard in every year; and that courses of a high degree of excellence have been of frequent occurrence. Many undertakings for the public welfare within the terms of the trust have received assistance from its funds.

THE PLAN OF THE SURVEY

In the winter of 1910-11 the writer was requested by the Trustees of the White Fund to recommend to them a certain line of social inquiry, the cost of which would come within certain limitations fixed by the free income of the fund. At the same time, though naturally this has not been embodied in any formal action, he was informed that dependent upon the values revealed in this investigation, might be further action of the Trustees in later years, as their funds permitted other investigations of a similar character. In other words, he was made to understand that this proposed first inquiry, while self-contained, need not be considered as the whole, but as part of a possible whole yet to be created. Outside of these considerations no limitations whatever were put upon the scope of the proposed investigation, nor was the slightest suggestion made by any of the Trustees as to the advisability of this or that field being omitted because of the economic and social make-up of Lawrence. The only limitation in fact was that the investigation should cover Lawrence and be for the education of its citizens, thus coming within the provisions of the trust imposed upon the trustees of the Fund.

Armed with such a *carte blanche*, so far at least as offering proposals were concerned, it was evident that what was required was to find some principles of elimination which would logically point out our field. Much ground could be covered superficially, or a more limited area with some greater degree of thoroughness. No other policy than the last was thinkable, considering the circumstances. An educational fund, such as the White Fund, could not publish anything which was not thorough as far as it went.

Therefore it was evident that a search should be made for the definite beginning point, and that proceeding along the road which there lay stretched out, we should travel just as far as we could and still see what in detail lay on both sides of the road.

Naturally the beginning point seemed to be some understanding of topography and physical characteristics. Following that, those conditions which affect all, or nearly all; and what could these be excepting questions of public health and of housing. Housing is mentioned apart from public health because it presents other problems than the purely physical. In the first drafts of the plan submitted there were schedules covering education and public recreation. But

it soon became evident that these could not be reached. This for the reason that the extremely serious housing conditions, revealed by the most superficial of observations, plainly indicated that a very highly specialized and extensive investigation would here be required. In the field of public health it was later revealed that as extensive an investigation would have to be made of milk, another one of the fundamentals affecting all. Another fundamental, water, required no such inquiry. So our fundamentals are housing, milk, water, other general public problems, prefaced by a topographical sketch. So to a later day must be postponed consideration of education, recreation, child welfare, and so on along the line to living and economic considerations.

But the foundations have been laid, and the fundamentals which affect all community life, have been presented.

Two experts have been engaged in making the investigations which are here presented. The soundness of their methods and the scientific character of their researches are evident. So far as their individual deductions or conclusions are concerned they stand essentially as they have been presented and for their individual verity the investigators themselves must be responsible.

In closing this introduction it is well to say that this is to be no fruitless investigation, but that the first steps have been taken to form the necessary organization to carry on the propaganda for the successful attacking of those evils which these investigations reveal.

FRANCIS H. McLEAN.

TOPOGRAPHY OF LAWRENCE

Lawrence is situated on both sides of the Merrimack River, about twenty-three miles from its mouth, in the heart of a fertile country, wooded to perhaps 10 per cent. of its area, within a radius of five miles. The city is bounded on the north by Methuen, on the east by the Merrimack and Shawsheen rivers, which separate the city from the town of North Andover, on the south by Andover, and on the west by Andover and Methuen. The territory of the city extends about a mile and one-third north and about a mile and one-half south of the Merrimack, and is about three miles in extreme width east and west. The area is about 4577 acres, 2097 being south and 2216 north of the Merrimack, with about 264 acres in the river itself. The Shawsheen river, about fifty feet wide, which forms a part of the eastern boundary of the city, winds gracefully through a wooded defile, about twenty feet below the broad and gently sloping sandy plain, which at an average elevation of fifty feet above sea level stretches southerly from the Merrimack to the range of wooded hills, extending at an elevation varying to 200 feet above sea level, along the entire southern boundary. In the westerly section of this range are located the quarries of gneiss which furnish the stone for the foundations (and in one important case, of the superstructure), of all the principal buildings of the city. This ledge which underlies the whole ridge appears to terminate in an abrupt wall of rock some fifty feet high, known as Den Rock, around which cluster many weird legends.

The Merrimack, which is about 600 feet wide, is crossed obliquely a little above the centre of the city by the great dam, 900 feet long, and from near it run the two canals down along each bank of the river, the lesser one on the south, the principal one on the north, furnishing the water power for the mammoth mills which form the life of the city. North of this canal in a valley something over a mile wide, and averaging, like the plain on the south of the Merrimack, fifty feet above the sea, is located the most populous part of the city. Bounding this valley on the west rise the twin summits of Tower Hill to a height of 245 and 248 feet above the sea.

This hill is in the line of the famous "Indian Ridge" which Dr. Hitchcock particularly mentions, and which has been studied and mapped for a distance of some thirty miles. The nucleus of this hill

as also of Prospect Hill on the east, belong to the "till" or ground moraine, with superficial deposits of sandy gravel covering the whole eastern slope to the summit. Extending to the north the valley terminates at the foot of the more gentle slopes of Clover Hill, the summit of which, 153 above the sea, has been called Sunset Ridge. On the east is Prospect Hill, which attains an elevation of 190 feet above sea level, with a moraine of sandy gravel covering its eastern slope.

The Spicket River, (about the size of the Shawsheen) falling forty feet in its course through the city, furnishing three mill privileges (one of which has been purchased by the city) runs in an easterly direction about midway through the northern portion of the city to Prospect Hill, where it turns abruptly almost at right angles and flows in a southeasterly direction along the foot of the hill, and discharges into the Merrimack River about half a mile above the mouth of the Shawsheen.

The surface of the valley is generally composed of drift deposited several feet deep upon trap rock, which crops out above the general surface in various places forming a line of low elevations extending in a northeasterly direction from south of the Merrimack to the abrupt bend in the Spicket at the foot of Prospect Hill.

The drift forming the surface varies from a coarse mortar sand to a fine "quicksand" which tenaciously holds water, and forms a treacherous material in excavation. This latter is particularly prevalent north of the Spicket, where the surface was formerly damp, but which drainage has mostly dried up. Above the general plain are here and there slight elevations, forming very desirable places of residence.

ARTHUR D. MARBLE.

LETTER OF THE CITY ENGINEER

To the Trustees of the White Fund:

In December, 1910, Mr. McLean asked me to answer certain questions, and I made a reply in March, 1911, which I have now revised at the request of Professor Sanborn. The original letter of December 16, 1910, asked me to answer the following questions:—

(1) The engineering problems which will probably be solved the coming year.

(2) The possible engineering problems of the future.

(3) Map showing the sewered and unsewered sections of the city.

(4) Outline description of the general sewer system.

(5) Mileage of paved streets.

(6) Permanent sidewalks.

(7) Other important data.

The map you already have, answering No. 3.

I will not consider No. 1, as too uncertain.

(2) The future engineering problems undoubtedly will include the extension and improvement of the waterworks system. The growth of the city will require an additional supply. This may come from a source more remote than the Merrimack river, or it may come from the improvement of the present filtration plant at the Pumping Station. This improvement may be the covering of a part of the old filter built in 1892, or it may be a new covered filter built in another location. If the latter, then a concrete bottom could be laid in the part of the old filter bed from which comes the most trouble on account of the permeability of its present earth bottom.

These improvements or additions to the filtration plant will not probably increase the purity of the water supply, but it may remove some of the color in the city water, on account of cutting off some of the ground water which now finds its way into the old filter bed.

The covering of the filter would increase the amount of water capable of passing through the bed, and prevent the freezing of the surface in winter, thereby decreasing the cost of maintenance, and allow of more frequent cleaning of the surface during cold weather.

The improvement in the Spicket river which was made during the fall of 1910 eliminated the offensive condition of that river, so that during the summer of 1911 there were no complaints from property owners because of foul odors along the banks of the stream. So long as the river remains an open channel, constant and intelligent super-

vision will, however, be necessary to prevent its being made a dumping place for all sorts of refuse by those living near to and on the banks of the river.

It is quite possible that sometime in the future the river will be walled and covered, and the area thus formed be made into a park.

Other engineering problems include the disposal of the sewage of the city in some more sanitary and inoffensive way than discharging it from open sewer outlets into the Merrimack river, which outlets now are, at certain stages of the river, some distance from the thread of the stream:

The abolition of grade crossings:

The construction of one or more bridges over the Merrimack river:

The relocation of the railroad station in South Lawrence, connecting the same with North Lawrence by an electric car line, and discontinuing the "cab" train:

The sewerage of the section of the city lying on the westerly slope of Tower Hill, and the disposal of the sewage from the same so as not to make it an offense to the citizens of the district and an added pollution to our water supply.

The disposal of the surface water from this same section.

The sewerage of the southerly slope of Phillips Hill, and of the valley of Cold Spring brook. These sections are separated by ridges from the Merrimack river, and naturally drain into the Shawsheen river.

The State Board of Health will probably not allow the sewage to be discharged into the Shawsheen river, and the problem is how to dispose of it at reasonable cost.

(4) Generally speaking, the sewerage of Lawrence is on the combined plan. The outlets are chiefly into the Merrimack river, but one main sewer discharges into the Spicket river.

There are also fourteen overflow sewers in the Spicket river, which are only in commission during a heavy rainfall, and the matter then discharged is almost entirely street wash.

Portions of the city, notably parts of Tower Hill, Prospect Hill, and the valley of "Bloody" brook, are sewered on the separate system, the surface water finding its way through street gutters to the nearest water course or river. The separate system sewers cannot take care of any roof, yard or other surface water.

The sewage from all the sewers is discharged in a crude state into the river.

(5) Street surface in Lawrence:

Granite block paving	9.18 miles
Asphalt	0.33 "
Wood	0.09 "
Brick	0.42 "
Macadam	25.10 "
Earth	79.51 "

Total streets open about 114.63 miles

(6) Permanent sidewalks, principally of tar concrete, are laid throughout the thickly inhabited part of the city. Of late, many walks of cement concrete, commonly called granolithic, have been laid. The city and the property owner share equally on the first cost of these sidewalks, and the city bears the expense of all subsequent repairs.

(7) Under this number might properly be mentioned the Park system. This was begun by the Essex Company by the gift of the Common, which has an area of about seventeen acres in the very heart of the thickly settled part of the city. Through all the years since the early days, the Essex Company has from time to time given areas for parks which are scattered all over the city. These include Storrow Park in Ward one, 10.75 acres, the Amphitheatre, 7.5 acres, in Ward five, Union Park, 11.25 acres, and Stockton Park, 0.4 acres, in Ward six, and lately the bank of the Shawsheen river, 15 acres, in Ward six, which we hope will eventually be transformed into a beautiful parkway leading out to Den Rock, where the city has acquired by purchase about eighty acres of wooded hills and river valley, including the picturesque rocky cliff. In addition to the parks above enumerated, there are the following:

Jail Park	area 0.80 acres
Durant Park	" 0.04 "
Pine Street Park	" 0.03 "
Milton Street Park	" 0.02 "
Crescent Park	" 0.08 "

The last four items are triangular plots of ground at the junction of various streets, which have been graded and curbed. There are also areas for playsteads in Wards one, three, four and six, all of which have been improved and graded, and some of them furnished with equipment for the enjoyment of the children. Some of the parks have also been equipped in the same way. Ward four has two play-

steads, one a large one suitable for ball-playing ,and one smaller, more particularly for children's use.

To the problems of the future might be added the poles and wires belonging to the public service corporations, and their proper regulation and disposition.

A topographical description of the city is included herewith.

Yours truly,

ARTHUR D. MARBLE, *City Engineer*

April 21, 1912

HOUSING CONDITIONS

By

ROBERT E. TODD

This examination includes in its census and some other statistics all houses in the city, but the rest of the inquiry does not include the houses of Lawrence as a whole. Lawrence has many good houses. The great majority of those outside the center are such. Though all defective houses are not at the center and all center houses are not defective, the city's pressing housing needs are at the center: hence that is the field covered in this inquiry. The exact scope of the examination is shown in the diagram on page 54. In connection with the description of the most important conditions an estimate is made of the probable extent of such conditions.

HOUSING CONDITIONS

One of the former trustees of the White Fund, a banker and a man who had the interests of Lawrence near his heart, used to delight in speaking of the city as "a city of homes." This may have been true a decade ago. It is evidently the fact now that Lawrence is by more than one-half a city of tenements.

But the term tenement should be given the arbitrary and technical meaning described later. The essential idea in it is not necessarily bad housing but the nearness of families under the same roof; for, the word tenement, a "holding," and the word apartment have meaning only as opposed to the complemental idea that several families have quarters in the same house. It is the nearness with the common use of space and other circumstances, as well as the nearness of houses to each other, that needs to be controlled by legislation. No greater need exists in Lawrence.

THE EARLY HOUSES

It will be seen in the following paragraphs that the early houses were nearly all small and that the large houses have been built recently. While the work on the dam and canal were still going on, as early as 1847, the mill owners began building houses for the operatives and continued at intervals for about a decade. Most of these houses were in brick blocks located along Canal and Methuen Streets. Many of them have been supplanted by mill warehouses, offices and other buildings, but about seventy-two are still in use, though now largely owned by individuals. Most of the houses are three stories high, but some of them have dormer rooms on fourth floors. One square of forty two-story brick houses which were built by the Lawrence Machine Company about 1847 and are still in use, are similar to that satisfactory type of house which for years has been so popular in Philadelphia.

When the dam was being built, many of the laborers on it lived in South Lawrence in the fields not far from the work.

Their small shacks or huts were built hurriedly of slabs and rough lumber, with roofs of over-lapping boards, with sod piled high around the walls, and with stove pipe chimneys. These cabins stood for a good many years, but gradually their occupants left, or bought a right to the locations; and the last two of the shacks, occupied to the end, were torn down, one in 1894 and the other in 1898.

In the same period houses of a different class were being built in the districts to the east and north of the Common. They were almost as small as the shacks, but much more durable and with much better interiors. Usually each house had its own garden, and each occupant owned a few goats, pigs and hens, and kept the rural habit of laying in such stores both of meats and vegetables as would carry the family through the whole winter.

Several of these houses, improved and well painted, indicate present prosperity and comfort, and look like good homes; a few remain in use unaltered; many have been moved to the rear of the lot; some are vacant, or used as sheds; and many have been torn down. In a few instances, two, three or four have been moved up together, attached and extended, and make, as rented, a most interesting jumble of tenements. There are still standing at various locations, but not now in use, three or four peculiarly long and narrow houses that at once remind one of houses seen in Irish and English pictures.

Except those built by the mills, nearly all houses were made of wood. There were some wooden blocks, a considerable number of double cottages and houses, and several of that type of four-family double house of two stories with attic rooms which is so common in most of the mill towns of New England. As late as 1875, the three-story houses were probably less than ten in number, though the population had reached 35,000. Between 1875 and 1895 the three-story, flat-roof house began to be more common, though its incoming was quite gradual.

There is one instance of a four-story frame house which is said to have been built before 1850. But as late as 1895 there were not more than six or seven of these houses without stores, and about the same number with stores, making altogether less

THE NUMBER OF APARTMENTS
GROUPED FOR EACH YEAR IN RELATION TO THE YEAR
Illustrated
June 1, 1906 to

19

1906



In Houses of
1 and 2 Apts.

In Houses of
3 Apts.

In Houses of
More than 3 Apts.

In Houses of
1 and 2 Apts.

In Houses of
3 Apts.

1909



In Houses of
1 and 2 Apts.

In Houses of
3 Apts.

In Houses of
More than 3 Apts.

In Houses of
1 and 2 Apts.

ENTS IN NEW HOUSES
 TO THE THREE FAMILY HOUSES
 Area.
 ne 30, 1911

7 «»

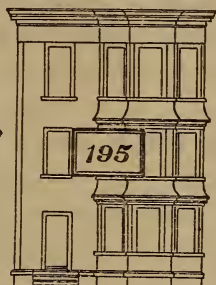


In Houses of
More than 3 Apts.

«» 1908 «»



In Houses of
1 and 2 Apts.



In Houses of
3 Apts.

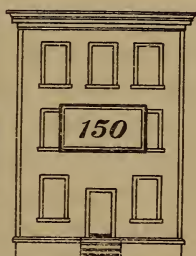


In Houses of
More than 3 Apts.

«» 1910 «»



of
pts.
In Houses of
3 Apts.

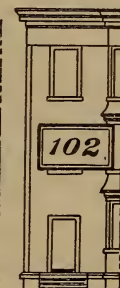


In Houses of
More than 3 Apts.

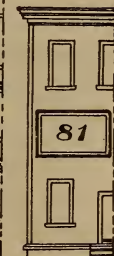
«» 1911 «»



In Houses
of 1 and
2 Apts.



In Houses
of
3 Apts.



In Houses of
More
than 3 Apts.

than fifteen four-story frame houses sixteen years ago. Since then the number of these houses has increased rapidly.

THE FUTURE OF LAWRENCE AS A CITY OF TENEMENTS

The most common definition of a tenement house includes every house which has three apartments or more. At the present time Lawrence has:

17,988 apartments in 8,202 houses:

8,599 apartments in houses for one and two families

9,389 apartments in houses with three or more families.

Forty-eight per cent of the families in Lawrence are living in one and two-family houses; the remaining fifty-two per cent are living in houses of three apartments or more.

The number and size of the houses which are now being erected can be found in the records of the office of building inspector which was established just prior to June 1st, 1906. In the five years and one month ending June 30, 1911, there were constructed:

3063 apartments in 1052 new houses:

735 in houses for one and two families	24.0 per cent
1335 in houses for three families	43.6 per cent
993 in houses for more than three families	32.4 per cent

In the accompanying sketch the capacity of these new houses is shown as they have been built year by year. The number of tenements which were constructed in old houses by additions and alterations in the first four and one-half years is 283.

Thus we see two facts: more than one-half of all families are living in houses for three or more families; and among the new buildings the large houses greatly predominate. Only about one-fourth of the families that have been provided for in new houses are living in one and two-family houses. In every one hundred new apartments, seventy-six are being built in houses of three apartments or more.

In other words, the character of the homes of the majority of families is being rapidly and radically altered. This fact alone, as a general statement based on the building operations for the last five years, is abundant reason why the citizens of Lawrence should be seriously interested to determine whether the changes

in forms of houses are good and suitable for the preservation of that healthy family life, upon which the permanent welfare of any community depends.

In considering this question, we must not be too easily influenced by the fact that a large number of the three-family houses located in districts outside of the center are good-looking houses. This is only part of the story, and in Lawrence it is less than half of it. Bad housing is not a question of averages and majorities. The majority of the houses in a city may be excellent, and the minority so exceedingly deficient as to be a grave peril to the permanent welfare of the community.

THE NUMBER OF APARTMENTS AT THE CENTER

In Lawrence not only is there a rapid increase in the number of families which are being provided for in the larger houses, but there is steady growth in the process which is crowding houses together at the center of the city. In every 100 apartments of the city, 19 are located in South Lawrence, and 81 in North Lawrence. In a central district bounded on the south by Essex Street, on the east by Union and Garden Streets and the Spicket River, on the north by Maple, Auburn, Cross, Broadway, and Acton Streets, on the west by West Street, Bradford Place and the railroad, there are 300 acres. The congestion within this central district, relative to the city's area and population, is most remarkable.

For every 100 Acres in the districts named, there are

In the central district,	2,036	apartments
In the rest of North Lawrence,	443	"
In South Lawrence,	152	"

In other words, the density of apartments in the central district is about four and one-half times the density in the rest of North Lawrence, and more than twelve times the density in South Lawrence.

Yet the houses are made of wood. The need for ceasing to use wood for the houses at the center is very great. It is this piling up risk upon risk that has made a national burden which, though general, is nevertheless a very real burden. It is made general by our arrangements for paying fire losses.

FIRE BURDEN AND MENACE

WHAT WE BURN EACH YEAR

The true character of the fire loss and the extent of its burden upon us should be brought with such force to the conscience of the intelligent citizens that they will at once bring effective action for its reduction. We are extravagantly wasteful of our social wealth and we need to be told it many times and in many ways.

If a man were to sell all the property he had accumulated during his life-time for about \$20,000 in gold, put the gold in a basket, and, taking passage on a steamer, drop it overboard in mid-ocean, there is no one who would not say that the property was completely wasted. When property goes up in smoke, the loss is just as absolute; but by our arrangement for distributing the fire loss over the ninety millions of persons in the United States, it is not directly borne by any given individual, and its true nature is not seen.

The fire game which we Americans are playing is a wonderfully great game. Every man, woman and child in the country participates, but, strange to say, few of us realize that we are in it. We all need to be told how it is played. Whether we carry fire insurance or not, we pay landlords and merchants for carrying it. In effect, whether consciously or unconsciously, whether willingly or unwillingly, it is as if each householder in the country who is at the head of a family of four, takes a good chair, or a serviceable bookcase, or six valuable books, or any other articles that have a value of eleven dollars,* and goes every year to the landlords and the merchants, with a statement, "Here is what we desire to have burned up this year." They reply, "All right! We are a young and rich country. The nation at large will see that your wish is carried out. But these goods are awkward to ship to the nation's great tax-gatherers, the insurance men. Give us, instead, eleven of your hard-earned dollars." These dollars the landlords and merchants stamp "Money to burn," and pass on to the insurance men. The insurance men are in a ring. They throw the money in various piles within their circle and stand guard over it. Up rush the Citizens called Unfortunate, Ignorant, Indifferent, Careless, Fraud and Thief, each crying, "Hold, did you not see that smoke? That was my building with all the contents. To be sure, I built cheap. What of it? Everybody's doing that. Where is my share of what was set aside this year to be burned?" The circle of insurance men send out representatives, investigate, judge the claims, and parcel out the money. It's a great game.

*The source for figures and quotations relative to housing conditions are listed on page 143.

During each year for the last decade, this country has turned into smoke \$216,000,000, not including fire losses in forests, in mines or at sea. These annual losses have increased in the last thirty years 134 per cent, although the population of the country has increased but 73 per cent. "If all the buildings burned last year (1910) in the United States were placed together on both sides of a street, they would make an avenue of desolation reaching from Chicago to New York, and, although one seriously injured person were rescued every thousand feet, at every three-quarters of a mile, a man, woman or child would nevertheless be found burned to death." And it would take eighteen hours on the fastest train, or five days of daylight by trolley, to view without stopping this avenue of desolation and death.

Huge as that price is, it is not all we are paying for the use of fire, for it costs money to fight fires. Thousands of men and thousands of pieces of expensive apparatus are employed constantly. In fire defence, this country spends yearly, by an authoritative estimate, \$241,000,000, an expense that is entirely additional to the \$216,000,000 that is burned up each year.

THE FIRE BURDEN IN LAWRENCE

Compared with other cities, Lawrence's record in the matter of fires in the past is a remarkably good one in nearly all points, such as confining the fires to the building or place of origin, number of fires to 1,000 population, losses which are not insured, and the average total loss by fire each year: though the record is slightly less favorable in the cost of maintaining the fire department. In each year of the decade ending December 31, 1909, the total loss in Lawrence has been \$53,367, of which \$49,975 was insurance loss, and \$3,392 was uninsured. Fifty-three thousand dollars is a large amount of property to burn up each year. It is quite three times the amount of money which Lawrence spends yearly for the maintenance of the public library,

Yet this is only about one-quarter of the amount that fires are costing Lawrence. The total amount of fire insurance premiums paid each year, by an authoritative and conservative estimate, exceeds \$200,000. Because so many of the other cities

of the country, as well as Lawrence, have not been willing to restrict themselves in the use of wood, Lawrence business men are paying out every year more than \$150,000 which is consumed elsewhere in the country; and this waste is increasing at a very rapid rate. It demands everywhere and particularly in the cities of eastern Massachusetts a radical change from the present lack of building regulations. Cambridge, Worcester and Lowell have made a beginning.

THE FOUR STORY WOODEN HOUSES

The most striking fact about houses in all cities in Massachusetts is that they are almost exclusively built of wood. Outside of the center in a few cities, such as Boston, Worcester, Springfield and Holyoke, practically all houses are frame. Building in Lawrence goes to the extreme in this respect. Fully ninety-seven per cent of the houses in Lawrence are made of wood. Three-story wooden houses with large floor areas unbroken by fire walls are a constant menace to their occupants, no matter where in the city the houses are located. When these houses are located at the crowded center, they also magnify seriously the conflagration hazard. This is equally true of all four-story frame houses and in addition there is a greatly increased life risk for all who live upon the fourth floor. They are farther from the ground, and the speed and the volume of a fire can be very much greater than it could be in a three-family house. Also the four-story frame house is usually much weaker structurally than the smaller houses. In fire insurance rating, houses of one to three apartments are in one class, those with four to eight families in another. In building practice in most cities four-story frame houses are relatively very infrequent. Many cities prohibit them. There is a concensus of opinion that they are dangerous, too dangerous to be tolerated. They are especially dangerous in the congested wooden center in Lawrence.

In the number of such houses which have been built, Worcester and Lawrence exceed all other cities in Massachusetts, and the condition in Lawrence is much worse than it is in Worcester. Lawrence has 268 four-story frame houses, 216 of them located

in the central district of 300 acres, which is described elsewhere. A majority occur in blocks where the three-story houses have already crowded out most of the small buildings and where rear buildings are the rule, some of them being four stories high. Worcester has 120 four-story frame houses. Located on its side hills, there are also 200 three-story and basement houses which have four families, one above the other, or three families above a store. They are not quite comparable with the four-story frame house in that one end or one side is only three stories from the ground. On the other hand they are much more dangerous than the ordinary three-story frame building. With them included, the number of these houses in Worcester is 320. They are, however, scattered about the city, and are not in one relatively small area as in Lawrence, and where they occur there is greater distance between houses. Furthermore, four-story frame structures are now prohibited everywhere in the city, and the three-story and basement houses are not allowed to accommodate more than one family on a floor, unless the building is provided with a brick wall from front to rear, and from cellar to roof, with one apartment on each side of it. Worcester has a central fire district which is more than twice the area in North Lawrence which lies south of the Spicket River and east of the railroad. Within it no new frame houses can be built. Additional to this there are two other fire districts containing about 126 acres, where the three-story and brick basement houses are allowed, provided they are placed no nearer than seven feet to the side or rear line of the lot. Such buildings must also have tar and gravel or slate roof.

Lowell has 140 four-story frame houses, which is a few more than half the number in Lawrence. In August, 1906, Lowell prohibited the construction of these houses anywhere and established a good-sized fire district within which wooden buildings may no longer be erected. Since Lowell ceased to construct this form of building, Lawrence has built nearly one hundred.

There are three cities in the state which have smaller areas than the 6.53 square miles in Lawrence, and all three cities have greater densities of population. Lawrence has 13,210 per square mile. Somerville's density of population is at the rate of 17,160

per square mile, and the city has not over 50 four-story frame houses. Cambridge, with a density of 16,050 per square mile, has 110 houses of this kind. Chelsea, with a present density of 14,420 per square mile, is not comparable, because the houses in half its area have so recently been reduced to ashes. The distribution of the population in Lawrence is so uneven that at the center the density is more than five times greater than it is in all the city. Such center density is a result of four-story houses, rather than a reason for them. With the 268 four-story frame houses in Lawrence we should compare the number of such houses in Fall River, 95; in Salem, 90; in New Bedford, 55; in Lynn, less than 50.

THE COMING CONFLAGRATION

The yearly fire loss in Lawrence, \$53,367, serves well to illustrate the tremendous loss in a conflagration. This is less than a sixtieth of what was recently burned in Bangor in a few hours. Chelsea burned two hundred and twenty-two times as much in seven hours. It is in the daily fear of such disaster that many of the citizens of Lawrence are living. As one prominent business man remarked recently, "It hasn't come yet. But we will surely come down to the center some day with the face of the earth changed."

The sticks are all laid for a most superb bonfire. With the prevailing winds as they are, from the west, and north of west, a fire that originated in the vicinity of Broadway at any point from Common Street to Cross, and broke from the control of the firemen at a time when a measurably high wind is blowing, could not fail to destroy the section north of Essex to the Common, and, if the wind were from the west, could hardly fail to sweep to the east around the Common to the Union Street district, and possibly cross the Spicket River to the shingle roofs of the section in the vicinity of Avon and Belmont Streets. Excluding, however, the latter district, the area threatened is 300 acres, and contains 6108 apartments.

It should be noted that this central district, as described, does not include the mercantile and mill buildings south of Essex Street, and that additional values are there endangered.

Besides the large number of four-story frame houses at the center, there were counted in the house census of this investigation 1,000 shingle roofs in this area of 300 acres. As a form of construction, shingle roofs are quite comparable to paper hats as a form of clothing.

"In the old days, roofs were covered with thatch. The process was to thatch a roof, watch it dry and eventually try to stop it from burning up. It was useless. We know that a thatch roof is not desirable. But we progressed slowly. Our next idea was to use wood in the form of shingles. We simply changed the rate of deterioration. Shingles dry up and eventually burn. Some day we will learn that shingles should be given up and placed in the museum with thatch.

"Have you ever thought of the first cost of a shingle roof? Then have you added the cost of the upkeep? Have you added the cost of the damages to materials under that roof? Have you watched a shingled roof catch fire? Or seen the sparks fly to the next shingled roof? Or realized that you were viewing a conflagration?

"Many people have. Many cities have gone through this experience. The mayors telegraph for help. The papers are full of the pitiful details of homeless people, of wasted property, of appeals for subscriptions. A conflagration is a terrible menace hanging over many cities and the shingled roof is the main cause. The great fire in Chelsea, Massachusetts, spread horizontally, from roof to roof (burning down) instead of from wall to wall."

The report on the City of Lawrence made in July, 1908, by the Committee on Fire Prevention of the National Board of Fire Underwriters, says concerning the Valley Street and Lowell Street district; "The potential hazard of this considerable area of large, compactly grouped frames is high. A fire once beyond the control of the fire department would become a most serious conflagration. The prevailing direction of high winds being from the west or northwest under ordinary conditions, the principal mercantile district would become involved and the mill district threatened. Even with the efficient fire department, the abundant water supply at moderate pressures and the good accessibility, the probability of a large fire is great, due to the character of the population and the extremely hazardous construction."

The habits of the population in the congested district, as well as the lack of convenience in the houses, certainly add very materially to the fire risk. The conditions which attend the use of



Papers and rubbish under cellar stairs in a six family wooden house with four floors. Tenants on the second, third and fourth floors front have egress only down the stairs over this pile. An equally great pile was seen in the next house. These houses are so situated that an uncontrolled fire in them would sweep the whole center of the city.



The cellar had six sub-divisions or bins. Straw in large quantities was found in five, one of which is shown above. The straw was more than two feet deep. A sixth large pile lay in the open cellar near the foot of badly broken stairs, which are under the main entrance and stairs in a six-family, three-story rear frame house.

the cellar, especially in the winter time, illustrate this. The stairs are frequently very narrow, winding, dark and, in a considerable number of instances, broken. In some of the cellars artificial light is absolutely necessary, and hence the striking of matches and the carrying of lamps is very common. It is most frequently the children who are sent to the cellar, and the load of fuel together with the lamp, and the conditions surrounding its use, make a daily risk that is excessive.

The presence of piles of inflammable rubbish in the cellar add to the risk. Among the houses examined in six half blocks, an average of one in six had a serious amount of inflammable rubbish in the cellar. Where the condition occurs to the extent shown in the photographs, there can be no question about the risk involved. There surely need not be more than one such cellar in each of the 160 half-blocks at the center to make a conflagration hazard well worth periodic and efficient fire inspection. This the city has not had, but should have.

Another illustration is the practice in lighting kitchen fires. Many tenements are deserted during school hours. All the adults work, and the children below school age are left in other tenements. Hence the kitchen fires are allowed to go out at least once, and in many cases twice, a day. At the end of each morning and afternoon, it is the school children who reach the house first, and upon them falls the duty of starting the kitchen fire. Many of them are not taught how to do it, and others are altogether too young to be trusted to do it safely. Kerosene is used, and used by very young children. In one apartment a small Italian boy not over eight years of age was seen at the stove starting the fire. He scratched so many matches and went so many times to a small closet that the attention of the writer was finally attracted, just as he was raising a can to pour oil into the open hole of the stove. A shout stopped him and a glance into the stove showed red embers. This youngster of eight years and his brother, not over six years old, were alone in the tenement.

In Ohio and two other states, by legal enactment, the children are being taught in the schools the causes of fires, the dangers in handling materials, and what to do in time of fire. Lawrence

would do well to secure at once the introduction of similar instruction in the public schools.

THE SUFFERING INFLECTED BY A CONFLAGRATION

What conflagrations mean to the individuals who suffer in them, we do not sufficiently consider. A former Lawrence citizen, who passed through the Chelsea fire, afterwards described his experience. Having taken some bundles to a distance, he returned to his house for more. Soon a neighbor called to him, "Mr. B., are you in there? Come out as quick as you can. The next house is all ablaze and your roof has caught." Mr. B. escaped hurriedly, and, in referring to his loss, said: "No one, who has not gone through the experience, can possibly realize what are the sensations of those who were driven from their homes, and lost all their worldly goods by the flames." He had no insurance, and saved only a suit and a little other clothing.

The life risk in Lawrence is greater than it was in Chelsea. In that city at the time of the fire, there was a density of population at the rate of 16,880 per square mile. The density in North Lawrence is at the rate of 20,732 per square mile, and in the 300 acres of the conflagration district, it is at the rate of 72,000 per square mile.

At the time of the conflagration in Chelsea, the 275 acres which were burned did not equal the present conditions in Lawrence in the congestion of wooden buildings. The buildings were not as high and they were not as near together. In Lawrence, in the 216 four-story frame houses of the 300 central acres, between 1800 and 2000 persons are living on fourth floors. As shown elsewhere in the report, there are altogether too many third and fourth floor apartments from which there is no adequate second egress. This condition is most serious, and, though the greatest risk involved is from fires that originate inside the houses, the lack of egress greatly complicates and increases the life risk at the time of a conflagration. But the possibility of safe exit is not the only factor in the probability of life disaster in a conflagration. In the historic newspaper fire of the *Spring-*

field Union, in which about eight persons lost their lives, most of them perished because they were in such a condition of panic, that no one thought to break the glass in an elevator door which had blown shut and locked, and through which they might have escaped to safety, as others before them had escaped. The safe egress of everybody in a midnight sweeping conflagration might possibly take place and yet hundreds be injured by returning to their quarters at great risk with or without very much reason. The natural instinct to try to save money, papers and various articles, is, many times, responsible for more deaths than the original condition of peril in which the individuals were.

The Chelsea fire began a little before eleven o'clock Sunday morning, and yet nineteen people lost their lives. It is hard to see how a conflagration in Lawrence, especially if it were to occur at night, could have a loss of life less than that which took place in Chelsea; and it might easily be many times greater.

OUR RESPONSIBILITY

Lawrence has never had any very large fire. The collapse of the Pemberton Mill when eighty-seven persons were killed, took place fifty-one years ago, and is not now remembered vividly enough to stir anyone to action. In 1906 the roof of a new rink fell in, just after a large crowd of spectators had left; and out of its dust came the present inadequate building code. In this record, the absence of any great fire has practically nothing to do with the danger from a sweeping conflagration, and the recklessness involved in continuing the present policy in the use of wood at the center. Lawrence is in the position of the small boy who repeatedly goes in swimming just above the dam. The argument that the city has been getting along well enough under present lack of restrictions is no better than the small boy's argument that he has never been drowned yet. Is it probable disaster or possible disaster which causes individuals to carry accident, life or fire insurance? The sum total of our lack of real interest, as individuals, in the welfare of the community in which we live is colossal.

We desperately need to be jeered at in the manner of a recent newspaper editorial.

“ ‘We are greatly shocked,’ volunteers the head of the pulp and paper company whose dam, collapsing, brought death upon Austin, Penn.

“ A proper sentiment and typical. The American people are most convincing in moods of amazement and consternation. They are most themselves when they are ‘greatly shocked,’ which they are pretty frequently.

“ Temperaments of less ardor and more calculation than theirs do not shock so effectively, because they get less exercise. Instead of celebrating calamity, less gifted people merely prevent it. Such a people, for example, would have heeded the first warning given by the Austin dam last year. They would not have permitted a moving picture of the deluge to be staged in a remote Pennsylvania valley.

“ It is left for Americans to know that in many theatres exit doors open inward or are locked during performances, and then to be greatly shocked when 587 persons are burned to death in an Iroquois fire; to know that excursion steamers are often over-loaded, inadequately manned, insufficiently provided with fire-fighting appliances, and then to be greatly shocked when a thousand persons lose their lives in a General Slocum disaster; to know that many factory lofts are unprovided with fire-escapes and factory hands unacquainted with the fire-drill, and then to be greatly shocked when 145 girls are burned or crushed to death in an Asch Building horror.

“ By forestalling disaster the phlegmatic German and the dull-witted Englishman may make life safer in their jurisdictions; but that is dry, routine business that does not appeal to American emotions.”

THE LOSS OF POPULATION AND OF UNINSURED PROPERTY

The loss of population in Chelsea is interesting, as shown in the five-year periods subsequent to 1895. After a gain in 1900 of 8.9 per cent, and in 1905 of 9.4 per cent, the loss in 1910 is 12.9 per cent. There is possible of course only speculation as to how many persons would be forced to leave Lawrence after a sweeping conflagration, but the extent of the risk should be considered. In the central fire district mentioned, there are at least thirty thousand persons who could be rendered homeless by a sweeping conflagration. This would mean a very great loss of population for a long period.

The fire report of the Underwriters says in a summary, "Structural conditions are poor except in the manufacturing district. The congested parts of the tenement district constitute a high conflagration hazard." The report concludes with the recommendations:

"That a complete building code be adopted.

That the fire limits be extended.

That the construction of frame tenements over three stories in height be prohibited.

That incombustible roof coverings be required on all new or repaired buildings."

About \$3,000,000 of the \$12,000,000 loss in Chelsea was not paid back in insurance. Is the amount daily in jeopardy in Lawrence much less than \$10,000,000, and would the uninsured loss be much less than one-quarter of that sum? Can Lawrence afford to continue to add daily to this great risk?

Concerning the city of Chelsea, the authentic insurance report of the conflagration said, "Chelsea openly acknowledged a deplorable condition of affairs, and yet nothing was done to improve it."

What will the record of the business men of Lawrence be?

NUMBER OF HOUSES CLASSIFIED BY HEIGHT IN STORIES

		LOCATION		HEIGHT BY STORIES					
NORTH LAWRENCE		Front or Rear	One	One and one-half	Two	Two and one-half	Three	Four	Five
SEC.									
A	West of R. R. Tracks . . .	F	4	312	232	486	225	18	
		R	1	75	21	30	24	2	
B	R. R. Tracks to Lawrence St. .	F	5	375	156	679	735	110	
		R	4	108	41	66	64	25	
C	Lawrence to Prospect . . .	F	1	266	169	695	392	104	1
		R	1	68	30	46	38	24	
D	East of Prospect St.	F	0	277	149	198	82	0	
		R	0	16	10	6	3	0	
Total Front Houses . . .			5671	10	1230	706	2058	1434	232
Total Rear Houses . . .			703	6	267	102	148	129	51
Total for North Lawrence .			6374	16	1497	808	2206	1563	283

		LOCATION		HEIGHT BY STORIES					
SOUTH LAWRENCE		Front or Rear	One	One and one-half	Two	Two and one-half	Three	Four	Five
SEC.									
E	West of Southern Div. R. R. Tracks	F	1	166	18	159	60	6	
		R	1	31	4	16	1		
F	Southern Div. to Western Div. .	F	2	167	30	112	50		
		R		7	4	1	1		
G	East of Western Div.	F	1	232	146	400	155	4	
		R	2	21	6	10	14		
Total Front Houses . . .			1709	4	565	194	671	265	10
Total Rear Houses . . .			119	3	59	14	27	16	0
Total for South Lawrence			1828	7	624	208	698	281	10
TOTALS FOR THE CITY .		F	14	1795	900	2729	1699	242	1
		R	9	326	116	175	145	51	0
			23	2121	1016	2904	1844	293	1

SUMMARY OF TOTALS

Front Houses	7380
Rear Houses	822
	8202

HUDDLE FEVER

The increase in urban population, everywhere a matter of common knowledge, is especially noteworthy in the cities of Massachusetts. In 1875, only thirty-five years ago, 620 out of every 1000 persons were living in towns and cities of less than 30,000; whereas the census for 1910 shows that now 620 out of every 1000 are living in cities of more than 30,000.

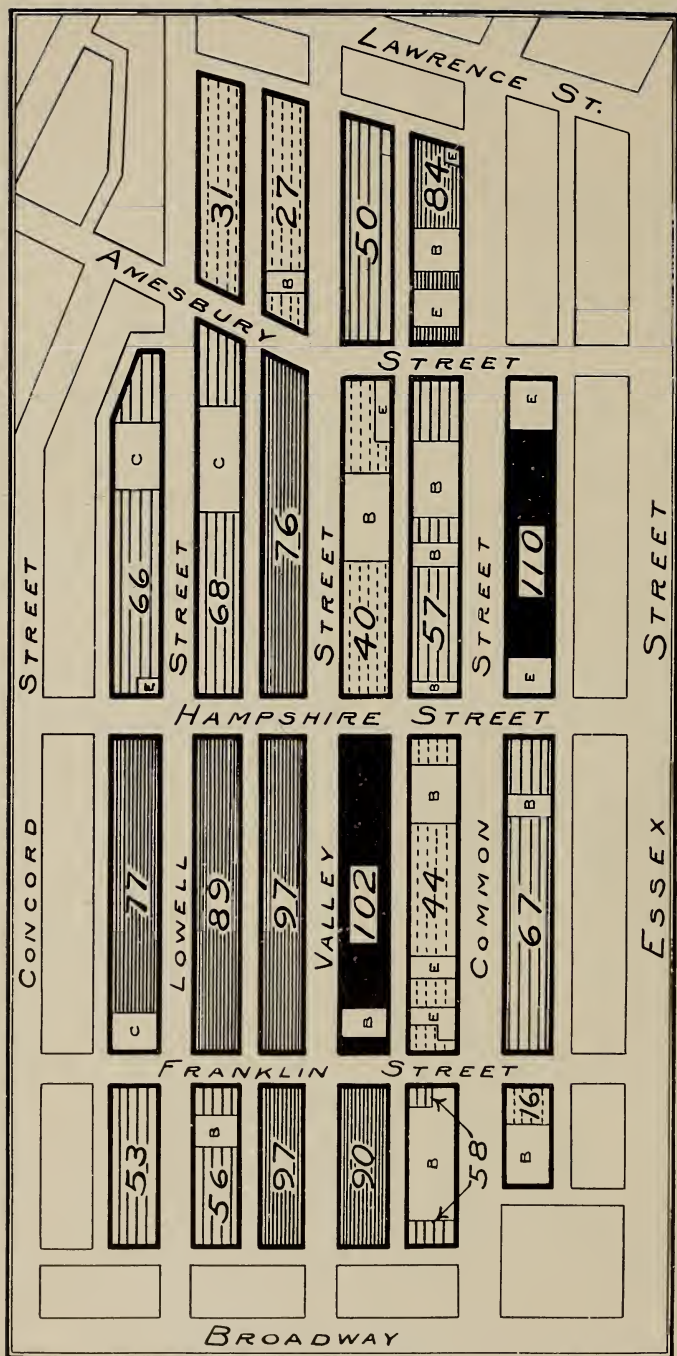
Simultaneously the tendency to crowd people onto land at the center of a city is universally increasing. The never ending seesaw on each lot between new, high sale-price and increased amount of rent goes on steadily, though by jerks, like a cutter across bare ground. The increased amount of rent of course usually comes from a larger number of persons using the land.

The forces impelling the congestion are exceedingly strong and with their results, seen everywhere in the hundreds of families crowded together in the beehives at the centers of the cities, make a condition that must increasingly come to be viewed as abnormal, unnatural, a social disease rightly to be called by some such term as huddle fever.

In many cities in Massachusetts these forces have been placed under almost no legal restriction. In other cities the few restrictions that have been established are pitifully inadequate. Disorder and chaos prevail. The progress toward wretched conditions is rapid and demands immediate restraint. Such measurements and equipment as will produce good living conditions for healthy and contented family life must be set up as legal standards, and it ought to be impossible for any builder to go below them. The need for public intervention is seen to be all the greater when we contrast the interest of builders with the interest of the public. Those who build houses in quantity receive their reward within a few months or years. Their interest is relatively momentary. Yet the living conditions which they create continue in use for 50 to 80 years, and sometimes for more than a century.

THE STUDY OF LAWRENCE BY A HOUSE CENSUS

For an adequate study of the congestion in Lawrence, a special house census was made, and the figures secured are the basis for the following sketches. In the first one, the average number of apartments per acre is given for thirteen special sections of the city. In general these sections comprise the blocks which have the largest number of apartments in a particular locality. The second and third sketches make a study of density by half-blocks for the three sections nearest the center of the city, namely, those which appear in the first sketch with the averages 69, 60 and 49.



AVERAGE NUMBER OF APARTMENTS PER ACRE

IN TWENTY-TWO HALF BLOCKS AT THE CENTER OF THE CITY

Shading shows Four Groups

Less than 50 per Acre,	50 to 75	75 to 100	More than 100
5 half blocks	8	7	2
"	"	"	"
"	"	"	"
"	"	"	"

Unshaded Space Excluded

Its use shown by letter:

B, Business

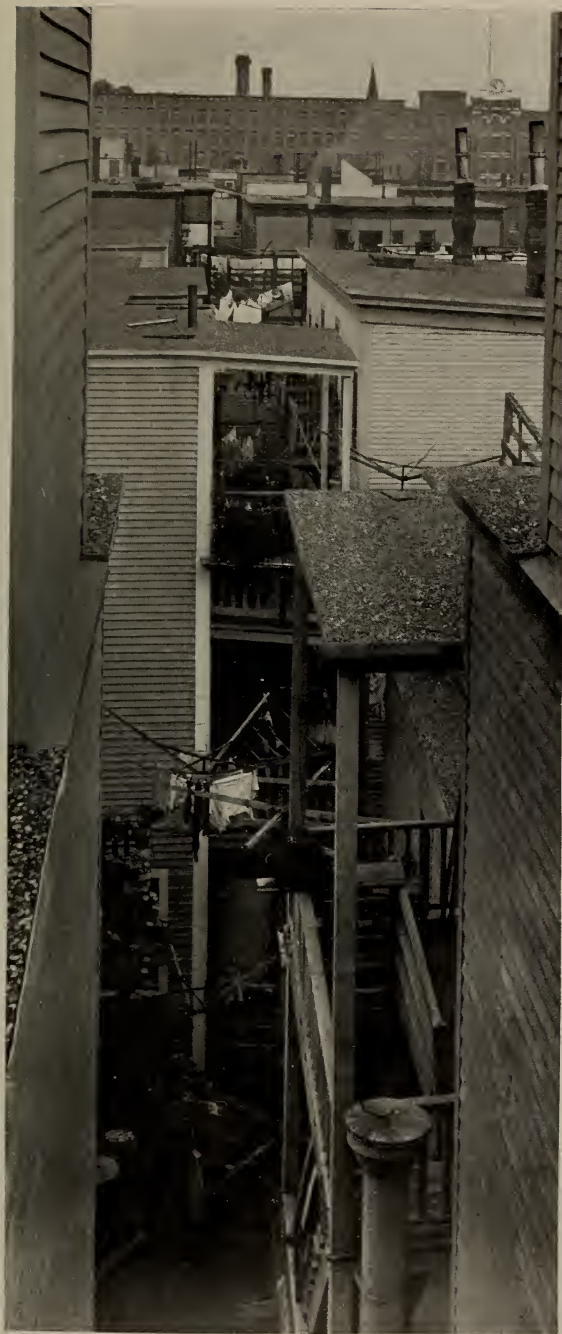
C, City

E, Economic family: hotel, boarding or lodging house

THE INVESTIGATION OF HOUSES



The two districts, A and B, are in a middle zone lying between the center and the outskirts, where several blocks are badly congested but most of the blocks are not. The central district, bounded by the broken line, contains the 300 acres that have been described. The six half-blocks, in solid black, represent the center and its future. In the point of crowding houses together, they are among the worst twelve in the city. They were chosen on that account. It should be noted how they are distributed around the center.



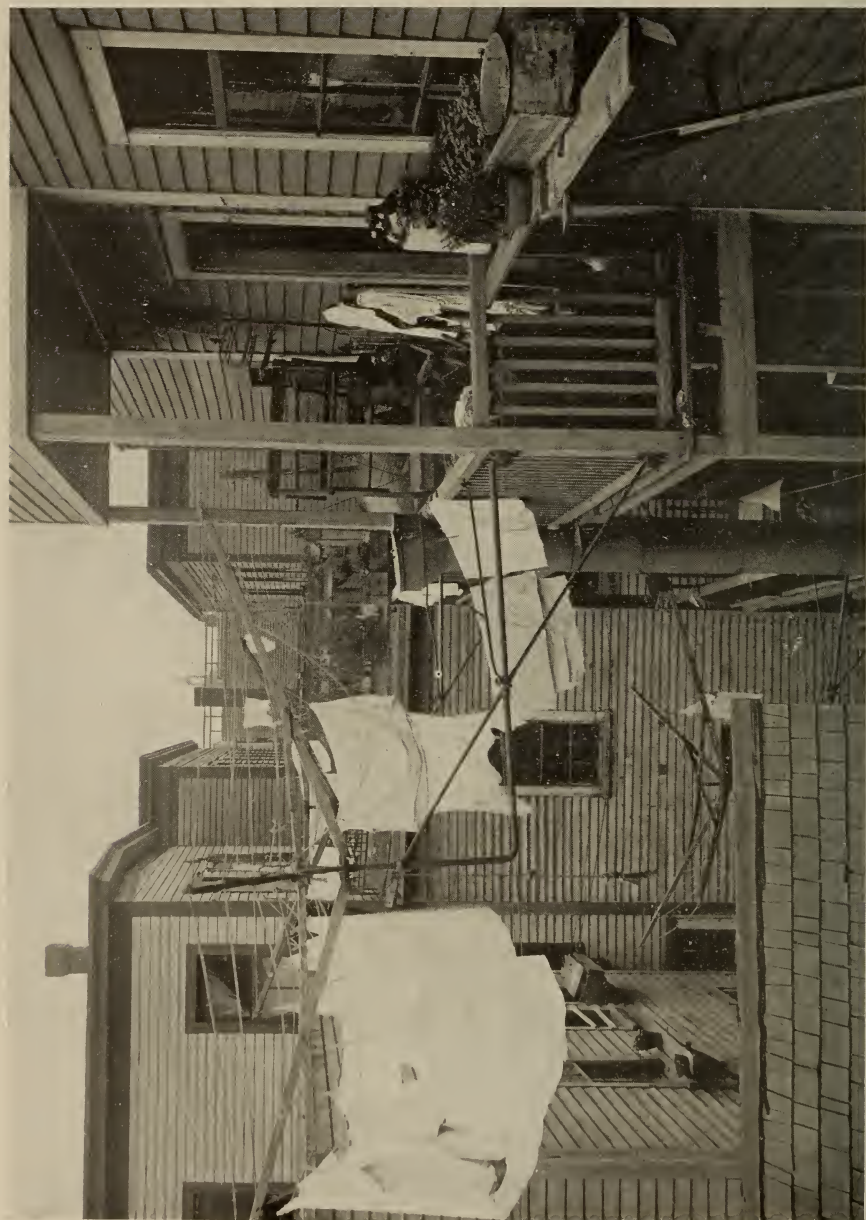
THE COMMON STREET

Two Half-Blocks

They contain the greatest congestion of population in wooden houses on any three acres in the state of Massachusetts. No three acres exceed these except at the infamous center of Boston where the houses are nearly all brick.

In the rear houses, those at the right in this picture, the best light comes from an alley fourteen feet wide.

LOOKING EAST INTO THE CENTER OF ONE HALF-BLOCK



LOOKING WEST INTO THE CENTER OF THE OTHER HALF-BLOCK



THE ALLEY SIDE OF THE HALF-BLOCK WEST OF NEWBURY STREET

These two half-blocks located on the south side of Common Street east from Jackson Street contain 3.2 acres with one-half the surrounding street space included. An adequate idea of the narrow spaces, dark rooms and other conditions can be secured only by seeing them. But from the foregoing pictures it is possible to judge partially, especially if one imagines himself standing in among the houses. The open spaces shown in the first two pictures are those between front and rear houses at the center of the lots. The slits in the picture above is all the space there is at the sides of the houses.

The houses are so close in these half-blocks that it is said to have been the practice of one agent to collect rents at the third and fourth stories by reaching out into the apartments on the same

floors of the next house. Thus he saved himself trips above the second floor. One instance occurs where, by reaching out the kitchen window, four or five kitchen utensils are regularly hung on nails which have been driven in the side wall of the neighbor's house. As a matter of fact two or three houses occupy so fully the lots on which they stand that there is not room to place a garbage can on the same lot with the house.

These buildings are exclusively used for dwelling with the exception that the majority of the front houses have stores on the first floor, and as indicated in the sketch which follows there is a small group of one-story stores and a small shop. Except two brick houses and one concrete house all the houses are of wood.

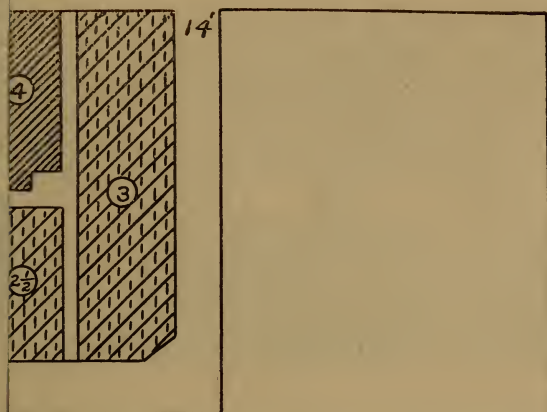
THE AMOUNT OF LAND OCCUPIED BY HOUSES

At the east end of Common street the overcrowding is duplex,—houses on land and persons in apartments. The latter form is described elsewhere. In the other four half-blocks the densities of population in 1911 were due chiefly to the number of houses on the land, and these half-blocks represent more of the center blocks than do the two on Common street.

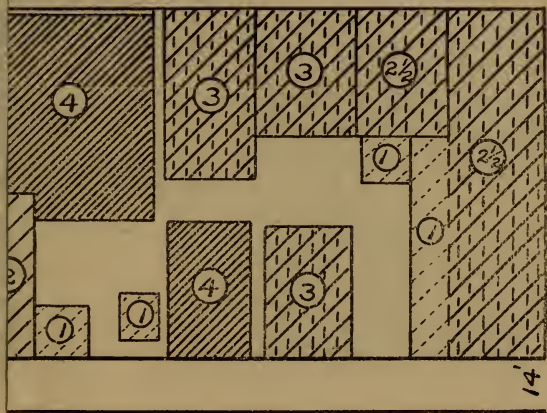
In ascertaining in the six half-blocks examined what proportion of a lot is occupied by a house or houses, the computations that were made used the dimensions of the house at the second floor. Thus the areas of the houses do not include one-story buildings or extensions. A house that is not on a corner lot ought not to occupy as much as 70 per cent of its lot. The following are the facts as they exist in the interior lots of the six half-blocks examined. The amount of land occupied is:

less than 70 per cent	in 22 lots
70 to 75 per cent	" 7 "
75 to 80 " "	" 15 "
80 to 90 " "	" 10 "
more than 90 per cent	" 2 "

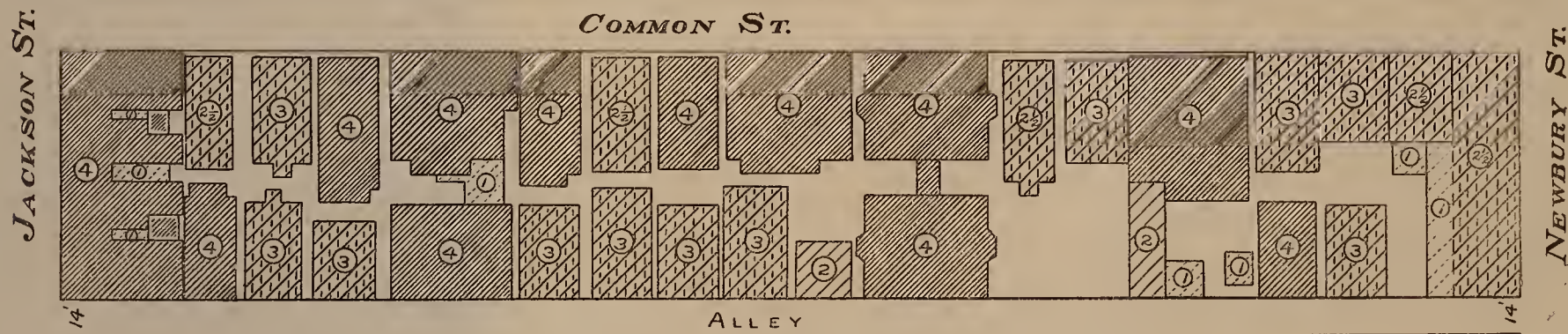
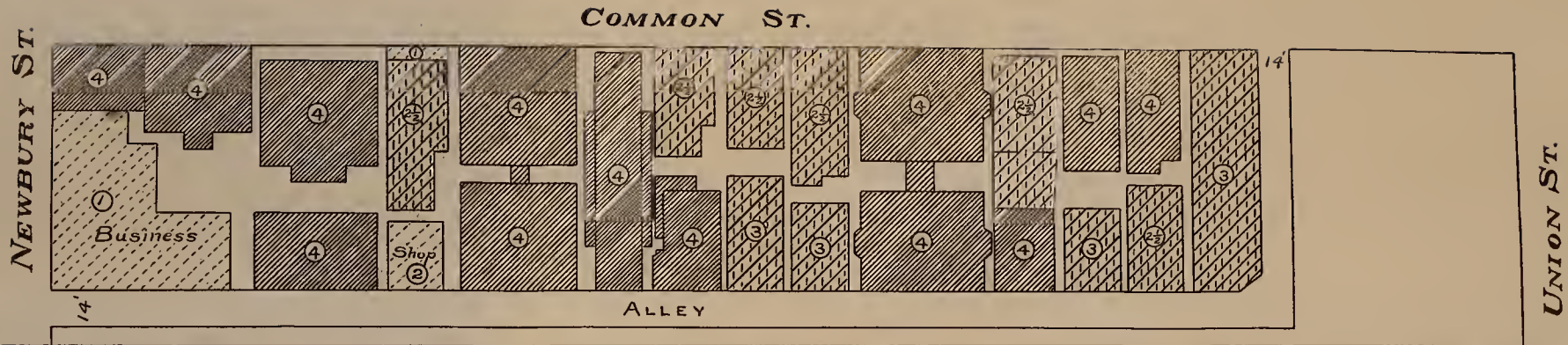
Thirteen of the twenty-two where less than 70 per cent is occupied are on Oak and Oxford streets. In the four half-blocks on Valley and Common streets, among the thirty-seven interior lots only nine have less than 70 per cent. This is extreme congestion.



UNION ST.

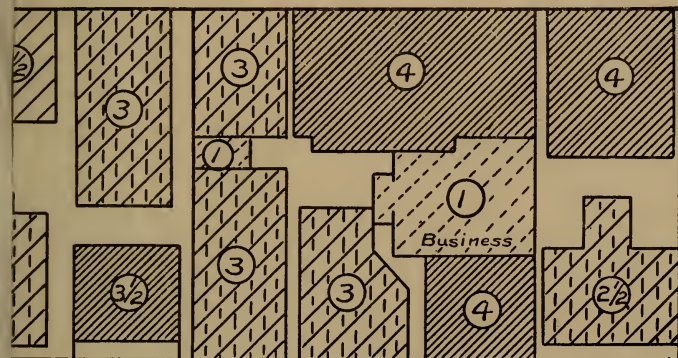


NEWBURY ST.



THE AMOUNT OF GROUND OCCUPIED BY HOUSES
AT THE EAST END OF COMMON STREET
IN TWO HALF-BLOCKS ON THE SOUTH SIDE OF THE STREET

The number in the circle shows the number of stories in the houses. The ground unoccupied
by houses is the white space between the sketches.

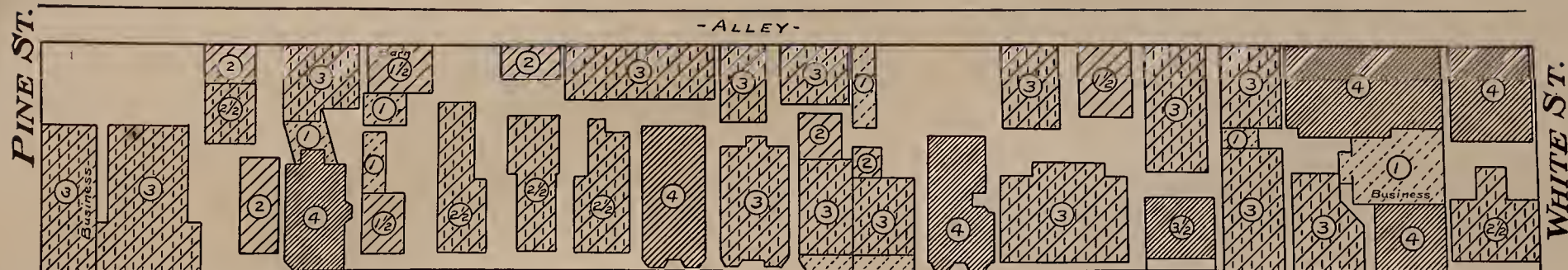


WHITE ST.



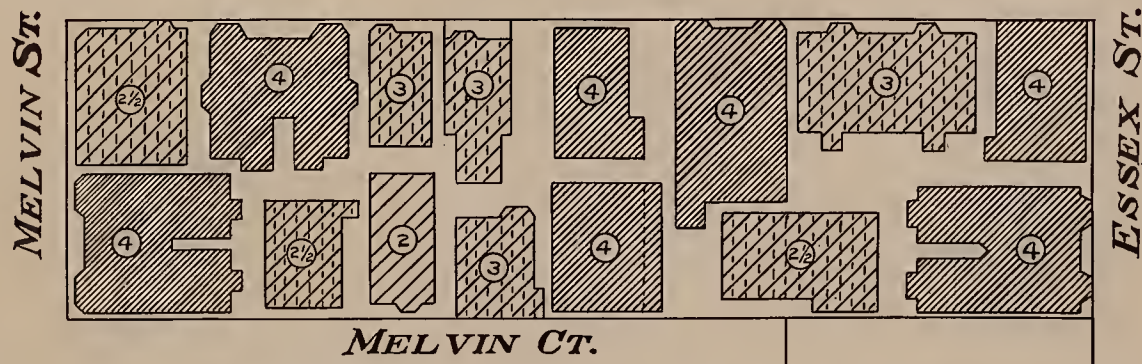
ESSEX ST.

In
reet,



OAK STREET

OXFORD STREET



The amount of ground occupied by houses in the Oak and Oxford street half-blocks. In the former large new houses are steadily being built. Several of the blocks in Oxford Street, though west of the railroad, will soon be as congested as any locality in the central district.

1892



1892





THE SOUTH SIDE OF VALLEY STREET WEST OF HAMPSHIRE STREET

THE DENSITY OF POPULATION IN THE SIX HALF-BLOCKS

With the following figures concerning the number of persons living in the six half-blocks, there is a second column which gives an estimate of the probable density at times when there is regular employment, for in the spring of 1911 the number of vacant tenements was unusually large.

The number of persons per acre:

	Actual Density	Estimated Density
1. Common Street S. side E. fr. Newbury	556	603
2. Common Street S. side W. fr. Newbury	439	462
3. Valley Street S. side E. fr. Franklin	327	348.
4. Valley Street S. side W. fr. Franklin	322	342
5. Oak Street N. side W. fr. White	287	303
6. Oxford Street W. side N. fr. Essex	243	266

All Lawrence citizens who go to New York by rail pass in front of thirty blocks situated along Park Avenue from 125th Street Station to the entrance of the tunnel at 110th Street. Among the houses seen the five and six story predominate. They appear oppressively high and close together, and the streets are crowded. It would seem scarcely possible that any congestion in Lawrence would be comparable with the congestion in those blocks. Yet according to the 1910 Census there are only three of those thirty blocks which have a density of population greater than 600, and only seven others greater than 462.

SEMI-DARKNESS

The rooms which are lighted from other spaces than the side courts are described elsewhere. The following is the statement for the spaces at the side of the houses, and it has to do solely with rooms for which the chief source of light is a window with the location described.

Window	No. of rooms
On the lot line	58
Less than 1 foot from lot line	70
1 to 2 feet from lot line	163
2 to 2.7 feet from lot line	145
2.7 to 4 feet from lot line	131



Spaces between front and rear houses in the Oak Street Half-Block; the densest north of the Common.

LAWRENCE SURVEY

SUMMARY OF RATES OF RENT PER ROOM PER WEEK

Rates in Cents	Common St.		Valley St.		Oak St.		Oxford St.	
	No. of Apts.	Per Cent	No. of Apts.	Per Cent	No. of Apts.	Per Cent	No. of Apts.	Per Cent
Less than 40	2	.01	5	.036	14	.152	6	.10
40-50	5	.025	22	.159	19	.203	7	.117
50-60	30	.149	85	.616	28	.304	19	.316
60-70	40	.189	23	.167	26	.283	24	.4
70-80	46	.228	3	.021	0		1	.016
80-90	35	.174	0		4	.043	0	
90-95	43	.214	0		1	.011	3	.05
	<hr/> 201		<hr/> 138		<hr/> 92		<hr/> 60	

On Common Street 61 per cent have rates greater than 70 cents.

On the other streets 92 to 98 per cent have rates less than 70 cents.

PERCENTAGE OF LOTS OCCUPIED BY THE HOUSE OR HOUSES ON INTERIOR LOTS IN SIX HALF BLOCKS

	Number of Lots	Less than 70 per cent	Per cent 70 to 75	Per cent 75 to 80	Per cent 80 to 90	Per cent 90 to 100
Common St. (south side)						
East from Newbury (C11K)	12	1	1	4	4	2
West " " (C12K)	13	3	0	6	4	0
Valley St. (south side)						
East from Franklin (B16K)	8	2	3	3	0	0
West " " (B17K)	4	3	0	0	1	0
Oak St. (North Side)						
West from White (B43L)	13	10	1	2	0	0
Oxford St. (West Side)						
North from Essex (A52M)	6	3	2	0	1	0
	<hr/> 56	<hr/> 22	<hr/> 7	<hr/> 15	<hr/> 10	<hr/> 2

Among the fifty-eight rooms lighted from a window on the lot line, thirty-five are in rear houses, and in such houses the best light in any room is from an alley.

All of the facts about the open spaces show the variant, irrational and low standards which have prevailed. They spell a gloomy future for the working people in Lawrence; for a proper amount of light is a prime requisite in any apartment that is worthy of the name home. But it is no mere prospect that is confronting them. The hardship of living in gloomy and dingy homes is already theirs; for one of the most noticeable results of house crowding in the center of Lawrence is the excessively large number of dimly lighted rooms.

The typical light condition in these apartments may be described as follows. Eighty-three per cent of the apartments have either four or five rooms, and in most of them the kitchen, which is unusually large, is located in the center of the floor space. In the apartments of the front house, one or two rooms are well lighted from the street; the kitchen receives but little light; and the two rooms at the rear are almost as poorly lighted because of the lack of space between front and rear houses. This is just as true of the front rooms in the rear houses, because they have the same source of light. The kitchens in the rear houses are also entirely inadequately lighted. Many of the rooms which open upon the alley are not well lighted, although in others the amount of light is fair at present, because there is not yet a high building on the rear of the lots across the alley.

The rooms which were examined in the matter of light are grouped below according to the location of the window which is the chief source of light for each room.

Source of light	Number of rooms
Street	497
Alley	386
Yard	574
Side court	720
Outer court	85

In giving to each room that was visited a grade according to the amount of light in it, a definite meaning was assigned to

each grade and that method is the basis for the following summary. There are 342 rooms in which it is not possible to read except within a foot or two of the window. There are 561 other rooms where it is difficult to read on the side of the room opposite the window and where also protracted eye work in any part of the room is dangerous for the majority of persons. There is a satisfactory amount of light in only about fifty-nine per cent of the rooms. There are 31 apartments in which no room has a satisfactory amount of light.

What these dim tenements mean to their occupants is partly shown by two casual comments made by women at work in kitchens. One woman looking up from the peculiar, double-ended wash tub which the Italians use remarked, "Don't know what I am doing. Can't see much." Another mother whose little child was walking around against her wish commented, "Windows no good. Baby won't stay here in the kitchen near the fire."

It is doubtful whether architects and builders have sufficiently considered the financial disadvantage there is in dimly lighted tenements. There is a constant loss of income in the worst houses in Lawrence. In the two half-blocks at the east end of Common street, in a total number of thirty vacant apartments, twenty-two were located on the first and second floors where the light is the least. It is evident that, when tenements are not in great demand, the dimly lighted quarters on the lower floors are abandoned. Smaller tenements with better light would yield an equal or a larger income than do these dimly lighted houses.

Nearly all factories now being constructed are given a great abundance of light, in the belief that any lack of light results in a reduction of the quality or quantity of the work in them. The same standard for the homes of the workers ought to be considered commercially advantageous,—not to the builders, as such, but as a matter of general public policy. The efficiency of workers is constantly being reduced by the impaired vision and permanent injury to their eyesight that is one of the results of their living in darkened houses.

The newspapers have at various times in the past urged that the industries of the city should be diversified, and that one of the

natural developments would be to secure the incoming of clothing factories. The products of the woolen and worsted mills are now transported to New York and Rochester, and there made into clothing. The question raised is, why the products of the woolen and worsted mills should not be used in Lawrence? If Lawrence were to have clothing factories, with the usual accompaniment of sweat shops in tenements, the present houses are so wretchedly lighted, that the resulting conditions would need another Dante to describe them properly.

FROM DARKNESS TO DEATH

There are numerous kitchens and other rooms which have a most generous supply of glazed area in the windows, and yet artificial light is absolutely necessary, whenever any work is being done. In some of these rooms lamps are kept burning constantly. The majority of the rooms located at the centers of the buildings require artificial light when the sky is fully clouded. This means inconvenience, loss of time, and expense. It also means suffering and danger from disease. We need again and again to consider seriously the chain of the D's, in order to feel that they do lie bound together in a *CHAIN: Darkness and dampness and dirt; dirt and discomfort and disease; death*. The following is one of the memorandums made on an inspection card. "Mother coughs and looks tubercular; just back from hospital; there three months after child-birth. Kitchen dirty and black dark; lamp burning on stove at midday, March 4th. Same March 15th." This is a new house, less than three years old, and the kitchen has abundant window area.

In the most recent report of the state inspectors of health of Massachusetts the comment is made concerning cases of tuberculosis in two mill cities: "Many tenements were found from which cases of tuberculosis were frequently reported." Concerning a certain tenement quarter in another city the report says: "In looking over a list of deaths from tuberculosis, and the residence of the patients, it was discovered that a large number of persons were found to have died at the same street number, some of the same family name, showing by the dates that one had

taken the disease from another. Many were found at the same number with different names, thus giving rise to the question whether the persons may have contracted the disease from the bacilli left in the house by former patients." Tuberculosis is already costing Lawrence dearly, and a toll of about 150 lives yearly. Thousands of dollars are being spent in Massachusetts for the cure of this dread disease. Wise business policy for a successful city, and the public's need for conditions that produce health, not that destroy it, demand that we place an awakened and intelligent valuation on these dimly lighted tenements. It ought no longer to be possible to build them.

WINDOWLESS ROOMS

There were fifty-nine rooms examined which have no windows to the outside air.

In the six half-blocks, there are four rooms which have no windows whatever, eight rooms with transoms only and 21 other rooms which have no windows to the outside air, but intercommunicating windows to rooms or halls. Among these 33 rooms, 25 were used as bed-rooms, four as kitchens, and four as store rooms. In the two districts, there were examined seven rooms without any windows whatever; and nineteen rooms with no window to the outside air, but small windows communicating to halls or rooms. Many of the interior windows are immovable.

When windowless rooms are used as bed-rooms the kind of use they commonly receive may be illustrated by the description of one of them. In it there slept regularly a father, mother and a three year old girl in a three-quarter bed, and two boys in a crib. Two weeks previous to the visit an eight months old baby had died. The mother was still grieving over the loss, and with apparent unconsciousness of the inconsistency in her ideas, stated that the baby had always slept in the same room with the rest, that from birth he had been the strongest of her babies, and she wondered why he had died.

If fifty-nine windowless rooms were seen in this examination, Lawrence must have a good many more than that. When the intelligent citizens have seriously considered how these rooms are

usually used and what culture bins they can become, pushing on through the years and piling up ill-health and death, suffering and expense to thousands, and great expense to the city, they will not submit to the continuance of building regulations that permit the construction of such houses.

SANITARY EQUIPMENT

The following are the facts concerning the sanitary equipment and arrangements as found in the six half-blocks. There is in every apartment a sink and a supply of city water. In five or six apartments on upper floors tenants complained that they could not secure water when it was being drawn on the floor below,—due probably to pressure reduced within the house by old or small pipes. The general condition in this respect is one in which the city may well take much pride. The fact that all the houses are connected with sewers is good reason for further satisfaction. There are very many cities in the country that are not to be compared at all with the New England cities in these two particulars, water supply and sewers, and among the New England cities Lawrence is at the front.

Judging by the six half-blocks, the bath-tubs and wash-tubs at the center of the city are few. In the Common, Valley and Oak Street half-blocks one apartment in nineteen has a bath-tub. In the Common Street half-blocks there are fourteen, nearly all at the west end; in Valley Street, nine, and in Oak Street, four. In the Oxford Street half-block one apartment in two has a tub; twenty-six of them being old pattern tin tubs encased. A considerable number of all the tubs have only one faucet, and a number of those that have two faucets and that are new are not connected with hot water, because the tenants say they cannot afford it. One apartment in fourteen has a wash-tub. They are distributed as the bath-tubs, except that the Oxford Street half-block has fourteen.

All the houses have water closets inside the house; and twelve out of thirteen of these closets are located within the apartment. All closets not located within the apartment are in public halls adjoining the apartment, there being no basement or cellar closets

in these six half-blocks. Among 132 houses, there are only four where two families are using one closet. This is a remarkably good showing. There are probably few cities where the houses are better equipped in the number of water closets.

It is much to be regretted that the amount of light in the water closets is not greater. Nine per cent of the closets are supplied with artificial light at night. Four per cent more have sash doors, which admit some secondary light at night. In eight per cent, there is practically no daylight whatever. In eighteen per cent more, it is not possible to see such obstacles as pails. In twenty per cent more, it is impossible to see whether the floor is clean or dirty. Altogether forty-six per cent have insufficient daylight.

Many of the old closets are encased in wood, and the conditions behind the casings are not right. In a considerable number which were malodorous, the very apparent source was not accessible.

The houses which have ash chutes number on the average one in four.

Among 23 yards which are regularly used as passage-ways, eight are not paved. Among 34 side courts similarly used, there is no pavement in 11.

CONDITIONS WITHIN THE APARTMENTS

In grading occupied rooms according to the condition of cleanliness, it was noted that there are a smaller number of very clean apartments in Common Street than in the other half-blocks. So far as very dirty rooms are concerned, the six half-blocks do not differ from each other materially. The figures show that they all have relatively about the same number. About seven per cent of all apartments seriously needed much cleaning, and five other apartments were in wretchedly filthy condition.

There is wide contrast in the facts that cause these dirty tenements. In some where there are several boarders and children, the women work hard and still are always in dirt. In others the women seem to let dirt accumulate in order to be able to clean it up at their



This water-closet is so constantly wet that cement is used to keep the water from passing under the matched board partition across the kitchen floor. The floors and bases of most water-closets ought at least to be kept well painted. Many ought to have a floor of some other material than wood.

special cleaning seasons. A few of the families are poor creatures, dependent and on the verge of degeneracy.

The largest number of water closets with wet floors and the greatest amount of dirt on the floors occurs in the half-blocks at the east end of Common Street. Among 128 water closets where there was a considerable amount of water on the floor, 91 are located in those half-blocks. This is thirty-eight per cent of all the closets there. Many of them had old wet, rags and paper; some were so foul smelling as to be nauseating; and dogs were kept in two. In the other four half-blocks thirteen per cent were wet and dirty.

OVERCROWDED COMMUNAL APARTMENTS

The great density of population in the two half-blocks at the east end of Common street is due to the over-crowding of apartments as well as to the crowding of houses upon the land. The

prevailing arrangement of four bedrooms around the kitchen not only furnishes economy in fuel expense, because all bedrooms can be heated from the kitchen, but also makes easy the use of the apartment by several families. In these two half-blocks, in three of every five tenements, there were more than one family; in one tenement of every five, there were more than two families. Six apartments of five rooms each had fourteen persons each; and in one apartment of five rooms there were eighteen. Fifteen apartments had three or more families and also an average of three or more persons per room, excluding the kitchen. Seventy-three per cent of the population of these two half-blocks were living in 117 apartments where the average number of persons per room excluding the kitchen is more than two. This proportion in the other half-blocks is, in Valley street 40 per cent, in Oak street 37 per cent, in Oxford street 0 per cent. In 120 apartments where there were more than one family, there were 1,152 persons, 202 of them unmarried boarders. The foregoing figures were taken at a season when the mills were running on part time. Nearly all of those who live in these two half-blocks are mill workers.

The manner of living at the east end of Common street differs materially from that in the houses of the other half-blocks. Many of the bed-rooms are kept locked, the key being carried away by the occupants. The money paid to the family who rents the tenement is rent only and does not include board. Sunday and holiday meals are cooked and eaten separately. Usually the woman who rents the apartment cooks one meal a day for the others, but the food for this meal is furnished separately by the couples or families and is usually eaten separately. The other meals are purchased, prepared, and eaten separately. Such small stock of food as is carried from one meal to another is frequently kept in the bed-room. That the dirtiest water closets seen in Lawrence were in these apartments, is probably due to the fact that it is felt by all occupants, that the water closet is a community convenience and that no one person, not even the one who rents the tenement, is wholly responsible for its condition.

It is said to be the practice with some landlords in these two half-blocks, when the work is plentiful and the tenements are

crowded, to make the amount of rent collected depend upon the number of persons accommodated in the apartment.

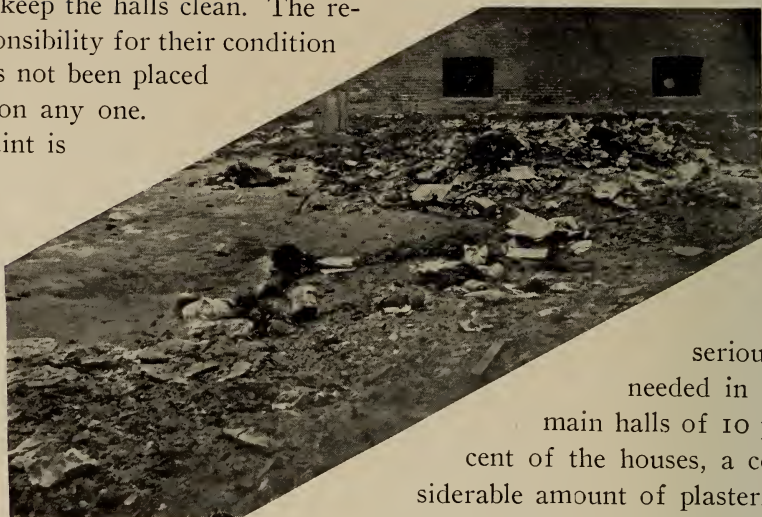
Among other serious disadvantages in these communal apartments, two may be mentioned: the absence of reasonable privacy, since all the bedrooms are heated from the kitchen, and the universal absence of bath-tubs. Such lack is bad enough in any apartment; but, where the tenement is used by three or four families and there is no heat in the bed-rooms, the confusion and inconveniences make bathing most difficult.

One of the worst conditions that is found in large cities is the makeshift tenement which is made by cutting off space at the rear end of the store with dwarf partitions, curtains, etc. The combination of dark rooms, no ventilation, food for sale, and frequently dirt and children, together with flies in season, makes a most deplorable condition. Two such quarters were found in February at the east end of Common street. Each store, and, in one of them, two children, were in the care of a man who stated that he could not get work but his wife could. Lawrence would be in a wretched state, if the city officials could complacently allow such overcrowding. Evidently this is realized; for, less than two months later, these stores had been vacated and most of the partitions removed. It is to be hoped that, with a rejuvenated city government, other investigations will not be necessary to keep such conditions permanently out of Lawrence.

DEFECTIVE MAINTENANCE

The conditions of cleanliness and repair in public halls were marked with gradations that had definite meaning. This scoring makes possible the following statement. Twenty-seven per cent of the houses had main halls and stairs which were excessively dirty. Rubbish, ashes, garbage and litter were found in them, and in most of them black dirt gummed down indicated that the floor had not been washed for many months. The dirtiest of the halls and the largest number of them are in the houses at the east end of Common street. In several of these houses the landlords themselves are living, but into certain others the present landlord has perhaps never entered. Apparently there is almost no attempt

to keep the halls clean. The responsibility for their condition has not been placed upon any one. Paint is



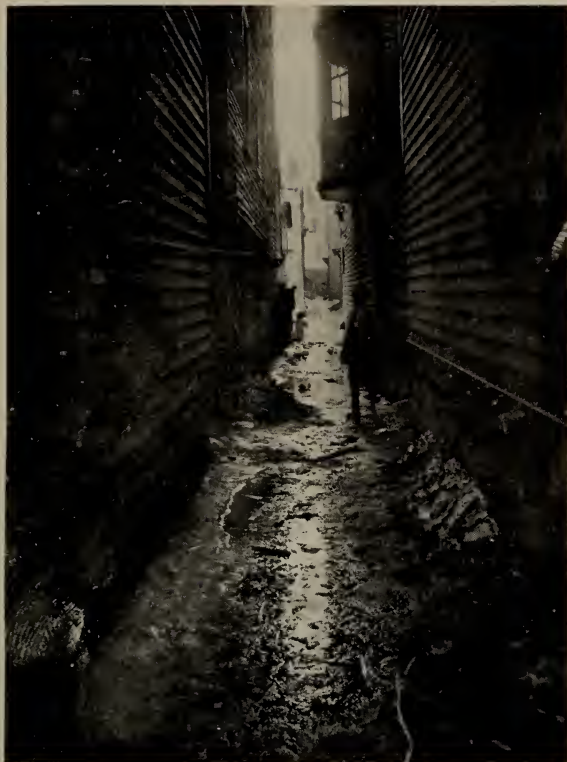
seriously
needed in the
main halls of 10 per
cent of the houses, a con-
siderable amount of plastering
in 25 per cent, and whitewashing

in 66 per cent.

Scoring for the walls of rooms, made conservatively, shows that the walls in 13 per cent of the rooms are in need of repair. The largest proportion of such rooms are in a Valley street half-block and the smallest proportion in the Oxford street.

The cellar floors were wet in thirteen houses. The roofs were in bad repair in five. More than half the pitch roofs and a few of the flat roofs have seriously broken eaves and leaders, or none. This is the more serious, because of the lack of pavement in the yards and side courts and because so many of these spaces are used as passageways. Some of the courts and yards have pavement in bad repair. At the time of steady rain many pavements hold puddles to be crossed, or are so graded that they throw small brooks across the street walks for pedestrians to wade through; for almost none are sewer connected.

Two defects in water closet plumbing were the most common. There is frequently a leak at the bottom of the flush-box where the flush-pipe joins it. This usually results in a steady dribble of water down the outside of the flush-pipe onto the floor. The galvanized two-inch pipe that ventilates the water closet bowl is rusted out in many closets at the point where it joins the bowl.



This is the passageway to the street from eight apartments in one rear house and three in another. Pavement is dished and not connected with the sewer. It is impossible to use without wetting the feet,— as the mother and child are doing.



The steps are front entrance of the eight-family rear house. At its corner in the upper picture a boy is standing.



In some bowls this gives at times a quantity of water as overflow out of the bowl. In several closets this pipe is completely dislocated and the value of the vent destroyed.

In a total number of 70 lots, the surfaces of 56 had a considerable amount of ashes, rubbish and garbage, and 16 had an excessively large amount. There was an entire lack of receptacles in some yards. In others where the supply is adequate, the receptacles are either not used or are used very carelessly. The photographs tell the story better than figures or words; though even they do not tell the whole story, as any one knows who has tried to get a photograph of rubbish that appears as bad as the condition. Only a few ash chutes were noted as clogged or in very bad repair; though a considerable number were seen which were not emptying squarely into the receptacle under them, or had no receptacle.

To give a better knowledge of the conditions than figures can give, by a cursory review of the inspection cards, the following hit-or-miss transcript was made from the notes on the back of some of the cards. Nothing can give the impression that would be made by a visit to the premises.

—Bottom of air shaft loaded with rags, papers, cans and swill. Cellar entrance loaded with rubbish.

—Odors from cellars and garbage cans are very strong at the rear of these rooms; two bedrooms.

—Cellar compartments loaded with rubbish, old rags, mattress, excelsior, cans, two spots of human filth, dead cat. Under stairs about a barrel of excelsior.

—Sink: side gone, door off, trap leaks; has been repaired with putty and rag. In bad condition for a year. "Owner tried to fix it about three weeks ago but he has not been to it since. I've told him about the casing many times."

—Water warped floor boards at sink make trip for feet; broken drain board; waste pipe at trap wrapped with grease-soaked rag.

—Two holes in bottom of sink stopped by rags.

—Waste pipe tied with large rag. "Leaked before, not now." In water closet leak from above through ceiling. Tenant says condition is chronic, and that the water drops on the seat. Discolored spot, wet, confirms the statement.

—All paint at sink and cupboard scrubbed off. Tenant here six years. No painting in that time.

—Tenant here ten years. Two rooms white-washed in that time.

—Here eight years. Front room done over two years ago, paper not paint.

—Both front and rear halls in very dirty condition. Two tenants say they have not been done over in ten years. Good-sized holes in plaster in rear hall and places lacking paper in front.

—Water closet floor badly wet with dirty water as from soil-pipe. Tenant says the leak has been here five months. Source not discernible. Hole in kitchen ceiling over stove, about four feet by two feet. This tenant lived five years at the west end of the building. No painting there in that time.

—Two holes in second floor hall patched by nailing pieces of boxes onto them.

—Here thirteen years. "He clean one time."

—Sink doors in all these apartments (3) off hinges.

—Entrance sash door (front) permanently boarded: stairs with winders made very dark.

— Here more than twenty years. "Painted kitchen once. So long back I can't remember. More than fifteen years." In apartment on same floor: here eleven years. "Front room and kitchen done two years after we came. No painting." Three owners in twenty years. Present landlord has owned the house seven years.

— Hole in entrance hall at threshold of front door.

— Door from hall into tenement (only entrance), upper hinge severed. "Told the agent three weeks ago."

— Floors in hall very thin and full of humps. Stairs same. Nosing on four treads all gone.

— Nosing gone on winder (triangular tread). Girl fell on the stair last week.

— Leak at sink strainer follows waste pipe to water closet floor around the bowl which is encased. Floor inside case soaked and with filth: not accessible. Water follows soil-pipe into cellar and keeps a section of soft ground wet. Sink waste pipe is not trapped, goes into cellar, thence into soil-pipe direct. Vent pipe from water closet trap is open into the compartment, due to the fact that a sink formerly on the opposite side of the partition was served by the same vent pipe, and when removed the tee was not closed.

A house owned by an elderly woman who is a life-tenant only, was in particularly bad repair. The following are the facts about the first floor tenement at the rear. The ash chute from the two floors above emptied directly, without box, onto the porch floor which is the only approach to the apartment. No barrels have been provided for several months, and the occupant of the tenement was forced to keep the ashes and garbage swept into a pile under the ash chute to avoid the necessity of climbing over them. In the room which was used as a sitting-room, the paper on the ceiling hung down in long strips. It had been in this condition for three weeks. The tenant stated that he had been there five years, and that no repairs had taken place during that time, although he had asked for them. He had hesitated to move because with eight children he had found it difficult to find a tenement. In a bedroom off the kitchen such dim light as could have entered the room was entirely shut out by a blind. When the tenant was asked why the blind was kept closed, he pointed to the fact that a pane of glass was gone, with the statement, "The landlord said if we wanted it fixed, we would have to do it ourselves. But I'm not going to. It is not right. It fell out for lack of putty. None of us did anything to it."

The supply of water in nine water closets was cut off by frozen pipes. Most of these were in houses owned by one man, and all the tenants in those apartments claimed that the condition



The boys are in the front and only entrance to a six-family rear house. The brace in the upper left corner is at the steps of the front entrance of a three-family rear house.

was usual in cold weather. In three hall closets in two houses, lanterns were kept constantly burning to keep the closets from freezing. In another house where there are six hall closets, the water was turned off in the cellar, and a tenant who had been there several years stated that in very cold weather the landlord habitually kept the water turned off except during the hours six to nine in the evening, with the idea that so many were out of the house during the day. Mothers and children were found in three apartments, and at the noon hour several others were seen. The house was visited three times in two weeks and at these times the odor from unflushed closets was sickening.

About ten apartments on Common street were found vacant and unlocked. The public had free access at all times. The closets had been used many times and could not be flushed. Many of the floors had been used in place of the water closet. Six other similar apartments were noted in one of the half-blocks on the opposite side of the street. There three halls were also in the same filthy condi-

tion. During the summer the windows of these apartments were open, and the odor from them was obnoxious. Flies abounded, and the open doors and windows of grocery and meat stores are close at hand. Apparently these conditions are constantly to be found in these particular houses, for they existed through the spring and summer.

Almost no halls are lighted at night in the Common and Valley street half-blocks. Most of the houses in these blocks are not provided with gas in the public halls. In some where the house is piped for gas, there are no fixtures in the halls, and in others where the fixtures exist, either there is no supply of gas or no regular arrangement for lighting it. An examination of the halls in the two blocks at the east end of Common street made between eight and nine o'clock on three different nights, two of them Saturday, found less than ten halls with lights in them. Similar examination in two blocks on Valley street disclosed only four halls which were lighted. One yard in the Common street half-blocks and four yards in the Valley street are the only instances where the space between front and rear buildings was found lighted at night.

THE COMMON NEED FOR BETTER HOMES

A chief of a fire department recently described the manner of gathering certain figures as a "triangular dispensation." The phrase well summarizes our city life in the tenement districts. We are under a triangular dispensation, the neglect, ignorance and low ideals of the owners, tenants and the city officials. It is waste of time to debate with anyone which of the three groups has been chiefly at fault in the past. But it is quite worth while to consider methods for meeting in the future the need for better homes.

The idea which many have that the owner of a house is the one who should be considered responsible is natural, justifiable, and necessary. The clearing of the walks promptly in winter is a typical responsibility. It can be borne by no one so well as by the owner. No one else has control of the spaces which are used in common in and around the houses. The halls and stairways should be always clean, in good repair and well lighted; the open spaces clean, well-drained and, if used as a passageway, lighted at night.

This means for the owner constant expense in money and time, and much anxiety. It can seem an unreasonable burden only to those who have been regarding their ownership as purely a matter of investment, who regard rent as identical with interest. Monthly, weekly and almost daily expenditures for maintenance,—cleaning, lighting, repairing and watch-care,—will come to be common practice; for the care of the public places such as hallways, yards and walks is inherently part of the business of owning a tenement house. There are in Lawrence a considerable number of landlords who seem to regard the ownership of these houses as they would regard the conduct of a store. They give their time and attention to the details involved in the business. In these rapidly growing cities the idea will prevail with increasing speed, that it is not good public policy to allow tenement house owners to ignore their manifest duty in this particular, or to pass the responsibility to the tenants, or to say that the habits of the tenants are beyond the owner's ability to control. A janitor is needed in the largest houses and a caretaker in the smaller ones. In every house there ought to be a definite financial arrangement with a tenant or another person for the lighting of the halls and the care of all the public places. Whatever arrangement a landlord may make, his responsibility for the successful working of the arrangement seems unavoidably part of the business and, in the event of its failure, there ought to be a recognized right with any family to ask the city for the safety of light, and for protection against the dirt of other families. This protection will seldom be sought from the health department directly, because the families fear that the landlord will know who made the complaint.

That fact adds greatly to the need which is everywhere recognized, that tenement houses should have systematic inspection regularly within stated periods. For this purpose, though there were five sanitary inspectors in the employ of the city for most of the year 1911, Lawrence has not had the right kind of inspection. The right inspection would assist owners very materially, and they need such assistance. Additional to a caretaker the presence of a good inspector in a tenement house, recurring periodically whether

needed or not, is all that is necessary to better the conditions in hundreds of houses. Many owners do not need written orders and many tenants do not need reprimands to be stirred to remedy the conditions of neglect and carelessness. The right inspection should of course include conditions inside apartments. For this purpose and for other reasons, the right kind of a woman can secure the best results. Women have done some of the best work in sanitary inspection. They accomplish most in the education of the tenants, and that is important, for one of the chief objects ought to be persistent instruction in sanitary matters. This is needed by many tenants. The health department should deal officially and legally with owners, but its inspectors meet the tenants incessantly and the opportunity for effective service is constant.

Our public school curriculum cannot be loaded with cures for every social ailment, but certainly the instruction of the young concerning how to live in the over-crowded houses of the tenement districts ought to be serious and efficient. Two or three text books now in use in some schools are helping but they are not comprehensive in their topics and in most of their suggestions are altogether too meager. The right books and the right instruction would achieve direct and broad results. The education of the tenants is so much a social need that the community as a whole should be co-operating with the tenement house owners through the schools and the right kind of sanitary inspection.

THE IMPROVEMENT OF EXISTING BUILDINGS

If old buildings are kept in good repair, that is not all that the city might well be requiring; for there are improvements which can be made in existing buildings at a cost that is immaterial in relation to the benefit secured.

For many years it has been common practice in the large cities to paint or whitewash the side walls of buildings. In New York the law has required for ten years that the walls of courts shall be either of light colored brick or made white with paint or whitewash. Lawrence should be securing white side walls on many of the houses in the crowded blocks; for in this manner the dimly



"Little Indian, Sioux or Crow,
Little frosty Eskimo,
Little Turk or Japancee,
O don't you wish that you were me?"

Robert Louis Stevenson

lighted tenements would be very materially improved. This is the more desirable because there are so many dimly lighted rooms, and the improvement that could be secured is out of all proportion to the cost involved.

There are possible other low cost changes of various kinds in a good many houses. Better light can be secured in halls that are now dark,—by glass substituted for wooden panel in entrance doors, by windows in outside walls, or by the construction of a skylight. The light in water closets in some houses could be greatly improved. In some of the older houses there are windows only a few inches in either dimension. Also in some houses windows have been constructed through a partition into a room, in spite of the fact that the water closet is against an outside wall in which the window could have been placed. There are water closets with doors coming from public halls which could have had doors from each apartment and each then would have been within the apartment. Whatever question there may be about the city's ordering some improvements, there is no question about the desirability of removing the wooden cases around the water closets in many of the existing houses. This would be apparent to anyone from a most cursory examination of the conditions which are now to be found around many of these encased fixtures. The requirement that the floors of many closets be kept heavily painted would not be unreasonable and would be decidedly beneficial. Where the lower end of the galvanized local vent pipe has rusted out, a section ought to be replaced by another kind of metal;—that which several cities are now requiring.

There are buildings that ought to have fire escapes ordered onto them immediately. The need for this is shown later in the paragraphs concerning no second egress.

If the board of health were to adopt the policy of bringing into court regularly each quarter, or even each half-year, one good case of overcrowding, and give it much publicity, the living conditions in some of the tenements would be constantly maintained on a much better level than they are now.

THE BEST WATER CLOSET STANDARDS IN MASSACHUSETTS

If there were anywhere to be found a study of the history of water closet requirements as they have been adopted at various times in all the cities of this country, such study would probably show that Lawrence stands among the first in this particular. In fact it would not be surprising, if it were found that only two or three cities antedate this one in establishing equally high standards. Since 1894, Lawrence has been requiring by the regulations of the board of health, enforced by a plumbing inspector, that there shall be in every house one water closet for each family, and that it shall have a window of three square feet area. These two standards have not only been secured in new houses, but repairs in old houses have been accompanied by the installation of water closets within the house, and usually in the number required in new houses. That it might be possible to compare Lawrence with the other cities of Massachusetts, the plumbing codes and regulations of all cities with a population of more than 20,000 were studied. Only one other city could be found that has yet established these two standards which Lawrence has been requiring for seventeen years.

Whatever may be the results which are being secured without legislation in the other cities, these two requirements are far too important to be left to chance. Lawrence has added to them the specifications that each closet shall be "in a separate compartment separated from all other rooms by partitions from floor to ceiling," that windows onto air shafts shall be five square feet in area; and the "area of the shaft shall be equal to the combined area of the windows opening onto it." Eleven cities in Massachusetts have no requirement concerning the number of water closets that shall be placed in a house, and a twelfth specifies one for every twelve persons. Concerning windows: three cities permit them to open on a shaft of 3 sq. ft.; three others permit flues of six or eight inches; seven accept in place of a window that two inch pipe from the water closet bowl which is known as the local vent; two stipulate that the ventilation shall be "adequate": and six have no requirement. Thus among 27 cities, 21 have entirely inadequate specifications for windows. The citizens of Lawrence may well take

just pride in the record of the city in these particulars. But that record does not mean that there are no water closet conditions that need remedying.

HISTORY OF BUILDING ORDINANCES

In the 1908 report of the fire underwriters, it is said that a comprehensive fire limits district which had previously been established was abolished in 1880. On June 4, 1900, a small fire district, lying along both sides of Essex street, was established and has remained unchanged. This district is less than 280 feet wide, with Essex street's 80 feet in the middle of it. It does not even include the east end of this main business street, and by 1908 the city officials had forgotten that it existed.

In 1901 an attempt was made to secure a building code. The interest began in February and lasted, so far as any record could be found, till the first week in May.

In the draft first proposed, fire limits were to be established from the river to Haverhill street, from Union street to the Railroad. Within the district no wooden building exceeding one story was to be erected. Section 13 aimed a body-blow, though a very clumsy one, at the use of wood outside of the fire limits: "No tenement house shall be erected within three feet of the side or rear line of the lot, but, whenever two or more houses to be used for tenement purposes are hereafter built nearer together than twenty feet, the walls shall be brick at least twelve inches thick above the foundation walls to the roof." Another section required any tenement or lodging house "with a frontage of more than thirty feet" to have a middle fire wall from cellar to three feet above the roof.

Early in April, the matter was referred to a committee consisting of two aldermen, the city engineer, superintendent of public property, four contractors and two insurance men. Their draft reduced the fire limits to include only Common street, additional to the limits then existing. Sec. 13 was made to read "No wall or part of a wall shall be erected within three feet of the line of an adjoining lot or within six feet of the wall of another building, unless said wall or part of a wall is brick filled as specified in Sec. 7." Sec. 7 provided that tenement houses having two families on a floor should have a separating brick-filled wall four inches thick. The same kind of wall was required for all partitions inclosing stairways and light shafts.

The ordinance appears to have been smothered some time in May.

March 19th, 1906, the main portion of the roof of the Majestic Rink collapsed, because of a heavy fall of snow. A section of about 100 feet by 50 fell to the skating surface. The following day the Telegram said: "A significant warning, — something certainly ought to be done to enforce safe and sane building laws in this city. The collapse of the roof of the Majestic Rink is a case to the point. No new building like this one, properly constructed, would collapse under last night's snow fall. Just think of what might have happened had the accident occurred a few hours earlier, while a polo game was in progress. If this narrow escape from a terrible tragedy means anything, it means the city government will be remiss in its duty, if it does not at once pass wise building ordinances and appoint proper officials to see that they are carried out."

The agitation thus renewed secured the reconsideration of the formerly proposed regulations and of one or two other similar bills. The code finally adopted April 23, 1906, was based upon the proposed code of 1901 emasculated.

It strengthened Sec. 13 by substituting a twelve-inch brick wall in place of a brick-filled wall. It made the distance between front and rear buildings eight feet instead of six feet and irrespective of the character of the walls. It added the requirement of a bond from the inspector and the keeping of records and a paragraph giving right to enter. It incorporated the establishment of the office of inspector, the issuance of permits, and some paragraphs giving him much discretionary power over unsafe buildings. It also included verbatim three or four small paragraphs, relatively unimportant, and two important paragraphs weakened.

The amount of penalty possible was greatly reduced; the fire limits were omitted; Sec. 7, as summarized above, was dropped; and about thirteen paragraphs of conservative specifications for structural safety were ignored.

The building inspector qualified for his duties May 28, 1906. The building ordinance as adopted is now in force, except that minor amendments have since been made in two sections. The inspector's annual reports have repeatedly asked for a better ordinance.

THE CHARACTER OF THE BUILDING ORDINANCE

Concerning this, the report of the fire underwriters said: "The municipal building laws are practically valueless." The basis for this opinion may be seen by considering the ordinance in detail. That can be done briefly. Several of the sections have been sufficiently described above. There are three about metal leaders, chimneys and projections into streets.

For the purpose of fire protection, there are three requirements:

FIRST. "No tenement house shall be erected within three feet of the side line of a lot, unless the walls be brick" etc.

The ordinance does not define tenement house, and any building inspector could legally allow three-family wooden houses to be built on the lot line. This would be in keeping with the legal definition of tenement house in Boston, Springfield and a few other places. Fortunately Lawrence had for five years a building inspector who had sufficient interest in the city's welfare to define tenement house to include any house with more than one family. A second grave fault in the section is the fact that tenement houses are mentioned at all. Wooden boarding houses and other buildings are not mentioned and have been, and are being, erected on side lot lines.

SECOND. "Whenever two buildings shall be erected on the same lot of land, one in the rear of the other, the outside walls shall be at least eight feet apart."

Separate rear houses on lots of ordinary depths ought not to be allowed. If allowed, the distance of eight feet is altogether too small. Small as it is, the phrasing "outside walls" permits all sorts of encroachments on it. In very many instances porches, stairs, balconies and other encroachments have been constructed in this space, frequently filling it entirely.

THIRD. "All buildings hereafter erected two stories above the level of the street shall be provided with two separate stairways, placed in such manner that the inmates shall have easy means of egress at all times, said stairways to lead from each story."

It would seem to be the purpose of this section that all inmates shall have two means of egress, but the phrasing does not explicitly say this, nor does it say that the two ways out shall be independent of each other. Without doubt each apartment should have direct access to two independent and safe stairways or fire escapes. The section is from the 1901 proposed code verbatim with two exceptions. That code read "occupants" instead of "inmates," and its final clause read "each tenement to have access to both stairways" instead of "said stairways to lead from each story." The section as enacted appears to say what it does not say. There are new buildings in Lawrence where one or more third or fourth-floor apartments have no second egress. This is radically wrong, yet is possible, because the explicit language of the 1901 draft was dropped.

For ordering additional egress in old buildings, certain sections seem to give the inspector abundant power, but leave the question entirely to his judgment. Such a condition as no second egress from third and fourth floor apartments is too important to be left to the discretion of any individual.

The foregoing three sections have some value. A fourth has none. Wooden tenement or lodging houses are limited to the height of 48 feet. In this height five stories can be erected; what more would be desired? So far the builders have not desired to build wooden five-story houses, and only four or five four-story and basement houses. The 1901 draft limited wooden tenement and lodging houses to four stories.

For the purpose of structural safety there are three paragraphs; one against weakening timbers by cutting them for pipes; a second which limits the distance between studs to sixteen inches; and a third which gives two dimensions for certain timbers. Both these specifications are limited to buildings of "over two and less than four stories." The phrasing is ridiculous, for it includes only three-story buildings. Since the passage of the ordinance almost one hundred four-story, frame houses have been built; and there is not a word in the code concerning the strength of such buildings. Relate these ridiculous, structural provisions to the

new rink that fell and the public's demand for protection, and we have a tale of comedy fit for the best of court jesters.

The foregoing summary states all there is to the building ordinance of Lawrence and it has been in existence five years,—three years since the National Board of Fire Underwriters in formal report termed it valueless. It is not surprising that the building inspector said in his last annual report:

“Each year, I have recommended that the City Council take up the matter of revising the Building Ordinances. That suggestion is not out of place at this time. Last year and the year previous, I recommended that the Building Ordinances be revised along the lines laid down by the National Board of Fire Underwriters. This year I make the same suggestion. Under the present ordinance, there is no provision for foundations, thickness of brick walls, size of floor timbers or columns, floor loads, lighting or ventilation of buildings, protection against fire, or any of the important matters which a building ordinance should restrict. Of course, in a general way, some provision has been made in the ordinance to cover some of the matters above mentioned. The law should be specific and accurate, in order to be effective.”

It should be noted that the building code has nothing in it that meets the conditions of defective maintenance and the need for renovation that has been shown in the preceding pages. The care and improvement of old houses is a need that is found in every city and should of course be provided for in legal requirements. Serious as this need is, it is small in comparison with the need for controlling the construction of new houses. Prevention not cure should have first consideration. Any city of any size has this need. In view of the entire lack of control of new houses that exists in Lawrence, it is necessary to study in detail the extent to which this control is needed. Because of the congestion the character of the new houses is of supreme importance.

THE CENTER'S FUTURE

33,700 PERSONS ON 300 ACRES

This is the population in the central district elsewhere described. There are probably very few cities in the country where the population is less than 100,000 and there is so large an area as 300 acres with an average density of 112 to the acre. The density, if the 17 acres in the Common is excluded, is 119 per acre. There is one section of 14.9 acres where the density is 216 and another of 17.3 acres where the density is 214. The densities in six half-blocks, as previously stated on page 60, range between 243 and 556.

The area of the city is small in relation to most of the cities in Massachusetts. But the smallness of the total area is not the reason for the congestion in Lawrence, if it can be stated, as it can be, that *more than one-third of the population is living on one-thirteenth of the city's area.*

In the central district there are about thirty half-blocks where the majority of the lots are so built upon at present that further additions of houses will be in the nature of filling in the light and air chinks; with the result that such additions will make city blocks which are solidly built upon, except the narrow slits of space between houses. There are numerous other half-blocks which contain many vacant lots and also houses which are crowded together. Into two-thirds of the central half-blocks, large houses are steadily being inserted. The congestion is increasing rapidly.

THE LARGE NUMBER OF REAR HOUSES

The houses that are moved back on lots are usually small houses; but the new houses that are being built at the rear are large houses. Seventy such, built in the last four and one-half years, contain 255 apartments. There are in the central 300 acres, 360; in a district bounded by the rivers, Park, May and Margin streets, 500; in North Lawrence 703; in all Lawrence 822.

There is a striking contrast between the insurance map of Lawrence and the maps of other New England cities in the number and size of rear houses. The maps of all the important



An alley corps of "old settlers," most of them still in use but marking time waiting to be displaced by houses like those in the following picture.

cities were examined. In those for Manchester, Lowell, Salem, Fall River and New Bedford, certain streets have front houses as close together and in some blocks as large as the front houses in Lawrence, but the rear houses are not as numerous and not as large. Cambridge and Manchester have some badly crowded blocks, but the houses are smaller. Lowell and Salem have sections of blocks, groups of four to eight houses, which equal the worst congestion in Lawrence, but the pages in their maps do not display the conditions on the Lawrence map. The center in Lawrence has the largest number of large frame houses and the largest number of rear houses. With Boston's brick center excepted, the map of the Lawrence center is the worst in New England.



Rear houses in the next alley to that shown in the preceding picture; one block nearer to the center of the city.

SOME OF THE RECENT HOUSES

Lawrence ought to be examining with great care every house which is proposed to be introduced into the already overcrowded center. Some of the houses now being built would have to be considered badly lighted houses, if they were on a prairie. There are kitchen and water closet windows that open onto deep porches and the windows give entirely insufficient light. Builders are constructing dimly lighted and even windowless sink rooms, which also frequently serve as pantries. These are the work-rooms for the women. It is not difficult to guess accurately how many carpenters would build for themselves bench-rooms that have neither light nor ventilation; but they build them for the women.

In the two districts, there were found fifty-seven living-rooms where the source of light and air is from ten light-wells. Their areas and the number of living-rooms opening from them are as follows:

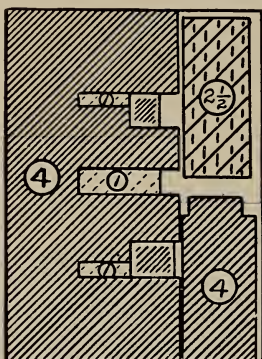
In	Area of	Living
Two shafts	Each Shaft	Room
Two shafts	20 sq. ft.	11
Three "	25 to 27 sq. ft.	18
Five "	32 to 36 " "	28

Six of these shafts serve, besides 34 living-rooms, 30 sink-rooms and 32 water closets or bath-rooms including water closets. Most of these shafts occur in buildings that are relatively not old buildings. The practice with architects in trying to secure light in this manner is current. The spaces on the plans are usually marked, "Light well—skylight over." All the shafts seen are covered with skylights and there are ventilators in most of them. In some of them at the bottom there is an opening to the cellar but in no case a fresh-air duct. The ventilation is quite inadequate. To the upper floors the bad air and noise of the lower floors are furnished. The shafts are enlarged speaking tubes; a quarrel or a child being whipped, a sick baby or a person who snores,—any of these in one family disturbs all other families. Onions for dinner in a lower apartment means onions for dinner in all apartments. The situation is ludicrous,—except for those who live in it. In the hot weather the bedrooms that open on

these shafts are a burden to the strong as well as to the babies and the sick. The light for the rooms on the top floor is fair at all times. On the next to the top floor a fair amount of light is secured only on bright days. For the rooms that are three and four floors below the roof there is inadequate light at all times. Such construction as this is not necessary.



The photograph was taken looking from a dark kitchen through a half-open window into an inner court between two buildings. It serves six kitchens and at the third and fourth floors contains porches four feet wide. Such space in Brooklyn and Connecticut would have to be about twice as large and could not have any encroachments. This inner court is materially better than the spaces that exist in some buildings, yet it is entirely inadequate for the lighting of the center floor spaces of the house.

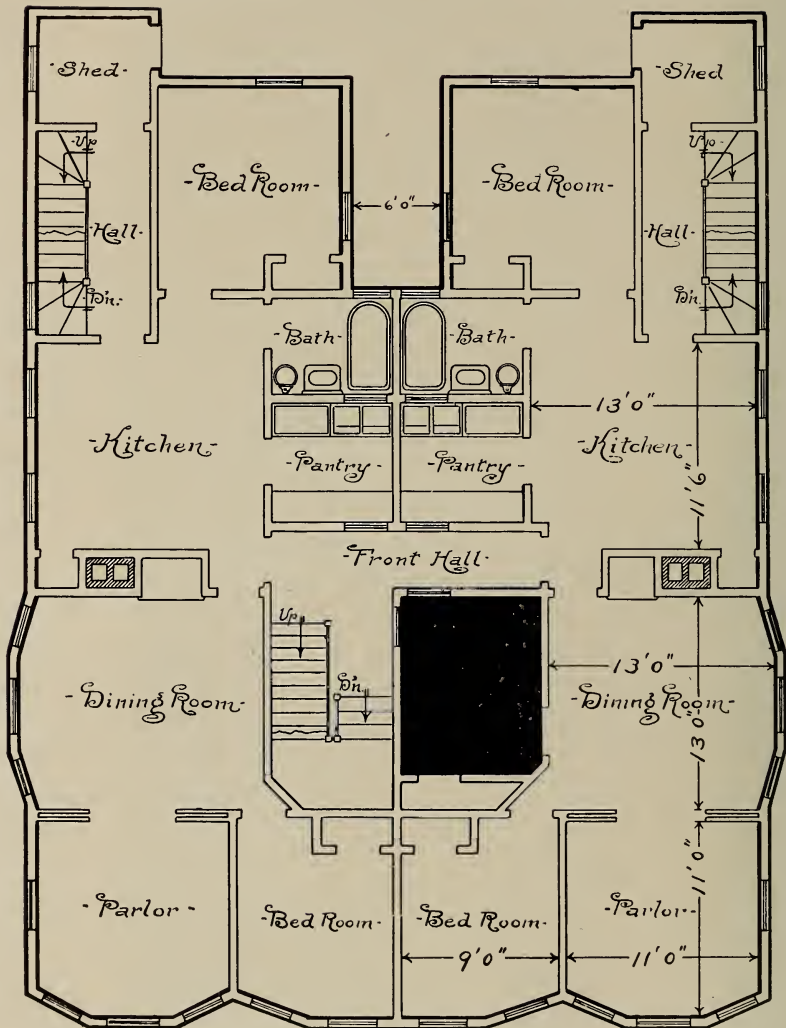


The left part of the sketch above is the outline of one of two recently built houses which are almost identical. The picture on the opposite page shows the interrupted wall as above. Both this house and its mate appear on their street sides to be among the best of the large tenement houses, and are good in many respects. But in the point of lack of light in the centers of the buildings, they are among the worst houses in Lawrence. The two narrow slits shown in the sketch are only three feet wide and their inner ends are twenty-seven feet from the rear wall of the building. For the purpose which these slits serve, other cities have for several years been securing by law courts nine and ten feet wide and in addition a yard of five feet depth at the rear of the building. Behind one of these buildings is a very small yard space; the other has no yard.

The front halls have windows into these narrow courts, but are so dark that one has to feel his way at the second and third floors. The open spaces are not even wide enough to give room for a window of adequate size to light the bedrooms that are located at the ends. At the rear end of the two courts, the sketch represents, by broken cross lines, space that is occupied by porches at each floor. Kitchen and rear hall windows open onto the porches and at the second and third floors receive almost no light. On cloudy days artificial light is necessary in the halls, kitchens, sink-rooms and bath-rooms. Such obstructions as these ought not to be allowed. The buildings will have even less light in them, when the owners of the adjoining lots have built as near the lot line and as high as these buildings stand.



A new building with rear wall on lot line, occupying 95.5 per cent of its lot. The open spaces are most seriously small. Several houses of this kind adjoining each other would contain many rooms which would require artificial light constantly.



ROOM WITHOUT LIGHT OR VENTILATION

A four-story frame house. "Not more than two such houses built each year."—*Building Inspector*. Such rooms are unnecessary, and permission to construct them is not good public policy. Built summer of 1911.

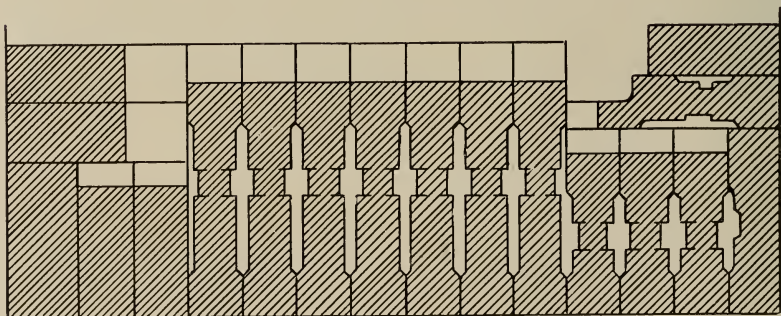


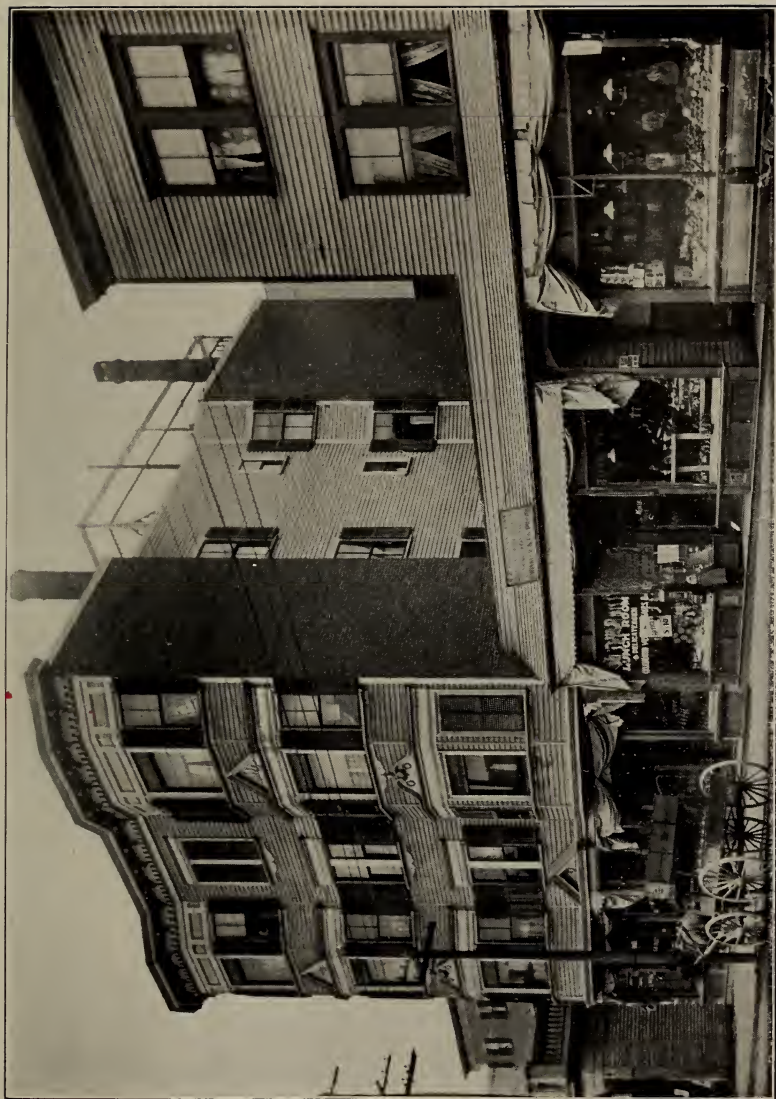
BADLY LIGHTED DOUBLE HOUSE

Looking between two rear houses to the rear of the front house. The court between wings, obstructed by stairs, serves six bed-rooms and six alcove rooms and is only four feet wide. From eight to ten feet are being required for such spaces in some cities, and the obstructions would be illegal. Built summer of 1911.

The foregoing picture shows a form of house which is already very common and will probably increase in number rapidly. It is the double house with two wings at the rear, separated by an outer court, making a floor plan with an outline that suggests a magnet. In many houses in Lawrence these courts are not wide enough to properly light the centers of the buildings and in numerous instances are obstructed by porches and balconies. In some houses the courts are almost entirely filled by such obstructions. The obstruction ought not to be allowed and a court of adequate width should be required. Cities with populations of more than a million are requiring that such spaces shall be eight feet wide and the standards in some cities are nine and ten feet. Surely Lawrence ought to be able to leave more open space around a building than is being left in cities with a population of a million.

Some of the new houses would not be bad houses in open fields but are thoroughly bad for the center of Lawrence, because of their relation to other houses. On the adjoining page is a picture of a building which is practically the same as that form of house known in New York notoriously as the "dumb-bell" house, so called because the outline of the buildings has somewhat the shape of a dumb-bell, as may be seen in the sketch below which shows the ground plan of a series of these bad buildings as they exist in New York. Each of the narrow slits seen between the houses is the only source of light and air for about forty-eight rooms. It has been impossible to construct them since the law of 1901.





Because of the recess in the side wall, this house is like the notorious "dumb-bell" house in New York City. When two such houses exist side by side the chimney-like space between them admits little light and ventilation. New York ceased to build such houses ten years ago.

The owner of the "ten footer" in the foregoing picture built the walls of the store wide enough to permit the construction of a four-story building and he is being urged even now to do this. He says he does not see what he can do, when he builds, except to duplicate the recess of his neighbor's building. When this has been done, the narrow space between these two buildings will admit practically no light and will furnish the upper floors only with the bad air of the lower floors. In New York City the construction of such houses was begun as early as 1879, and, although at that time the true character of the house was realized, this form became the prevailing type of tenement house for nearly twenty years. Since the passage of the new law in 1901, the legal requirements have been such that these buildings can no longer be erected. Except for the thousands of unfortunate families who still live in the old ones, the dumb-bell tenements have been for ten years a matter of history. Certain types of buildings such as this one are inherently bad, and never can be otherwise. It matters not in what city they are located. Knowledge of them ought to be universal. The experience which New York has had with this form of building ought to satisfy all the cities of the country. It would seem that the complete demonstration that has been made in that great city should be adequate to prevent the building of such houses anywhere. There are no peculiar conditions in any city which are so fundamental that they need to force in the repetition of the worst features in the worst houses in the old building practice of New York City.

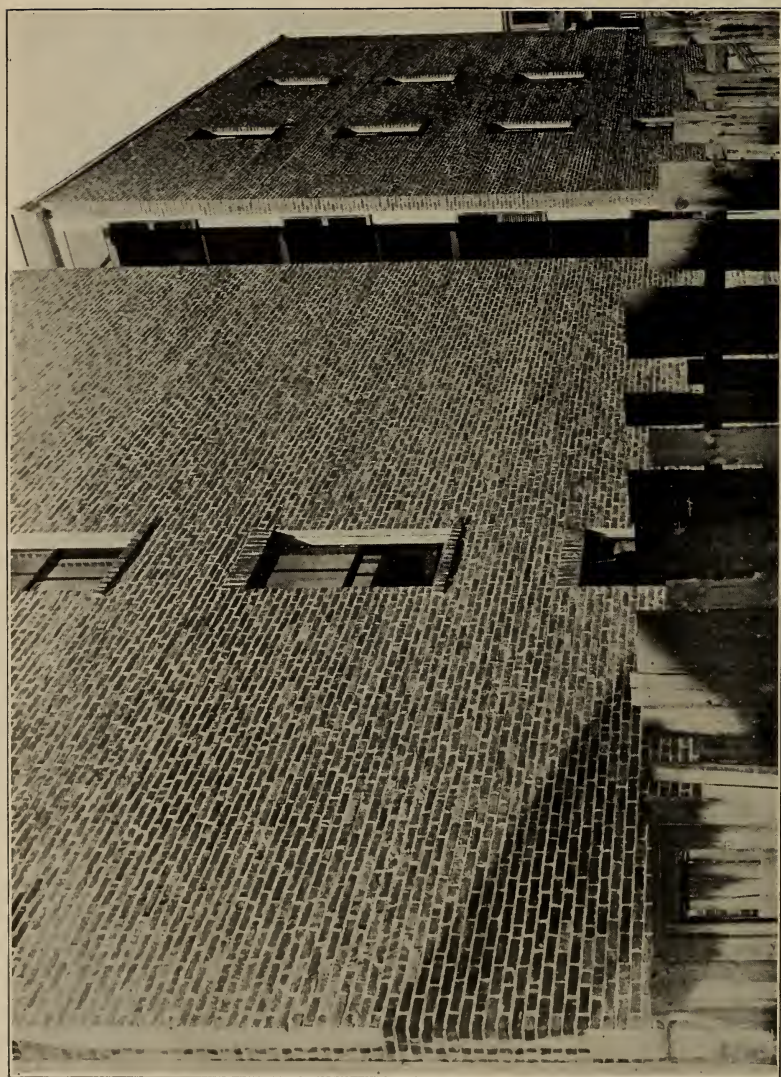
Scattered all through the center there are many other buildings which are paupers in the matter of light. They are being supported by their neighbors. In these buildings rooms are lighted solely by windows that are located on a side lot-line; such rooms being the majority of all rooms in some buildings. When the owner of the adjoining lot comes to build, he is almost forced to do as the man on the other side of the line has done, and by so doing he shuts out the light from the lot-line windows. There are numerous buildings where rooms have already been made practically windowless in this way. There are several



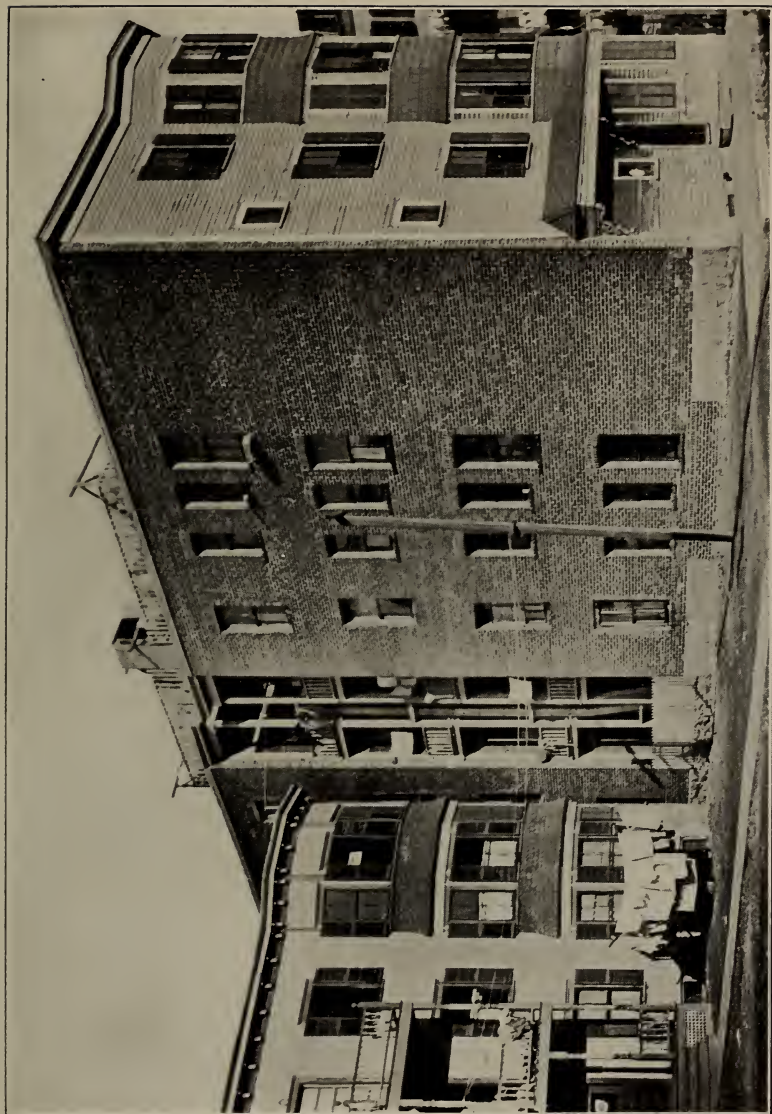
Old Settler "Marooned." Two three-story houses shut it in at the rear also. Both four-story houses have lot-line windows. What will become of them when the old settler passes away?

instances where the man who first built kept away from a side line, then the man on the opposite side of the line built close to the line and after a while the first man put out a new wall near the line. Thus the failure of two men to agree is allowed, by our lax public policy, to create dangerous housing conditions which will cost the public dearly. Considering the speed with which large new buildings are being introduced, it is certain that this blockading of windows at the center in Lawrence will increase rapidly during the next few years.

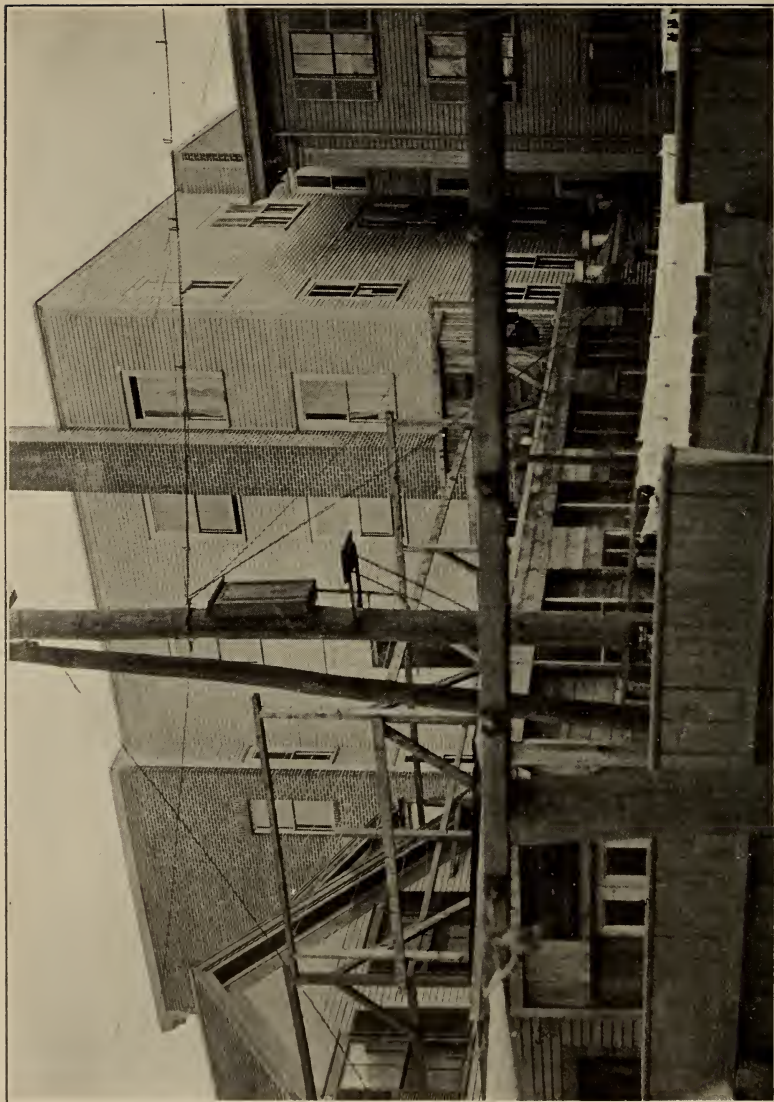
A house with lot-line windows and similar defects has some immediate financial advantage to the builder. There can be more rooms in a tenement or the rooms can be larger; so that for a few years the rents are higher. The builder has benefited himself at the expense of his neighbors and the public.



A side wall which extends from street line to alley line and is less than eight inches from the side lot line. It contains eleven windows which are the only light for eleven rooms. When the owner of the adjoining lot takes the same privilege, this building will have eleven windowless rooms. Eight other rooms open on the court shown. It is 5.7 ft. wide, 10.8 ft. deep; whereas in Brooklyn for ten years such spaces have been required to be 8 ft. wide by 14 ft. deep. Built summer of 1911.



The front porch of a rear house touching the rear porch of a front house, four tenements in each. Both the side walls shown are on the side lot line and together they contain windows which are the only source of light for eight bed-rooms, eight water-closets, and eight sink-rooms. The owner of the adjoining lot taking the same privilege will make these rooms windowless, and will make eight other rooms nearly windowless because they would then open only upon the two sets of porches between the buildings. The best light in the rear building is from the alley fourteen feet wide.



A new "chambers"—rooming-house. Located on a corner, with fine front walls, it is one of the best appearing houses in Lawrence. The light in it will probably be wretched before its usefulness is half over.

Rooming houses were purposely not included in this examination. But they should not escape attention entirely; for there are a considerable number of new ones and some of them are not well lighted, while others will be poorly lighted eventually. Most of the new ones have very good exteriors, but in the interiors the city is allowing the gradual accumulation of very badly lighted living quarters. The newest hotel in the city may easily become one of the worst buildings. The building shown on the opposite page is by no means a single instance, but a fair sample of all this class of dwelling-places.

That windowless rooms are being constructed in new houses, as in shown in the sketch on page 94, needs little comment. For more than ten years, thousands and thousands of houses have been constructed in New York with a window in every room, as the law requires. There is no opportunity for any feeling of complacency that Lawrence is not building a large number of these houses. We know too much about the use of such rooms through long periods of years to make it possible to think with complacency of one such house.

Two facts partly explain the bad new buildings. Some builders plan a house which is suitable enough for a good-sized lot. Then they use this plan over and over again, regardless of the size of the lot they are building on. This frequently turns a good house into a bad house. There seems to be no thought that the reduced size of the lot should radically change the form of the building. The other fact is the unwarranted toleration of the smallest lots. Nearly everyone is ready to excuse wretched construction on the plea of the smallness of the lot. It seems to be considered possible to take from a very small lot half the income which could be secured from a lot twice as large. This is unreasonable. In using building material there are certain minimum dimensions below which the material has little or no value. The same ought to be true concerning the smallest building lots. The amount of light admitted into buildings is subjected to definite measurements. The necessary measurements for open space in relation to width of floor and height of wall cannot be secured on

the smallest lots. It ought to be impossible to construct a house on them which has half the value of a house on a lot twice as wide.

As a help to a right view of the seriousness of the conditions, we should mark out as best we can in a coarse, rough way the number of people who will try to use such a house as that described elsewhere, in which there are eight apartments which have eleven rooms lighted solely by windows on a lot-line. Supposing that these windows are blocked by an adjoining building before the end of ten years, and after that the house remains in use for sixty years; using the average number of persons in private families in Lawrence, and figuring that there will be one removal in each apartment every two years, we reach the number 1,100 persons. At least one thousand persons will try to use this house after the windows are blockaded and the rooms are practically windowless. This is an underestimate for one house.

New houses so constructed that there are dark halls, dark and crooked stairs, rooms opening only on vent shafts, windowless rooms, lot-line windows, large floors unbroken by fire walls, and other similar defects are most serious. There is possible practically no alteration that betters these conditions. Once in existence, they will continue the same till the house is burned or torn down. Are not these the conditions that have cost the cities of England millions of dollars in the effort to better here and there a few patches? Is it wise that a few men should be allowed to take for a few years, a little more money than they would under reasonable restrictions, and the whole city suffer for it? Surely the intelligent citizens in Lawrence have not stopped to think about these houses. For such houses at the center of any city, and especially in Lawrence where the congestion is already so great, are not bad in any onefold, twofold or threefold manner. They are seventy times seven bad. The periods of their existence will average seventy years. Each one, because it seems possible to take a larger income from it than from a better house, will cause other new houses to take the same form. In fact, if unrestrained, they will become the prevailing form of house at the center. This is exactly the history of the infamous dumb-bell house in New York City.

HOUSES THAT TRAP MEN LIKE ANIMALS

The life hazard at the time of a conflagration, when fire attacks the exterior of houses, has been mentioned in the first pages of the report. The life risk from fires that originate inside of houses is excessively high in Lawrence; judging from the conditions which exist in the six half-blocks examined; for they are typical of about thirty half-blocks at the center. There is second egress from thirteen third-floor and two fourth-floor apartments only over the roof. When egress is to be had only by entering the upper part of a flight of stairs which may already be choked with smoke and flames, safe exit is very questionable. It is not to be expected that women, children, the old and the sick will act rationally or choose such exit when it involves rushing through dense smoke or flames. Two other third-floor apartments are depending for second egress upon wooden balconies in exposed positions. Three have egress only across a bridge through another apartment. Egress that involves the possible need for breaking into, and then out from, a vacant third-floor apartment is not what it should be for the young and the feeble. Four other third-story apartments have dangerous exit over roofs where the spaces between houses are from three to five feet wide, and it is necessary to step over these open spaces. Three houses that are not included in the figures of this paragraph had second egress completely shut off by obstruction. A description of one of them is sufficient. In a rear house there are four apartments, two each on the third and fourth floors. The rear stairs lead to the alley and were completely blocked by rubbish and wood at the second floor and on the first flight. They remained impassable below the second floor for more than nine months, and were in that condition when last seen. There are, in addition to the foregoing, thirty-five third-floor and seven fourth-floor apartments which have no second egress whatever. This makes in six half-blocks a total of sixty-six third and fourth-floor apartments which have insufficient egress. Under nine of them there are seven bakeshops.

WHAT NO SECOND EGRESS FROM A THIRD FLOOR MEANS

2 KILLED BY LEAP AT FIRE.

Fire started mysteriously on the ground floor of a tenement house at No. 250 Powell street, East New York, at 4 o'clock yesterday morning. The rooms of Julius Shapiro and his family were on the top floor.

The Shapiros groped their way to the front of the building. Shapiro stood on a narrow ledge at the third floor and dropped his infant Sidney safely into Policeman Thomas Goodman's arms. The father next dropped nine-year-old Aaron with like success. Aaron's hair was aflame. George and Sadie Shapiro, fourteen and twelve, were then dropped by their father. George's right leg was fractured, Sadie's skull and left leg were fractured and both were hurt internally.

Shapiro and his wife jumped and both were instantly killed.

"I would be pleased to receive contributions addressed to me, for the children, care of Box 14, Station P, Brooklyn," said Alderman Alexander Drescher.

East New York is a district in Brooklyn. The house contained two tenements above a store; and, because it is a two-family house, it is not under the state tenement house law. Each item of the accident as described above has been corroborated in a letter from Mr. Drescher. Was there any accident about the fact that the house had no second egress?

In view of all the knowledge we have of the daily occurrences in the cities of this country, was the event described below an accident, or something else? The *Hartford Courant* of December 4, 1911, under the heading "Woman Suffocated in Old Fire Trap," says:

"Through what the officials term a violation of the tenement house law Mrs. Jane Banks, 71 years old, lost her life late yesterday afternoon in a tenement house fire at No. 37 Wolcott street. The fire was of unknown origin, starting on the third floor, which was occupied by Mrs. Banks and her husband.

"Engine company No. 8 is located only a few blocks from the scene of the fire. Two ladders were put up the side of the house, but the fire was so hot and the smoke so dense the firemen could not penetrate the part of the building where the body was later found.

"The intense heat of the room had baked the body. The skin had peeled off the face and hands, and the hair was scorched off her head. The fact that her clothing was not burned indicated that she had not been actually touched by the fire, but dropped overcome by the smoke, and the heat of the room did the rest.

"Medical Examiner W. W. Knight was called, and he questioned Ladderman Collins about the finding of the body. The body was lying on the floor near a window, and it is believed that the old woman, who had been left sleeping some time before the fire started, awoke to find the place on fire and that when she found that she could not get to the stairs, her only means of escape, she tried to get back to the window of her sitting-room, but was overcome by the smoke before she got there.

"The house is an old one, and was originally a four-family tenement, with two tenements on a floor on each side of the brick block. It had been made over into a six-family block, however, and while the tenement house laws call for two means of egress to the ground from each tenement, there was only one from the third floor, and that is why the old woman could not be saved in the early stages of the fire."

LAWRENCE NEEDS NO MORE DISASTERS

Three years ago the fire underwriters said concerning explosives and inflammables in Lawrence: "The City laws are very meager and are not being enforced." The citizens cannot claim that they must wait for an explosion in Lawrence to make them feel that gunpowder will do there what it does elsewhere. They cannot claim that they must wait for a disaster in Lawrence like that in Brooklyn before making all buildings safe, or wait for another sweeping conflagration in New England before establishing an extensive fire district. They cannot claim that any exigencies in the building business, no matter what they are, make it necessary to wait for twelve or fifteen blocks of windowless houses before light and ventilation shall be required by law. The long period of indifference or ineffective interest ought to end.

THE SOCIAL RESULTS OF BAD HOUSING

Such centers as the one in Lawrence are not only seriously wrong, but especially dangerous to the common welfare, because of the new-comers who are filling the centers. In each of the three states, Massachusetts, Connecticut and New York, among every three persons only one has parents who were born in this country. In Lawrence, among every five persons four are the children of foreign-born parents. The English-speaking element in Lawrence is large, but in the last decade the non-English speaking element has been growing rapidly.

This is adding to our problems rapidly. Already the great majority of those who live in the crowded districts of the cities are persons from countries where the theory and practice of democracy either do not exist or have not progressed as in this country. Good citizenship is based on the moral integrity of individuals. We cannot have good citizens who use honestly and intelligently the opportunity to control our city affairs unless as children they are protected and helped in houses that are worthy the name homes. Many tenement houses at the center in Lawrence are permanently injuring the child-life that is in them. Because of the dim light, eyes are being strained and the rooms

are not being properly cleaned. Children are being brought up in rooms where it is constantly possible to see into and across the bed-rooms of other tenements, because they are so near. Dark halls at night are universal; yet they offer grave moral risk for the young, as many realize who know the life in the tenements. Some of the most important testimony taken by the New York 1900 tenement house commission shows what potent adjuncts dark halls are in demoralizing and ruining the lives of young people. The overcrowding of tenements with numerous boarders is demoralizing. The presence of dissolute tenants, especially the women, is debasing.

There are other social results of poor houses. We are inclined to consider the dimly lighted tenement too superficially. It is not a home but a tool-box. The gloomy rooms are not only not attractive but actually drive the children and many an adult into the street and away from the home. To the many other forces which are constantly interfering with family life, drawing and keeping the members of the family away from each other, we are allowing the repellant home to be added. The members of a family ought to know each other better. We need better and stronger home influence, to preserve and foster the integrity of the individuals; and we are not wise, if we do not see that bad housing has a distinct, deteriorating influence on character; while on the character of the individuals the stability of our institutions is based.

*“ Since things alter for the worse
spontaneously, if they be never
altered for the better designedly,
how is the evil to stop? ”*

—BACON

THE REMEDY

It is mid-day. The time for inaction is long passed. But action should be in the direction that will lead to the speediest, the most fundamental and the most secure relief. It is extremely doubtful whether adequate, effective action for the control of the conditions in Lawrence is attainable through any city legislation. Those among its citizens who know the city best and have the best interests of the city near their heart know better than the public knows what an extremely weak, and exceptionally broken assembly of peoples the city is. Though the pride of the individuals in their city may be as great as it is in most cities, the best of the citizens if they are honest with themselves must quietly acknowledge the fact. But the fact because of its relation to the housing condition is not one that can be merely quietly asserted. It must be openly faced, publicly asserted, if the help is to be secured that will bring in adequate remedies. It is not just to the better citizens in Lawrence to speak of it in direct comparison with other cities. The citizens with influence and civic ideals are too few. The prospect of successfully controlling the building of houses in the indefensibly congested center cannot be considered without mentioning the absence of the mill owners as residents. Stated baldly, Lawrence is an appendage to the textile industries — a tool-room attached to a workshop. Many cities have such economic balance within themselves that they are far more integers than Lawrence and far better able to take care of themselves. The city is woefully weak because there is lacking in the control of its civic affairs, the direct sense of shame and personal responsibility and the efficient, public-spirited, controlling interest which the mill owning families would have, if they were residents. Because the mill owners live outside of the city, the housing problem is a state problem, and can be solved only by state legislation.

This is true of other factory cities in New England. The economic power of the corporation over-shadows and dominates

for corporate purposes the weak city government in which the owners of the corporations as individuals and citizens have no responsibility and little interest, because they are not residents. To these political units, which are not economic units, or are so out of balance with the economic facts, the theory of home rule is ill-suited.

Our economic relations have greatly changed. This is remarkably well exemplified by the early relations of the textile employers to their employees as tenants. The mill owners founded the town for their manufacturing purpose. It was a component part of their project. They planned painstakingly for it and its welfare. They built sewers at their own expense and planted ornamental trees and shrubbery. For their employees they built houses that were large, but considering their date, exceedingly good houses. Some are still in use and are superior to many of the houses that are being built in the center now. For certain streets they stipulated that no lot should have on it more than one house and no house contain more than one family. They limited the height of and specified material for buildings on the main business street. But their intentions extended beyond the founding of the town as a business project.

What we call the industrial revolution had at that time brought in machines and factories in large numbers, but had not yet spoiled the feelings of the employers. Their point of view was that of the employing artisan toward his apprentice. Large numbers of the employees were unmarried and away from home. Boarding-houses were maintained or controlled by the companies at a low profit, and sometimes at an annual expense, for the purpose of preserving a proper supervision over the operatives. The mill agents were chosen as men who had wisdom for supervision of the houses as well as the mills. By rules and regulations posted in all the houses, the attempt was made to safeguard not only the physical welfare of the tenants, but their moral and religious life. Men and women were not allowed in the same boarding-house. Tenants were cautioned to pay particular attention to the cleanliness and daily ventilation of their rooms, were required to keep a quiet bed-room for the sick, and were vaccinated

at the office of the company at the company's expense. They were required to be in the house by ten o'clock at night, were expected to keep their twelve to fourteen year old children constantly in school, and were expected to attend divine service on the Sabbath. The corporation furnished a library and maintained a relief fund. We may smile when we first read their rules, but our sober second thought ought to bring us a deep feeling of gratitude that the philanthropic purpose in the employers was once so strong. What we smile at is the method of expressing the purpose, because the method is so ill-suited to our present social conditions. The companies were not many years in finding this out. The surveillance of course proved too troublesome. They learned the lesson that some other industrial corporations have yet to learn. They ceased to be landlords long ago, and have thus escaped the tangled relationship which made the town of Pullman a failure for many years, and has given serious trouble at Ludlow and elsewhere.

Recently one of the largest mill corporations has resumed this relationship in Lawrence, to the extent of building in 1907-8-9 houses for 142 families. Fifty-two are in cottages of exceedingly good design. They are on large lots, and serve as a benefit to a few families, an attractive feature of the town and an advertisement to the company. The rest of the houses are good houses, almost too good to be interesting to commercial builders. In view of the fact that this Company employs from three to four thousand operatives who rent apartments, the 142 apartments in these good houses are as a drop in a bucket. If anyone asserts that the purpose of the corporation in maintaining the houses as a financial burden is to benefit the employees, he should be asked whether the method is not still missing fire like an old flint-lock gun.

There are other great civic needs in Lawrence besides the housing conditions. It is symptomatic of a general condition. We can, any of us, dream in a utopian manner of an interest among the mill owners that would make them willing to say definitely to their representatives in Lawrence: "We feel that the city has reached a position which demands some of your attention and time, and we are willing that you should consider yourself free to participate in any civic movement which seems to you to be worth

while for the immediate betterment of the city's affairs. In fact the need there is sufficient to make us desire to have your influence count even though in some particulars your activities should temporarily work against our interest as a corporation. We will trust your judgment. You will be acting as an individual. You are not representing the corporation; but in the end you are working for the corporation's best interests, and we shall so regard the time you spend in enterprises that are genuinely for the best interest of the city as a whole."

Dreams sometimes come true, but even if this one should, it is doubtful whether the actual results achieved could be more than a partial remedy for the housing conditions. The forces at work are too deep and too strong. Huddling people together is a disease. It generates profits that are a poison, intoxicating the whole community. With unusually strong religious prejudices and race hatreds, and with the absence of those who conduct its chief enterprises, such a community would seem to have the chances all against its being able to cure itself.

The citizens who are genuinely interested in the city's welfare will welcome the day that wipes out the fictitious lines of the present political unit and establishes the unit more nearly according to the economic facts by including in it the towns, Methuen and the Andovers. Lawrence needs state legislation.

THE STATE'S DIRE NEED IS HOUSING LEGISLATION

Contemporaneously with a cholera epidemic in 1849, Lemuel Shattuck, one of Boston's citizens, became actively interested in securing healthful living conditions. With two others he was appointed by the state legislature to bring in a report on the conditions. "The report of the Sanitary Commission of Massachusetts: 1850" is a historical document of 500 pages, simple in its purpose and comprehensive in its argument for the establishment of a State Board of Health. It was chiefly a housing investigation and so is one of the earliest in the country. Besides describing the conditions in the center of Boston, it presents in about thirty pages a sanitary survey of Lawrence, to illustrate one of its chief objects, namely: "We recommend that special sanitary surveys of particular cities, towns and localities be made from time to time, under the direction of the general Board of Health."

The examination of Lawrence, then a town of 8,000, was quite comprehensive and has preserved a picture of its life in the early days as no other book has. It has much praise for the living conditions found there. One of its conclusions concerning the town is especially interesting in view of the present congestion. "We recommend that every practical effort be made to prevent crowding too many houses upon one lot and too many families or persons into one house."

It is a melancholy fact that this young town that happened to be chosen as a field to illustrate a method for improving living conditions should have developed since that time the most congested center in New England, apart from Boston. But Lawrence is fortunate in having some citizens who are interested in finding out the facts and willing to face them publicly. Outside of Boston it is the first city in the state to have a formal housing investigation and print an extensive report. It is fitting that Lawrence should call the attention of the other cities to the state-wide need for housing legislation.

The direct arguments for state control of housing which have been set forth by Mr. Lawrence Veiller in his book "Housing Reform," are incontrovertible, and there is no state that needs such legislation more than Massachusetts. No other state has an equal urban population distributed in many cities. There are twenty-seven cities and one town that have populations of more than 20,000. Sixty-two per cent of the people in the state live in cities of more than 30,000. An increase in population of more than 30 per cent each decade is common. The prices of real estate at the centers are going up by leaps and bounds — frequently doubling in less than ten years. There is being repeated in many of the centers, the crowding of houses which has been going on in Boston for one hundred years and has made its center notorious. Into already congested centers, large, poorly-lighted new houses are being crowded rapidly. For a century their dark rooms will continue to drive occupants into the street and foster disease as much as the old houses. With greater fire risks, conditions identical with those of New York's East Side are increasing yearly.

Yet the state law has practically no housing requirements and the ordinances in the majority of the cities are either worthless or ignore the subject of light, ventilation and sanitation. In a few cities such as Cambridge, Worcester and Lowell, there are a few fair requirements.

But most of the real and best housing interests of the cities are wholly unprovided for. Nine out of ten of the building codes treat of no other subject than fire protection and structural safety, and for these two purposes many of them are gravely inadequate.

Consider the requirements for part of the sanitary equipment, the water-closets. There is no requirement concerning the number of water-closets that shall be placed in a house in eleven cities; and in a twelfth city the requirement is one for every twelve persons, a method of measurement that is almost useless. Three cities permit water-closet windows to open on a shaft of three square feet area, three others permit flues of six to eight inches; seven accept in place of a window the small two-inch pipe known as the local vent; two say the ventilation shall be "adequate," and six cities have no requirement. Practically no one of the cities has anything to say about the floors.

In securing building codes from the twenty-seven cities which have a population of more than 20,000, it was found that two cities have no code, and four codes were out of print. Among twenty-one codes, fifteen speak of the space from the sides of a house to the side lot line, specifying distances that range from 1.5 feet to three feet, with only one city requiring four feet; such restrictions in all codes being made applicable to frame buildings only. Six codes are silent on the subject. Five codes only have anything to say about yards. Two codes only speak of courts. Shafts and light-wells are almost unmentioned. Only three codes have anything to say about the size or presence of a window in a room. Life is too short even to read a summary of all the important matters upon which these codes are silent.

If one glances casually into the paragraphs of many of the codes, he is impressed with the fact that they read well. Some of them have good requirements, very good requirements. But the impression that the paragraphs are good is not sufficient basis for judgment of the code as a whole. Such impression is based on an altogether too meager view,—the comparison of these paragraphs with nothing. We ought to read the building code of our city with a point of view different from that. In view of the rapid growth of these cities and their centers; in view of the present pressing need that conflagration hazard and fire waste be reduced, not augmented; that old houses be improved; that all houses be maintained in safe and serviceable, clean and sanitary conditions; that every new house shall for all time have adequate light and ventilation; in view of these needs, most of the present building ordinances are so ineffective and archaic as to be fit chiefly for a place in a historical library under the label, "The first crude playthings of the infant cities." This is not extravagant language spoken by an idealist. The better class of architects know and acknowledge it to be true and the prominent insurance men are active in proclaiming the fact to the public.

The General Court of Massachusetts is one of the few legislatures that persists in meeting annually. It holds long sessions and has created innumerable commissions: it has the commission habit. Yet none of the commissions in recent years has been on

housing, except the Homestead Commission, established June 30, 1911. This act provided for a permanent, unpaid commission of seven to report plans whereby, with the assistance of the Commonwealth, homesteads may be acquired by workmen in the suburbs of the cities and towns. As an attempt to foster communities like the garden cities of England such legislation, though desirable, is but a slight palliative. It does not deal with the problems discussed in this report. The Legislature has jealously held with tight hand to its great power over the cities; yet the sum total of its acts for the control of houses in a state which has twenty-seven large, rapidly-growing cities is a few trivial and ineffective paragraphs.*

In contrast with this most deplorable lack of legislation as it existed in January, 1912, we may well place the statement of one of Massachusetts' most prominent men.

“ We cannot push the troubles and cares of working men and women into the background, and trust that all will come out right in the end. Practical measures are plentiful enough:” among others: “ economical and energetic municipal governments; proper building laws. Here are matters of great pith and moment, more important, more essential, more pressing than any others. They must be met; they cannot be shirked or evaded.”

These are the words of Senator Henry Cabot Lodge spoken twenty-eight years ago.

Lawrence at that time was a city of 38,000 and the history of its center would have been far different if action to remedy the need that was then recognized had not been delayed through all these years.

But the national prize for procrastination in housing legislation is held by Boston. Boston began having housing

* Just after the completion of this report a bill was introduced into the Legislature and passed May, 1912, which gives permission to the towns to enact the housing regulations therein specified. The legislation has nothing to do with the cities considered in this report. It serves for the towns as a model law which has received the stamp of approval by the State Legislature. They may adopt it, if they choose.

investigations almost as early as New York. The 1849 report of the cholera epidemic shows the crowded tenement districts in clear and definite lines. The report of the Sanitary Commission of 1850 not only sets forth at length the evils of bad houses in Boston and London, but states the need for *prevention*, rather than cure so clearly that it reads as if it had been written for our needs as we see them now.

After citing various philanthropic purposes, the report continues: "*A great amount of labor and money are spent in the propagation of these sentiments. But how few of such persons (the philanthropic) apparently turn aside to notice the thousands of lives that are unnecessarily sacrificed — the social murders and suicides that are daily occurring around us on account of the existing evils which might be removed. If the same zeal, labor and money were expended in diffusing correct sanitary information among the people, in removing the causes of diseases which prey upon them,—how many more lives might be saved. We would not lisp a word against the great charities, nor wish the contributions to them had been smaller. It may, however, be stated that the number of recipients of these charities is comparatively few and limited. They comprehend a very small part only of the great masses of the people. And there is no doubt that if the same amount of money which our measure might require were applied to the careful ascertainment of the causes, a much greater number of beneficiaries might be assisted. All along we have endeavored to prove that prevention is better than cure. We urge the removal of the causes that produce the misery which these streams of benevolence are applied to alleviate.*" This is not "Boston — 1915" but Boston — 1850.

Since 1850 numerous investigations have taken place with little or no adequate result beyond the printed report. Until, after all these years, the last word at the opening of 1912 is a small pamphlet which bears the significant title, "Boston's Housing Problem — Preliminary Report." It professedly takes up the work of the Housing Committee of "Boston — 1915" where that committee left it, saying that the needs have been sufficiently investigated; hence its pages are devoted to the discussion of

so-called remedies. There is but one remedy — and that is barely alluded to in the report. Nothing is said of legislation directly. It asserts the duty of the city not to bear down heavily on the holders of small equities in tenement houses as if, inferentially, this is an insurmountable obstacle and ought to dispel from the mind of the reader any consideration of legislation.

Of course the word preliminary in the title of this last pamphlet merely means that it is the first report of another new group who are beginning to take an interest in housing, and that fact leads one to wonder what has become of the interest of the men who brought in all the previous reports. When the need has so long been so pressing and overwhelmingly great, the fact that all reports have been so fruitless should in itself be a subject for serious study and report. For Boston's history in this subject is not different from New York's through all the years of its dire need for action up to the year 1900. There, too, reports had accomplished almost nothing, while the most dangerous and defective houses were being added by the thousands for every year of delay. From 1900 on, the preëminently singular fact among a score of salient facts is that the small group of men who were active in the 1900 tenement house commission were just as active twelve years later and just as single in purpose. Apparently for them the maintenance of a decent law well administered that prevents the construction of the worst houses admits of no action on their part in any tangential line, tax reform, model houses, city planning or any other. The results have been most remarkable.

Chicago has a strikingly similar historical fact in another field of activity. A handful of men around a stationer began to tell in the bulletins of the Municipal Voters League who, and exactly who with all their characteristics, were being nominated for election as aldermen. The majority of the men in the council chamber for years had been venal, and the city's streets were about to be sold to the street railways for fifty years. The League's succinct statements based on comprehensively minute examination continued for at least a decade to appear just prior to each election; but they gave no advice on any other candidates than those for council and on no public questions. By this method

this very small group of men turned the council inside out in time to save the streets and kept it renovated.

In contrast with innumerable reports brought in by different groups at different times and bearing no results, what we have in these two historical instances seems to be: A program so simple that it can be stated in a sentence, yet is fundamentally adequate, adhered to undeviatingly through a long period. The prime need in Massachusetts where so many centers are crying to heaven for preventive legislation is a small group of wise men with money, who care, will keep on caring and will keep together. To secure a good law, keep it and keep it well enforced cannot be accomplished in one or two winters, nor can it be accomplished by the intermittent attention of any number of social workers.

The hardships involved in new legislation are not extensive. The wiping out of the equities of small owners is a minor incident, full of hardship for a very few, but not adequate ground for further criminal waiting. This hardship was not a convincing argument to a single judge in all the various courts up to and including the United States Supreme Court, through which the historic Katie Moeschen case passed, though it was the main argument in that case. It is not a convincing argument after all these years during which the introduction of new machines has been displacing so many industrial workers. The hardships of a few can not be placed over against the welfare and progress of the whole community.

If this is true of those who at present hold control by small equities over tenement houses, what shall we say of their right to build new tenement houses at the crowded centers? They build wretched houses. One of the worst of the recently built tenements in Lawrence was constructed under the control of a laborer, who makes his living delivering baskets of coal on his back. He has secured control of a lot adjoining his first house and is planning to erect a second one of these wretched beehives for twelve families. One of the worst new rear buildings, less than four years old, was constructed under the control of another recent immigrant whose family lives in a small house which he owns, in the front of the lot. His aged mother sleeps in a windowless

room; his wife and daughter are kept hard at work in the kitchen for boarders, and he is away all summer on his truck farm. He was planning to erect soon a second wretched tenement at the front of the lot. Such hard-working but ignorant and unskilled laborers, whose sole object is the saving of money and whose standard for themselves and their families is often miserable, are able to save one or two thousand dollars. They have no sense of civic responsibility and not the slightest ability to design a house for that most difficult of sites, the narrow city lot. Their right to own their own home is one thing, and their right to go into the business of providing and maintaining homes for other people, under no control, is quite a different matter. Such men as these apply to the banks and secure, many times with little or no examination of plans, loans that make it possible for them to burden the future of the city with their low standards built into a house. This is not peculiar to Lawrence; it is taking place in all the cities of Massachusetts. The wretched houses that are being thus constructed will last from sixty to one hundred years, and they will cost the cities dearly in weakened lives and lowered standards.

There are twenty-seven reasons why the state should not enact any housing legislation. They are the groups of men who are taking inordinate profits in the houses at the centers of the twenty-seven cities. There are twenty-seven other groups of men who would be found favoring the legislation, especially after they consider what it means to them. These are men who know what a good building is and are doing their best to construct only that kind. They have been and they will increasingly be forced into bad construction, because they are in competition with unrestrained, conscienceless or ignorant builders. There is no doubt that they will welcome housing legislation. Naturally some of them may hold back from favoring some of the standards that might be enacted, but their approval would be forthcoming shortly, if they were to inquire into the experience of other cities. One reason why the hardship of new high standards is more mythical than real, is because every builder at first thinks of himself alone as complying with the standards. In reality, all builders bear the

change, and the figures of the better builders can be made to accommodate themselves to the standards.

The two strongest arguments against a state law are, first that minimum standards enacted will level down some of the construction now taking place, and second that it would be almost impossible to make a law which equitably deals with the varying conditions that exist in different cities. To illustrate the possible leveling down effect of the law, let us consider the open space between the side wall of a house and its lot. Some builders who are now making the width of this space, without a law, six or seven feet, might with a law leave only the minimum demanded and that might not be more than five or six feet. Thus a considerable number of houses might be given some less light than they would have been given, if the law had not been passed. It is conjectural, of course, how extensive such leveling would be. The reason why six or seven feet and more is now left by some builders is, they believe the houses are better houses,—have more value in them. It is questionable whether there would be any considerable leveling, except possibly in a narrow zone just at the edge around the centers. Even if it were positively determinable that there would be considerable leveling, the idea that it should be avoided by allowing the centers to fill up solidly with any kind of construction is untenable.

The loss made by the law is far outweighed by gains. Consider the question of leveling down in connection with a minimum-sized room. The minimum in the New York law of seventy square feet floor space was enacted for the most exceptional crowding on the face of the earth. Outside of Boston's wretched center there is no reason for enacting a standard anywhere near so low. If we can judge from the conditions in Lawrence, the cities have not been constructing any considerable number of rooms nearly so small as seventy square feet. In general the public has not become accustomed to such small rooms, and will not rent them. It ought to be possible, now, to enact a requirement for cities outside of Boston that no room shall have less than ninety or one hundred square feet. But will that be possible ten years from now? Already in Lawrence in some of the newest

houses there are rooms of seventy-five and eighty square feet. They are occupied by recent immigrants and they have lot line windows. Evidently, the point has been reached already in Lawrence where the large returns desired must come from making the rooms smaller and forcing people to become used to them. No matter how many rooms would be leveled down by the enactment of a hundred-foot minimum now, they do not outweigh the probability of having to accept ten years from now a minimum of seventy square feet.

To write a law that would deal equitably with the varying conditions in the different cities is neither impossible nor almost impossible, but simply difficult. The housing problem is of course a group of problems in any city, and when we add the differences that exist between cities, as Springfield contrasted with Lawrence, Chicopee with Pittsfield, etc., we have made the question somewhat complex. Yet it is seriously questionable whether our sense of the complications is not due to too hurried and superficial consideration of the subject. Lowell has a center full of bad old houses and has indefensibly bad new houses, but the Lawrence center has not been duplicated there. It is probably demonstrable that the house huddle in Lawrence is not due to the wage scale. It is chiefly difference in wages that would make any reason for thinking the standards of a state law ought not to be equally applicable in all the cities. For the other elements are all common,—the human need for safety, sanitary equipment, light and air. To secure these, irreducible minimum standards would seem to be related only indirectly to the character of the population or the locality. If the same social foresight will prevail in housing legislation that has already prevailed in some of the state legislation, it will make the common need for safety, sanitary equipment, light and air, the all controlling factor in the question. Without doubt, the law should be specific in its demands and they should be based on an extended examination of the facts gathered and related in a scientific spirit.

Massachusetts will find a way to meet the need. Anyone would have thought that Boston's crooked streets would have been one of the last places for a trial of cars with trolley poles and

wires. Yet Boston was one of the first of the largest cities to make use of such arrangements. Boston's center needed the electric power more than most cities. The transportation perplexities in Boston, with such traffic as one hundred and twenty cars per hour passing steadily through Tremont Street, and with a most difficult topography, made one of the worst problems in the country. But Boston was one of the first cities to come somewhere near adequately solving her transportation problem, and apparently she is doing more than many cities in keeping pace with it. The exceptionally great need brought the adequate and seemingly impossible remedy.

The statement that the need for restrictive housing legislation is greater in Massachusetts than in any other state is probably unquestionable, based on the present lack of legislation, the total number of lives involved, the number of urban centers and the speed with which those centers are filling. Massachusetts has an exceptionally great opportunity to lead the other states in establishing and maintaining an adequate remedy. The subject is, primarily, a question of public health. Massachusetts was the first state to establish a State Board of Health with state-wide functions.

No state law meets the need that does not provide adequately for supervising the local administration of the law. Connecticut has a fair state law and no provision for direct or indirect watch-care of its enforcement. New Jersey has direct state enforcement of a law that is most seriously defective. State supervision of a locally administered law has yet to be effected. If a permanent housing commission of the dignity and status of the Railroad Commission were not established, Massachusetts has already established, and was among the first states to establish, state inspectors of health, with whom the supervision of a State housing law could be placed. It was the first state to establish a health district system with physicians as state inspectors. These physicians are doing pioneer work in demonstrating that factory and tenement house hygiene are a part of community hygiene.

No state law would meet the need that did not require that the cities shall keep uniform statistics and that the statistics shall

be subject to a ready verification as is demanded in auditing financial accounts. The statements of a city department concerning its activity in enforcing the law must be based upon records which can be readily examined and verified. It must also be possible to compare the working of the law in the various cities, and that would require uniform statistics. In its bureau of statistics, Massachusetts has already adopted the principle of demanding uniform financial statistics from all its cities and towns. It was among the first to do this, and is leading the others in its accomplishment.

The long list of progressive movements in which Massachusetts stands first and near the first is an earnest that the shameful neglect of the housing conditions will not continue much longer.

HOUSING, MISCELLANY AND TABLES

STAIRS WITH WINDING TREADS

The New York state law excludes from all stairs, except those in elevator houses, every step which is not of uniform width throughout its length, that is, the triangular treads. They are common current practice with architects in Lawrence. There are approximately 600 such triangular steps in seventy of the houses examined. By day these steps are a trap for unwary feet, especially for the very young and very old. They are constantly an unmitigated nuisance and danger for every one in unlighted halls at night. They are extremely dangerous at time of panic in a fire at night. If thousands and thousands of houses have been built for ten years in New York without these steps, it is a fair question to raise whether they are necessary in Lawrence.

THE NUMBER OF PERSONS IN APARTMENTS

The proportion of apartments which contained more than one family is as follows.

The number of families in each apartment is:

	More than Two	Two	More than One
Common Street	21 per cent	40 per cent	61 per cent
Valley "	1 " "	14 " "	15 " "
Oak "	0 " "	22 " "	22 " "
Oxford "	0 " "	0 " "	0 " "

The following statements apply to the Common Street half-blocks. In the twenty-two per cent (forty-two apartments) where there are more than two families in each apartment, there are 460 persons living, an average of eleven persons per apartment.

In forty-one apartments there is an average of more than three persons in each room, excluding the kitchen. Each of six apartments is the home for fourteen persons, one for fifteen, and one for eighteen; all the apartments having four rooms besides a

kitchen. The rate of four persons per room is reached in the apartment where eighteen live and also in another apartment where eight persons live in two rooms and kitchen.

The average number of persons per apartment was as follows: in the two half-blocks at the east end of Common Street, the average was eight; in one of the Valley Street half-blocks, 6.5; in the other, 6; in the Oak Street half-block, 5.9; and in Oxford Street, 4.6.

AIR SHAFTS; WINDOWLESS HALLS; SMALL ROOMS.

Air shafts that serve solely water closets and bath-rooms are being constructed in Brooklyn. The area required in a three-story house is at least fourteen square feet, in a four-story house at least seventeen square feet. There can be no dimension less than four feet, no hall or room window opening to the shaft, no roof of any kind, and at the bottom there must be a horizontal duct of four square feet to furnish a supply of fresh air.

In the six half-blocks four air shafts were measured where the area is less than ten square feet. A fifth has twelve square feet. One of the shafts is the only source of light and ventilation for eight living rooms, the other shafts serve 26 water closets, 19 sink rooms and one living room.

In the district examination there were found 20 air shafts which do not serve living rooms, six of them have areas smaller than would be required in Brooklyn practice. All the shafts are covered with a skylight; a few are open to the cellar and no one of them has a duct supplying fresh air at the bottom. The shafts serve 115 water closets and 50 sink rooms. This location of the sink rooms which are the work rooms for the women is seriously defective in ventilation and light.

Among twenty-two stair halls where there are no windows, there are nine that have no skylight. A skylight that serves to light halls ought to be twenty square feet in area and there should be immediately under it that open space at the side of the stairs which is called the stair well. This stair well to be effective should be at least twelve inches wide. There are five windowless stair halls where the skylights have an area less than eleven square feet, and

in four of them there are no stair wells. In sixteen of the halls where there are skylights there are no ventilating attachments.

In the six half-blocks there are no rooms with a strikingly small floor area excepting in the two half-blocks on Common street. There twelve rooms in six houses have areas less than seventy square feet; six of them being from fifty to sixty square feet in area. Eleven were used as bed-rooms.

In the windowless rooms mentioned on page 64 the area of the intercommunicating window is less than six square feet in each of eleven rooms. In two others there is an area from ten to twelve square feet. Among the remaining eight where the area is more than fifteen square feet, in four rooms the large interior windows secure no secondary light, and they are practically dark rooms.

PERCENTAGE OF OCCUPANCY ON CORNER LOTS

On corner lots less than 50 feet wide, less than 90 per cent of the lot should be occupied, and there ought to be a rear yard of not less than five feet for the full width of the lot. In nine corner lots two are occupied to the extent of 95.5 per cent, and there is no yard whatever on either lot. On another lot where the percentage of occupancy is not too high, the rear yard is less than two feet deep.

There is another class of corner lots where instead of a second street at the side of the house, a fourteen-foot alley occurs. A house on such a corner does not receive more than a third as much light as one on an ordinary street corner. It ought not to occupy more than 75 percent of the lot. There are five such corners in these six half-blocks; and on one of them the house occupies 91.7 percent and has no rear yard. In two others 82 to 85 percent is occupied, one of the rear yards being 3ft. 6in. in depth.

THE OPEN SPACES ON THE LOTS

Concerning the open spaces at various points around a house, there are one or two terms which have the same meaning in nearly all laws, but there are some spaces for which there is no one term commonly used. If a name is to be given them, it has to be explained.

Rear yard in this report means the space between a house and an alley or rear lot line. Such spaces in connection with corner lots have been mentioned. There are two rear yards on interior lots less than 7.5 feet deep; one 16 feet deep; the rest more than 25 feet. In the majority of the lots there is either a rear house on the alley line and so no rear yard or else there is only a front house with a rear yard of good depth.

Interior yard means the space between front and rear houses. If such a yard were to occur in connection with new tenement houses in the Connecticut cities it would have to be thirty feet deep. It is prohibited in Brooklyn on lots less than fifty feet in width, and on other lots it would have to be twenty-four feet deep. Hence there are practically no interior yards. In effect they have been outlawed. In the six half-blocks examined there are forty-one such spaces; ten of them less than 7.5 feet in depth; nineteen from 7.5 to 12; eleven from 12 to 24; one 25 feet.

By side court is meant the space at the side of a house, if such space extends fully from the front to the rear of the house. The widths found in the side courts are shown in the following statement. There is no reference in it to any other walls than those which contain windows to living rooms. The distance of such walls to the opposite side lot line is as follows:

on the lot line	12 walls
less than a foot	18 "
1 to 2 feet	31 "
2 feet to 2.7 feet	35 "
2.8 feet to 4 feet	30 "

These figures should be related with the commonly accepted principle that in the matter of light every house should be entirely independent of adjoining lots.

An outer court is the open space at the side of the house that does not extend through for the full depth of the house. In the six half-blocks examined, among five such spaces located on the lot line, one is 2.7 feet wide; the others four feet or more. Outer courts between the wings of a house ought to be at least 8 feet wide.

Among ten such courts nine have a width less than eight feet and serve altogether sixty-seven living rooms. The following are the details.

In	Widths	Rooms
One court	6.7 feet	6
Six courts	4 to 6 "	49
Two "	3.2 "	12

There are in the two districts houses where 105 living rooms receive their light from 18 outer courts in which the widths are less than eight feet. All these courts are between the wings of a double house. Their widths and the number of living rooms they serve is as follows:

In	Widths	Rooms
Seven courts	6 to 8 feet	38
Seven "	4 to 6 "	43
Four "	4 feet or less	24

Many of these outer courts contain various encroachments such as porches or balconies and several are thus almost completely filled. One of the narrowest is entirely roofed over with the boards of a clothes-yard. No obstruction of any kind is allowed in Connecticut or in Brooklyn practice.

Another court not included in those mentioned above is situated between wings. A roof covers all of it and stairs and porches occupy the greater part of it, but the porches are intermitted at the inner end, more than 25 feet from the rear of the building. A skylight is placed over this open space, making what might be described as a porch well. Six bed-rooms and water closets are lighted from this well, but the amount of light secured in the two lower floors is very meager, the bed-rooms having almost no light.

An inner court is open space that is wholly surrounded by a house, or is bounded on three sides by the same house, and on the fourth side by a lot line. Two such courts on lot lines serving three living-rooms each occur in two four-story houses located in the two districts examined. One of these courts is eight feet long, where Brooklyn and Connecticut practice would require it to be fourteen feet. The other is three feet wide, and 10 feet deep, as against a standard of eight feet wide by 14 feet deep.

THE AMERICAN WOOLEN COMPANY'S HOUSES

From 1906 to 1910 the American Woolen Company built in South Lawrence houses for 142 families as follows: Twelve one-family houses for overseers; fifty-two cottages; forty-two one-family, two-story brick houses; six three-story three-family frame houses; and three six-family frame houses. All these houses are superior to most houses that have been erected by manufacturing companies, and they are superior to most of the commercially built houses in Lawrence. The most interesting as homes for working people are the cottages and the two-story brick houses.

The following description of the single family brick houses is given by the architect who built them, Mr. James E. Allen of Lawrence.

Six buildings erected by the American Woolen Company on Market Street, for occupancy by their operatives are perhaps worthy of more than passing mention, not that any new type of building has been evolved but that an old type, the Philadelphia House so called, has been carefully studied, improved as regards the interior arrangement of its rooms, and carefully designed as regards its exterior with the result that very comfortable, economically arranged interiors and particularly pleasing exteriors have been produced.

The lot of land upon which these six buildings were built has a street frontage of 475 feet, and is 100 feet in depth, and is subdivided into four parts by three forty-five feet private ways extending from the street to the rear of the lot. The buildings are fronted upon these private ways which are traversed by eight feet walks running the entire length with narrower walks leading to the front doors, and the ground areas between these walks are planted with shrubbery. The utilization of the land in this way not only allowed the erection of two more dwellings than would have been possible had the buildings been faced on the street and been built in one continuous block of dwellings but also allowed two out of every seven dwellings to be of five rooms and with light on three sides. Moreover, it greatly added to the appearance of the street and buildings and is a plan which might be followed to advantage



ONE OF THE SIX BLOCKS OF SEVEN HOUSES

on land having a depth of 100 feet or more, because each dwelling by such arrangement occupies, including back yards and proportionate part of the front passageway, an area of about 1130 square feet, as against an area of 1400 square feet, if fronted on the street on a lot 100 feet deep.

Each of the buildings is 98 feet, 8 inches long and 39 feet wide and contains seven dwellings, each with a frontage of fourteen feet, and a depth of thirty-nine feet, two of which contain five rooms and five of which contain four rooms, besides front vestibules, rear entries, bathrooms and all necessary pantry and clothes closets. Each of the dwellings is entirely separated from the others by a brick partition wall running from cellar bottom to roof and each has its independent front and rear entrance and a rear piazza 6 x 10 feet, which is arranged within the main walls of the building and consequently is included within the size given. Each dwelling has also its own small back yard, fenced with a wire fence four feet high.

The plumbing system of one has no connection with that of any other dwelling, in order that those unoccupied in cold weather may be properly drained and freezing avoided, and a separate water meter is provided for each tenant in order that water waste may be properly traced and corrected.

The interiors of these houses are quite as unusual to this type of house as are the exteriors, the arrangement of the rooms and stairway being such that a single stairway is able to serve as both front and back stairs and may be approached and entered onto from either the living room or the kitchen.

The first floor of each dwelling is divided into a small front vestibule, a moderate sized living room, a generous kitchen together with the necessary accompaniments of pantry and dish closets, a back entry of sufficient size to accommodate a refrigerator and the cosy recessed piazza before mentioned.

The second floor is utilized for bed rooms and bath room, three bed rooms in the five room dwellings and two in the four room dwellings, the bath room being so located that a register in the kitchen ceiling provides the necessary heat in cold weather.

Throughout the buildings the window and door openings have been placed so as to preserve the greatest amount of unbroken wall space and in each dwelling one of the bed rooms has been made of sufficient size to accommodate two beds, thus small houses by skillful planning have been made comfortable quarters for reasonably large families.

The buildings are built of common red bricks laid to easy joints in white mortar, all stone trimmings are of white marble with tooled surfaces and all wood trimmings including the sash are painted white. The color combination of the red bricks with the white stone and wood trimming, taken together with the refinement of detail in the design of these buildings, their unusual arrangement on the lot, the avoidance of monotony by harmonious diversity of exterior treatment of the buildings, which are all of the same floor arrangement tend to make them much more attractive in appearance than is the case with most buildings of this type.

While by "rule of thumb" figuring of the "quick return" speculator it does not seem possible to erect such buildings as these to compete, on an investment basis, with the larger three and four storied frame tenement block or even the so called "Three Deckers" both with their common halls and stairways and other undesirable features, it is believed that the net returns from such buildings covering a period of twenty years with their obvious smaller repair bills and less loss of rent by reason of empties will compare very

favorably with that from the undesirable class of building above mentioned.

The following description of the cottages was furnished by the architect who built them, Mr. Perley F. Gilbert of Lowell and Andover.

The fifty-two cottages are one and one-half story, six room cottages, covering a ground area of from 576 to 721 square feet, exclusive of the piazzas and steps. Four of these, however, are practically two stories high.

They can be built for a sum ranging between \$2100 and \$2475, according to the number of buildings erected at one time and to the particular types of cottages used.

Arranged on the first floor of each cottage is a cosy staircase hall having a large hall closet, a living-room, dining-room, kitchen, pantry, china-cupboard, and a large back entry with space for ice box and storage. On the second floor are the three chambers and a bath-room, all connected by a well lighted hall and in the attic there is a place for storage entered by means of a trap door in the ceiling of the second story hall. All of the bed-rooms are well ventilated, having windows on two sides of the room. The closets are very spacious in proportion to the size of the buildings, there being four in every house and five in the majority of them. Provision is made so that all of the first story rooms and two or three of the chambers may be heated with stoves, and there are floor registers over the kitchen and dining-room stoves for conveying warm air to one or two chambers and the bath-room above.

The clear height of the basement is seven feet, of the first, and second stories about eight feet.

Outside there is considerable individuality, for to each type of plan there are many variations in the exterior designs: the gambrel roofs and shingled walls predominating, although there are some hipped and pitched roofs and a very few clapboarded walls to be seen. A comfortable and inviting porch may be found on every house, in fact, every building was designed to secure an attractive exterior and interior also and to give to the tenant a neat little home in very many ways superior to the ordinary run of cottage tenement and yet within reasonable cost limits.

The prices stated include the following items for each cottage, viz: — Setting the batters; the excavation of the cellar under the whole of the building; foundation-work; cemented floor, coal bin, vegetable closet and bulkhead in cellar; sewer connections; carpenter-work; brick-work; plastering; clothes posts in yard; hardware; open plumbing, including sink in pantry, also a water-closet, lavatory and bath tub in bath-room, supplied throughout with hot and cold water; gas piping and gas fixtures; painting; wall paper and picture moulding in every room except that the walls of pantry, bath-room and kitchen are painted; plate-rail in dining-room; fly-screens and window shades throughout.

NOTES CONCERNING FIGURES AND METHODS

The Figures for New Houses

The records of the office of Building Inspector begin June 1, 1906, and were examined to the date June 30, 1911. The statistics in the yearly reports of this office give the houses for which permits were issued. This is the practice in most cities, but such practice always includes figures concerning a considerable number of houses that are never built. Such houses are not included in the statement in the first pages of this report.

The figures for new houses, however, do not indicate quite all the tenements which are constructed each year; for old houses are constantly being enlarged. One very common form of alteration is the change of a pitch roof to a flat roof, and one or two tenements are thereby added in each house, and frequently the house is brought thus from the two tenement class into the three tenement. The number of tenements which have been constructed by additions and alterations as shown in the yearly reports of the building inspector for four and one half years is 283. Alterations which have involved very extensive changes have been regarded by the building inspector as new buildings, and have been so recorded.

The House Census

Unlike other cities in New England three or four of the water power cities are laid out with alleys. Lawrence's alleys occur chiefly at the center. For convenience in this report the word "block" has been used to mean the city square surrounded by streets, and "half-block" is given the arbitrary meaning, any sub-division of a block made by an alley. One blank census form for each half-block or block was set up from the Sanborn insurance map for the most of the city, and from the Richards' atlas for the rest. The filling of the forms in the field, verified and enlarged the facts shown upon the maps. The most general summary concerning the distribution of apartments has already been given on page 33. It shows that in the central district the density of apartments is about four and one-half times the density in the rest of North Lawrence, and more than twelve times the density in South Lawrence.

Block and District Examination

Besides the house census, including the study of 300 central acres, the other three methods followed were: a complete investigation of certain

half-blocks, a special examination of two large districts, and an examination of recently built houses with a study of new building statistics. In the investigation of the half blocks a 5 in. by 8 in. card form covering about two hundred items was applied to each house; another card form was filled out for each apartment; and a lot occupancy form was used in measuring and making sketches of the lot and house dimensions found at each premise. In the district examination every house was viewed, and a form filled out for each large house.

Density of Population in Six Half-Blocks

In filling out the apartment cards for the six half-blocks examined a census was taken of the number of persons living in each apartment. For this purpose an interpreter was used in the Common Street blocks, and in a few of the apartments on Oak Street. From the data it is possible to study the density of population in the six half-blocks as it existed in the spring of 1911.

In the spring of 1911 the number of vacant tenements was unusually large, the mills were running on part time, rents in several apartments were said to be twenty-five and fifty cents a week lower than formerly, and expressions concerning poor business were common. So that an estimate of the probable density at times when there is regular employment, is not without value. Computing such density on the basis that half the apartments found vacant would in other seasons be occupied, at the same rate as the other apartments in the same block, the figures secured are those in the second column on page 60.

Density in Two Districts

The following statement refers to the table given on page 60, and the districts mentioned on page 87.

Including one half the surrounding street space, the area for the fourth half-block is slightly less than an acre, and for each of the others between one and two acres. It is not possible to secure from the 1910 census the necessary figures for a comparison of all the foregoing densities with those of adjacent larger districts. There are, however, available figures for two districts in which two of these half-blocks occur. One district lies between Hampshire and Franklin streets, the alley south of Common Street and Bradford Street. It contains fourteen and nine-tenths acres, and includes half-block number three. The average density of population in this district is 216 per acre to be compared with 327 in the half-block. The other district lies between Hampshire and Lawrence, Oak and Chestnut streets. It contains 17.3 acres and includes half-block number five. Here the average density of population is 214 per acre to be compared with 287 in the half-block.

Density in the Central District

The figure 33,700 elsewhere given for 300 acres is chiefly the actual count made in the federal census. But a few of the census enumeration districts are split by the boundaries of the central district, and for those areas the number of apartments, as secured in the house census examination, was applied to the average size of family in that district. This method yielded the total, 33,760.

Four-Story Frame Houses

The figures given for the cities of Massachusetts in the first pages of the report are not on record in the various cities or anywhere. They were secured from the Sanborn insurance maps; the first count was verified; and the number that has been given is the multiple of five next above the count.

Definition of House

House, lot, apartment, family, living-room, these most common of words that appear so constantly in all building regulations and statistics are never given any definition in the law; yet, on the content of the word both statistics and the administration of the law seriously depend in hundreds of cases. They are a fair example of the inexact and unscientific basis on which many laws are drawn. The inexactness gives opportunity for favoritism in the administration of the law and it vitiates comparative statistics.

The ordinary meaning of the word house is of no use in dealing with long rows of houses of the form that exists exclusively in Manhattan and is found almost exclusively in Brooklyn and Philadelphia. There the subdivision of blocks into houses is not always easy, but it is much easier than it is in some cities where, as in Lawrence, the so-called semi-detached, attached and detached houses are found mingled promiscuously in all sorts of relation to each other, to the street, to the lot and to the fact of ownership. In the administration of a law it is unavoidable that values be assigned to the separating and unifying facts, interior common use, exterior common use, common ownership, marketable unit and others. Such values must be balanced off against each other as they exist in various combinations at given premises.

In a house census no extended inquiry at each premise is feasible. The structure must be classified quickly. To accomplish this in the Lawrence census it was necessary to consider the so-called double house as one house. Hence the definitions that are found below were given to the young men who did the work.

The number of double houses, as thus defined, are:

678 double houses which contain 2432 apartments,
259 are two-family houses.
213 are four-family houses
104 are six-family houses
102 are in various combinations, 2 and 1, etc., up to 4 and 4.

The definitions that were given in the instructions for the census were:

HOUSE: Four outside walls with not more than one party wall.

(Four outside walls with more than one party wall is to be regarded as a group of houses, each house being the space between the party walls. If in some peculiar arrangement there seems to be good reason for making an exception in this method of classification, the reason should be discussed at the office.

PARTY WALL: Query: *Do the tenants on either side of the wall use in common any stairs or halls or parts of them?* If the answer is negative the wall is to be regarded as party wall.

(For the purpose of this classification balconies or porches need not be considered. Porches connected by stairs are sufficiently covered in the question. The direction of the wall is of no moment. The idea of marketable unit is ignored. Emergency use, as fire egress, is not to be considered.)

HOUSE CENSUS

(April, 1911)

NUMBER OF HOUSES CLASSIFIED BY MATERIALS AND BY LOCATION FRONT AND REAR

SEC.	NORTH LAWRENCE	WOOD			BRICK	MISCELLANEOUS		
		Front	Rear	Total		Front	Rear	Total
A	West of R. R. Tracks . .	1272	152	1424	3	2	1	3
B	R. R. Tracks to Lawrence St.	2021	308	2329	39			
C	Lawrence to Prospect .	1494	206	1700	134		1	1
D	East of Prospect St. . . .	700	34	734	3	3	1	4
	Total for North Lawrence, .	5487	700	6187	179	5	3	8
	SOUTH LAWRENCE							
E	West of Southern Div.							
	R. R. Tracks	408	53	461	2			
F	Southern Div. to Western Div.	360	13	373	1			
G	East of Western Div. . . .	894	53	947	44			
	Total for South Lawrence, .	1662	119	1781	47			
	TOTAL FOR LAWRENCE, . .	7149	819	7968	226	5	3	8

SUMMARY OF TOTALS

Wood,	7968
Brick,	226
Miscellaneous,	8
	8202

(A table classifying the houses by height in stories appears on page 48.)

LAWRENCE SURVEY

SUMMARY OF NUMBER OF APARTMENTS

SEC.	NORTH LAWRENCE	Front	Rear	Total
A	West of R. R. Tracks	2606	279	2885
B	R. R. Tracks to Lawrence St. . . .	5366	784	6150
C	Lawrence to Prospect	3844	517	4361
D	East of Prospect St.	1146	52	1198
	Total for North Lawrence	12962	1632	14594
	SOUTH LAWRENCE			
E	West of Southern Div. R. R. Tracks	756	67	823
F	Southern Div. to Western Div. . . .	595	20	615
G	East of Western Div.	1854	102	1956
	Total for South Lawrence	3205	189	3394
	TOTAL FOR LAWRENCE	16167	1821	17988

THE TOTAL NUMBER OF APARTMENTS

	In houses of one and two apartments	In houses of three apartments	In houses of more than three apartments	Totals
North Lawrence, . .	6528	3360	4706	14,594 (81%)
South Lawrence, . .	2071	696	627	3,394 (19%)
Totals,	8599 (48%)	4056 (22%)	5333 (30%)	17,988(100%)

TOTAL NUMBER OF REAR HOUSES AND APARTMENTS

	Number of Houses Apartments		Average Number of apartments per house
North Lawrence, . .	703	1632	2.3
South Lawrence, . .	119	189	1.6
Total for Lawrence, . .	822	1821	

BUILDING INSPECTOR'S RECORD

(June 1, 1906, to June 30, 1911)

NUMBER OF HOUSES BUILT, CLASSIFIED BY
HEIGHT IN STORIES

Year	HEIGHT BY STORIES						
	One	One and one-half	Two	Two and one-half	Three	Four	Five
1906 (7 months)	.	5		44	37	6	
1907		4		49	96	25	
1908		12	3	48	64	7	1
1909	1	56		100	140	38	
1910		39		73	101	16	
1911 (6 months)	1	7	22	15	35	7	
Total (5 years, 1 month)	2	123	25	329	473	99	1

NUMBER OF HOUSES BUILT, CLASSIFIED BY MATERIALS

Year	Wood	Brick	Miscellaneous
1906 (7 months)	91	1	
1907	166	8	
1908	135	0	
1909	333	1	1
1910	226	1	2
1911 (6 months)	86	1	
Total (5 years, 1 month)	1037	12	3

NUMBER OF APARTMENTS IN HOUSES CONSTRUCTED
FROM JUNE 1, 1906 TO JUNE 30, 1911

165	Apartment	in	165	Houses	of	One	Apartment	each
570	"	"	285	"	"	Two	"	
1335	"	"	445	"	"	Three	"	
188	"	"	47	"	"	Four	"	
15	"	"	3	"	"	Five	"	
384	"	"	64	"	"	Six	"	
84	"	"	12	"	"	Seven	"	
112	"	"	14	"	"	Eight	"	
210	"	"	17	"	"	more than eight	apartments	each
3063	Apartment	in	1052	Houses				

EXAMINATION OF SIX HALF-BLOCKS

(April, 1911)

SUMMARY OF RENTS

IN OCCUPIED APARTMENTS

	No. of Sq. Ft. in Lots Occupied by Houses	Annual Rent for Occupied Apartments	
		Total	Average per Sq. Ft.
Common St. (south side)			
East from Newbury (C11K)	35,835	\$17,488.	\$.488
West " " (C12K)	45,425	17,774.	.391
Valley St. (south side)			
East from Franklin (B16K)	44,412	12,078.	.272
West " " (B17K)	26,784	6,587.	.245
Oak St. (north side)			
West from White (B43L)	52,703	12,606.	.239
Oxford St. (west side)			
North from Essex (A52M)	33,600	8,447.	.251

ESTIMATE OF THE TOTAL RENTS

	Annual Rent for Occupied Apartments and Stores at Apt. Rate		Annual Rent for Occupied Apartments, Vacant Apartments and Stores	
	Total	Avg. per Sq. Ft.	Total	Avg. per Sq. Ft.
Common St. (south side)				
East from Newbury (C11K)	\$20,270.	.565	\$22,285.	.621
West " " (C12K)	24,027.	.529	25,821.	.568
Valley St. (south side)				
East from Franklin (B16K)	15,042.	.338	16,251.	.366
West " " (B17K)	8,095.	.302	8,758.	.327
Oak St. (north side)				
West from White, (B43L)	14,388.	.273	15,584.	.295
Oxford St. (west side)				
North from Essex (A52M)	9,279.	.276	10,805.	.321

(A table summarizing rates of rent per room per week appears on page 60b. Also the percentage of lot occupied by houses.)

THE EXTENT OF CROWDING IN APARTMENTS

	More than two persons per room excluding the kitchen		More than one family in each apartment	
	No. of Apts.*	No. of persons in the Apts.*	No. of Apts.*	No. of persons in the Apts.*
Common St. . . .	117 60%	1160 73%	120 61%	1152 72%
Valley St. . . .	40 28%	348 40%	22 15%	183 21%
Oak St.	26 27%	202 37%	21 22%	148 27%
Oxford St. . . .	1	19	7	36

	Three and more in each room		More than two families in each apartment	
	Apts.	Persons	Apts.	Persons
Oak St.	6 6%	48	0	0
Common St. . . .	41† 21%	460 29%	42† 21%	460 29%
Oxford St. . . .	0	0	0	0
Valley St. . . .	10 7%	102	2	23

* Percentages for all the apartments examined on the street named.

† Only 15 apartments are in both, i. e., 15 apartments have more than two families, and an average of three or more per room.

BOARDING AND LODGING HOUSES

The Number in the City	139
Under State Inspection	60
Not under State Inspection	79

THE SOURCES OF FIGURES AND QUOTATIONS RELATIVE TO HOUSING CONDITIONS

PAGE

- 35 ff. The facts concerning fire loss:
- Proceedings of the Forty-fifth Annual Meeting of the
National Board of Fire Underwriters (pp. 69, 70)
May 11, 1911.
- Conservation of Utilized Resources from Destruction
by Fire, 1910, (pp. 5, 6).
- Address of the President of the National Board of
Fire Underwriters of the Forty-fifth Annual
Meeting, May 11, 1911.
- 36 The Survey, July 1st, 1911, "Fire Waste," Powell Evans.
- 40 Pamphlet, "Individual Fire Fighting," Pub. by Rochester,
N. Y. Chamber of Commerce.
- 44 ff. Facts concerning Chelsea:
- Quarterly of the National Fire Protection Association,
July, 1908: "Chelsea Conflagration," (pp. 25-35).
- 46 Editorial in the New York World, October, 1911.
- 49 The Population of Massachusetts in 1910: Pamphlet
issued by Mass. Bureau of Statistics. Pub. 1911.
- 118 Speech of Senator Henry Cabot Lodge in New York,
December 22, 1884.

The facts concerning early houses were secured from Charles H. Littlefield, Secretary of the Board of Trade, Arthur D. Marble, City Engineer, J. J. Carey, Building Inspector, Oswald J. Cullington, Plumbing Inspector, and R. A. Hale of the Essex Co.

The sketches, maps and tables were made with the assistance of George W. Hinchcliffe.

PUBLIC HEALTH

By

FRANK B. SANBORN

PUBLIC HEALTH

This investigation of Public Health conditions has comprised chiefly three phases: (1) The healthfulness of the Water Supply; (2) The present methods of Sewage and Waste Disposal; and (3) The Milk Supply and its relation to Public Health. The investigation began in the spring of 1911 and continued through the fall. During the summer special attention was given by myself and two or more assistants to a personal examination of existing conditions; and these conditions, accompanied by certain recommendations, are discussed fully in the report, but for the convenience of those who may not wish to read the whole report, a summary of the essential points will be given in the paragraphs that immediately follow:

CONCLUSIONS — STATED BRIEFLY.—

1. The Water Supply is ample in amount for present needs and after filtration is of a quality that is favorable to good public health.
2. The Sewage and Garbage Disposal methods are passable from the public health viewpoint, but involve important engineering features which need attention.
3. The Milk Supply I have found to have been neglected and I believe that it needs material improvements in the interest of Public Health.

THE MILK SUPPLY

The importance of the Milk Supply as affecting the general conditions of Public Health, the lack of supervision at present, and the great advantages that all classes of population would derive by improvements, have caused me to give attention particularly to an investigation of the Milk question.

I have found that much of the milk that is sold in Lawrence is produced under conditions which expose it to serious contamination; there is little or no supervision or inspection from the time it is produced until it is consumed; the City has been giving practically no attention to the milk supply; licenses to sell milk have been only partially required; there has been no list of milk producers or contractors; few citizens know where the milk they drink comes from, in fact the milk dealer is the only one who is likely to know.

Epidemics in Lawrence have rarely been traced directly to milk, but serious epidemics have occurred in other cities when the milk supply has been neglected and such epidemics may at any time occur in Lawrence.

SUMMARY OF RECOMMENDATIONS:

For improving the milk supply certain recommendations are offered of which the following are general summaries:—

To classify the milk there shall be three grades:

1. Certified Milk which shall be milk of distinctly superior quality; produced from tuberculin-tested cows on the best of farms scoring 90 or above out of a possible 100, (according to the method of scoring to be later described). It shall be certified by a proper medical commission as required by the existing state law; and the milk shall have a bacterial count at the time of delivery in the city, of 10,000 or less per cubic centimeter. Such milk would sell at a price of fifteen to eighteen cents a quart.
2. Inspected Milk Heated which shall be milk produced on farms better than the ordinary and under clean conditions. Such

farms should score sixty-five or more, and the milk at the time of leaving the farm should not contain over 100,000 bacteria per cubic centimeter. Before delivery to consumers the milk should be further safeguarded against infectious diseases by being brought to a temperature of 145° Fahrenheit, held at that temperature for twenty minutes, then suddenly cooled to 40° F., and should be kept at about that temperature until it is used by the consumers. The price of this milk in Lawrence would be nine to ten cents a quart.

3. Market Milk Heated which shall include common milk — four-fifths of the total supply — produced on farms of fairly acceptable quality, but many of which are trying to produce large quantities with no special attention to quality. Milk from sick cows, or from dirty farms produced under conditions that are dangerous to good health, should not be admitted to the City. Every farm should show a score of at least 40 points out of a possible 100, and a bacterial count of 500,000 or less. All of the milk included in this class should without exception be heated to 145° F. for twenty minutes and suddenly cooled to 40° before it is delivered to consumers.

Furthermore, the people should have opportunity of knowing what grade of milk they are buying, and for that reason every can or bottle should be labeled in a manner similar to the requirements of pure food laws as Certified Milk, Inspected Milk Heated, or Market Milk Heated.

Besides a reasonable inspection of farms and dairies, the twenty or more bottling plants about the City should be examined, and their managers advised as to improvements. The sanitary conditions of the bottling plants are of equal or greater importance than that of milk farms. The City authorities could well maintain general supervision of dairies and bottling plants, inspect them and make laboratory tests of samples of milk, and then in fairness to all make public the results of these inspections and tests. Thus the people would be able to select the best supplies and the farmer, or milkman, could find a market in accordance with the quality of milk offered for sale.

Finally, as a recommendation of great importance — second only to that of heating or pasteurizing — I suggest the formation of a business organization of producers, or dealers. The special object of this organization would be to centralize; to have one central plant for receiving, purifying and safeguarding the milk, and, in due course, delivering it to consumers, all more thoroughly and systematically than can be done by a dozen small dealers handicapped as at present.

These constitute the principal recommendations of the report, but to understand rightly the reasons for them it is necessary to have in mind some of the conditions that exist and the relation that these conditions bear to Public Health.

THE RELATION OF MILK TO PUBLIC HEALTH: —

The necessity of having safe drinking water, which has been notably demonstrated in the past history of Lawrence, is now accepted without question by the public at large. Less general, however, is perception of the fact that milk is hardly second to water as a means of spreading disease through a community when once the milk supply becomes infected with the organisms of disease.

That milk does offer such an avenue to infection; and that the possibility of infection, and hence of serious epidemics, is peculiarly great in a city which receives its milk from a great variety of sources, has been abundantly demonstrated.

In Washington, D. C., about ten per cent of the cases of typhoid fever can be traced to milk. Attleboro, Massachusetts, with its population of 16,400, had forty-six cases of typhoid during last August and September, that were caused by typhoid from one farm.

In 1901 Schüder of Germany tabulated 650 typhoid epidemics; of these the supposed causes of 462 were reported as spread by water; 110 by milk and 78 by all other means. In Massachusetts Dr. Harrington reported that in two years, out of eighteen local outbreaks of typhoid fever, fourteen were traced to milk. Stamford, Connecticut, a town of 15,000 population, had 160 positive cases of typhoid and twenty-four suspicious cases in a period of

nine days. One hundred and forty-seven of the cases received milk from one dairyman. The epidemic continued until there were 386 cases.

Although the medical profession has yet been unable to determine the specific organism that causes scarlet fever, ample proof has developed showing that the disease is frequently transmitted by the medium of milk. Dr. Trask has compiled a list of fifty-one epidemics of scarlet fever as spread by milk, twenty-five in the United States and twenty-six in Great Britain. In Boston, Cambridge and Somerville, Massachusetts, an epidemic of scarlet fever occurred in 1907 which comprised 717 cases, and 85 per cent of the cases were found to be supplied by milk from one dealer.

Diphtheria is known to be spread by milk. Dr. Trask has reported that twenty-three epidemics from 1895 to 1907 have been traced to milk — fifteen occurred in the United States and eight in Great Britain.

Also a few epidemics of sore throat have occurred in Great Britain that were traced to milk, and during the past year one developed in Boston, Cambridge, and Brookline that was most virulent and alarming. In a period of a few weeks there were in these three localities 1043 cases of tonsilitis and sore throat. Among children the disease was mild, but among middle-aged persons it was severe; forty-eight deaths are known to have resulted from these cases. Many physicians at first attributed the sickness to "dust in the air," or "influenza" and pronounced as absurd the report that milk was the cause. A thorough investigation, however, has established the fact that a majority of all the cases indisputably came from one milk supply.

When milk is infected at only one milking the epidemic may be confined to a few cases, but when the milk is infected day after day, the outbreak will be prolonged, increasing in broadening circles. A milk epidemic is therefore typical in its onset. If cases are promptly reported, classified, and their origin traced, an epidemic can be stopped at the beginning. Furthermore, a practical way to prevent such epidemics would appear to be some form of heating, or sterilizing, the milk.

The relation of milk to public health begins on the farm at the time of milking and continues through the dairy, the bottling, the transportation, delivery to the consumers, and handling in the household. It is a long and circuitous route open to contamination at many points. That Lawrence has so far escaped serious epidemics by infected milk is good reason for expecting one at the present time. Furthermore, it is reasonable to assume that an increase in sickness and death by epidemics or otherwise is more liable to occur from dirty milk than from clean milk.

It may be of interest, then, for the reader to ascertain where the milk that is sold in Lawrence is produced, and the character of some of the farms that supply the milk.

WHERE THE MILK THAT IS SOLD IN LAWRENCE IS PRODUCED.

As an indication of the chaotic condition which prevails in regard to the milk supply of Lawrence, it is worth recording that, when this study was begun, it was found that the City Board of Health could not supply a list of licensed dealers who were selling milk in the city nor of the farms from which the dealers drew their supplies. The only city list available contained no names of dealers who had taken out milk licenses either in 1911 or in 1910. For 1909, there was an incomplete record extending from January to August. During this period of seven months, Dr. Thomas H. Collins had been acting as Milk Inspector; and records, which at the beginning of his term had been fairly satisfactory, gradually declined until for the past year and a half no official records were made of any licenses. For 1908, while Eugene A. McCarthy was inspector, a fairly complete list was kept, which, although three years out of date, appeared to be the best means available for ascertaining the present dealers.

As shown by the map on next page, nearly all milk is from the north, and one-fourth of it comes from Maine and Vermont towns 150 to 200 miles away. Very little milk comes from the South of Lawrence. The total milk supply of Lawrence, amounts to about 24,000 quarts. There are three main sources:—

CANADA

Lake Memphremagog

Newport

Orleans

Barton

Sutton

From these towns

2550 QUARTS DAILY

Shipped to Derry, N. H.
there pasteurized and
bottled; then shipped to
Lawrence.

Distance Sutton to Lawrence
194 Miles.

E. Barner

MS Indoes

W. Burke

Lyndonville

Lyndon

Centerville

Putsumpsic

NEW

HAMPSHIRE

VERMONT

From these towns

4000 QUARTS DAILY

Shipped to Auburn, Me. There
pasteurized and separated
into Cream and skim milk;
then shipped to Lawrence.

Distance Canton to Lawrence, 161 Miles

Livemore
Falls

Canton

Hartford

E. Sumner

Buckfield

Paris

Littlefield

AUBURN

MAINE

Sebago
Lake

Rangley
Lake

Richardson
Lake

Umbagog
Lake

Me. Cen. R.R.

Andover

Rumford
Falls

Dixfield

Peru

Me. Cen. R.R.

Paris

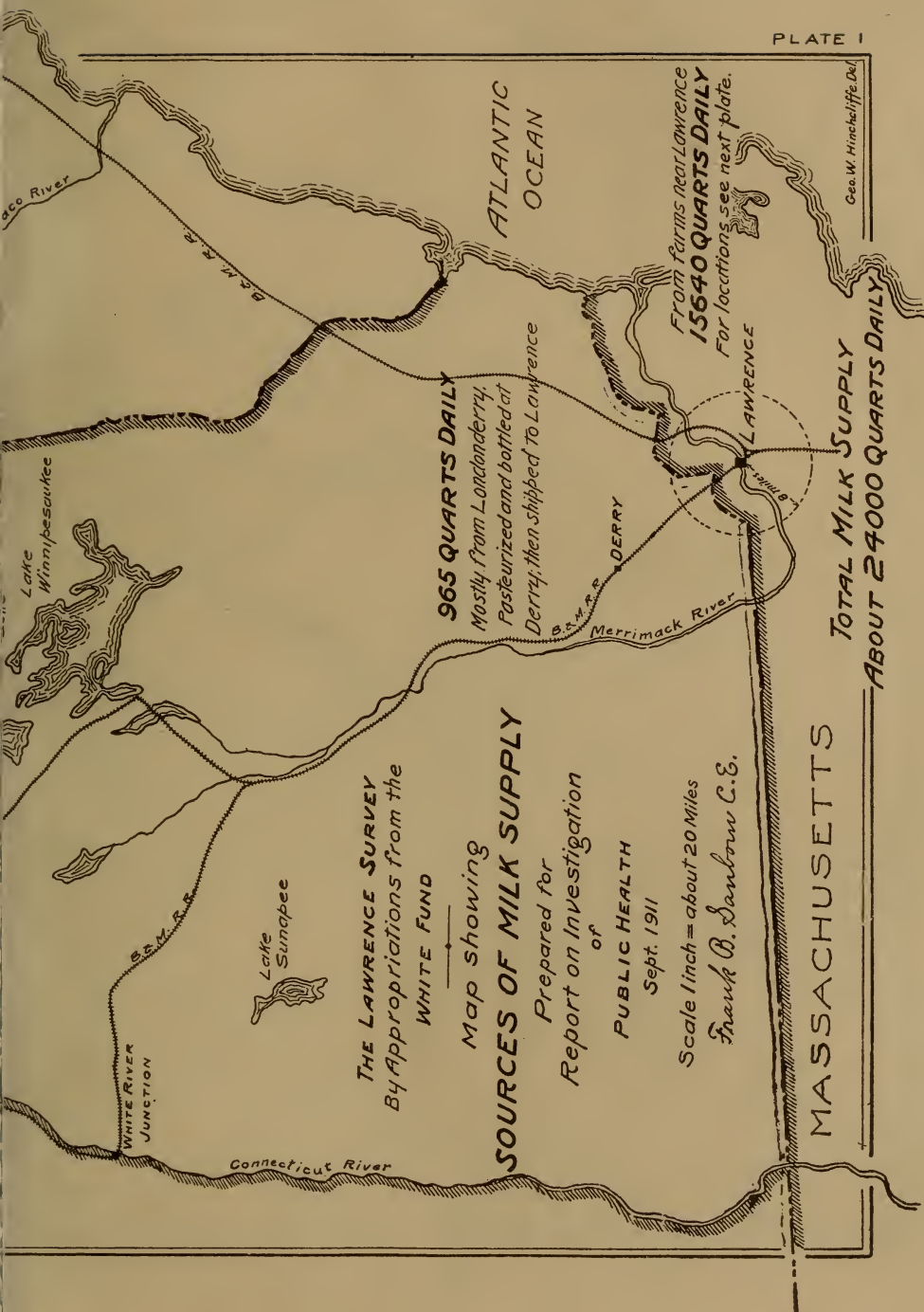
Buckfield

Littlefield

AUBURN

Androscoggin River

AUBURN



Geo. W. Hinchcliffe Del.

THE LAWRENCE SURVEY
By Appropriations from the
WHITE FUND

SOURCES OF MILK SUPPLY

Prepared for
Report on Investigation
of
PUBLIC HEALTH
Sept. 1911

Scale 1 inch = about 20 Miles

Frank B. Sanborn C.E.

MASSACHUSETTS

TOTAL MILK SUPPLY
ABOUT 24000 QUARTS DAILY

From farms near Lawrence
15640 QUARTS DAILY
For locations see next plate.

965 QUARTS DAILY
Mostly from Londonderry,
Pasteurized and bottled at
Derry, then shipped to Lawrence

ago River

Lake
Winnepesaukee

WHITE RIVER
JUNCTION

Lake
Sunapee

Connecticut River

ATLANTIC
OCEAN

B. & N. R.
DERRY

Merrimack River

LAWRENCE









PLATE 2.

BOXFORD

NORTH ANDOVER

LAWRENCE

THE LAWRENCE SURVEY
By Appropriations from the
WHITE FUND
Map showing
MILK FARMS NEAR LAWRENCE
LOCATION and QUARTS PRODUCED DAILY

Prepared for
Daniel J. Donovan, 100 QTS.
Report on Investigation
of
PUBLIC HEALTH
(Sept. 1911)

Scale 1 inch = nearly 1 1/2 miles.

Frank B. Sanborn, C.E.

WILMINGTON
Geo. W. Hinchcliffe, Del.



1. The H. P. Hood & Sons milk, amounting to about 3,500 quarts, comes from two general sources, — the Vermont supply, which totals about 2550 quarts, and which is collected by a daily milk car running south on the railroad from Newport, Vt.; and the farms of Londonderry, Hudson, and Windham, N. H., amounting to about 950 quarts. All this milk goes to Derry, N. H., and the supply for Lawrence is pasteurized and part of it bottled for shipment.

2. The Supply from Maine, consisting of approximately 4000 quarts of milk, is collected from about ten towns by the Turner Center Dairying Association. The milk is shipped first to Auburn, Maine, where it is pasteurized, then separated into cream and skim milk and afterwards shipped to Lawrence.

3. The supply that comes from nearby farms within a radius of ten miles, amounts to nearly 16,000 quarts or two-thirds of the total supply.

Included in the above three sources of supply are 600 farms that send milk to Lawrence.

INSPECTION OF DAIRIES: —

Of these farms 150 are near the City; and the map on preceding page shows their location, gives the name of the owner or lessee, and the quarts of milk produced daily.

In order to determine the quality of dairies thus located near Lawrence all that are shown on the preceding chart (150 in number) have been inspected and rated according to a score-sheet that was especially prepared for this investigation and is shown on the next two pages.

The values assigned to the various items that go to make up the score of Equipment and Method of this sheet, are values recommended by the United States government and the Official Dairy Inspectors' Association. It will be noted that perfect conditions would mean a score of forty points for Equipment and sixty points for Method.

One advantage of this form of score card is found in the fact that an untrained person can use it with fairly satisfactory

DAIRY INSPECTION OF LAWRENCE MILK SUPPLY

One copy of this report is sent to the Owner, or Lessee of Dairy; one to the Milk Contractor; and one copy is kept on file.

OWNER, or LESSEE, of Farm Dairy No.

TOWN OF STATE OF Date

Quantity of milk :

Produced here quarts per day. Number of cows ; number milking

Receive about quarts per day from dairy of

Shipment :

Milk is taken from this dairy by teams of ; about a.m. p.m. ; delivered at

..... station usually about a.m. p.m. ; shipped to Lawrence

by railroad, electric, team ; reaches there about a.m. p.m., and is

delivered to consumers about a.m. p.m.

Milk shipped includes : Night of day of shipment Yes, No ; morning of day of

shipment ; night of day before shipment ; morning of day before

Exposure of milk to contamination :

Water supply is from open well, covered well, spring, pond Supply likely to be contaminated.

Privy vaults protected against flies.

Any case of typhoid, scarlet fever, diphtheria, tuberculosis, tonsillitis at

this farm? What cases during the past year?

Milk Cooling :

Milk is cooled by placing closed cans in brook, well, spring, tank

Temperature of water at date Ice is used for cooling during months

of Ice on hand sufficient for present season.

Other method of cooling is

Inspector's recommendations :

Minor improvements suggested

Important improvements especially recommended

.....

Inspector interviewed at dairy owner, lessee, laborer

Sketch or photo of dairy and surroundings :

DAIRY INSPECTION — SCORE CARD

Approved by the United States Government and by the Official Dairy Instructors' Association

EQUIPMENT	SCORE		METHOD	SCORE	
	Perfect	Allowed		Perfect	Allowed
COWS			COWS		
Health:			Cleanliness of cows	8	
Apparently in good health	1		STABLES		
If tested with tuberculin once a year and no tuberculosis is found, or if tested once in six months and all reacting animals removed	5		Cleanliness of stables:		
(If tested only once a year and reacting animals found and removed, 2.)			Floor	2	
Comfort:			Walls	1	
Bedding	1		Ceiling and ledges	1	
Temperature of stable	1		Mangers and partitions	1	
Food (clean and wholesome)	2		Windows	1	
Water:			Stable air at milking time:		
Clean and fresh	1		Freedom from dust	3	
Convenient and abundant	1		Freedom from odors	3	
STABLES			Barnyard clean and well drained	2	
Location of stable:			Removal of manure daily to field or proper pit	2	
Well drained	1		(To 50 feet from stable, 1.)		
Free from contaminating surroundings	1		MILK ROOM		
Construction of stable:			Cleanliness of milk room	3	
Tight, sound floor and proper gutter	2		UTENSILS AND MILKING		
Smooth, tight walls and ceiling	1		Care and cleanliness of utensils:		
Proper stall, tie, and manger	1		Thoroughly washed	2	
Means of light: Four sq. ft. of glass per cow	4		Sterilized in live steam for 30 minutes	3	
(Three sq. ft., 3; two sq. ft., 2; one sq. ft., 1. Deduct for uneven distribution.)			(Placed over steam jet, or thoroughly scalded with boiling water, 2.)		
Ventilation: Automatic system	3		Inverted in pure air	3	
(Adjustable windows, 1.)			Cleanliness of milking:		
Cubic feet of space for cow: 500 to 1000 feet	3		Clean, dry hands	3	
(Less than 500 feet, 2; less than 400 feet, 1; less than 300 feet, 0; over 1000 feet, 0.)			Udders washed and dried	6	
UTENSILS			(Udders cleaned with moist cloth, 4; cleaned with dry cloth at least 15 minutes before milking, 1.)		
Construction and condition of utensils	1		HANDLING THE MILK		
Water for cleaning	1		Cleanliness of attendants in milk room	1	
(Clean, convenient, and abundant.)			Milk removed immediately from stable	2	
Small-top milking pail	3		Prompt cooling (cooled immediately after milking each cow)	2	
Facilities for hot water or steam	1		Efficient cooling: below 50° F	5	
(Should be in milk house, not in kitchen.)			(51° to 55°, 4; 56° to 60°, 2.)		
Milk cooler	1		Storage: below 50° F	3	
Clean milking suits	1		(51° to 55°, 2; 56° to 60°, 1.)		
MILK ROOM			Transportation: iced in summer	3	
Location of milk room:			(For jacket or wet blanket, allow 2; dry blanket or covered wagon, 1.)		
Free from contaminating surroundings	1		<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> Read your score card carefully and improve where score is low </div>		
Convenient	1				
Construction of milk room:					
Floor, walls, and ceiling	1				
Light, ventilation, screens	1				
Score for equipment	40		Score for method	60	

Score for equipment of plus score for method of equals Total Score

NOTE 1.—If any filthy condition is found, particularly dirty utensils, the total score shall be limited to 49.
 NOTE 2.—If the water is exposed to dangerous contamination, or there is evidence of the presence of a dangerous disease in animals or attendants, the score shall be 0.

Inspector. _____

(Signed) _____
 Inspection sheet prepared by The Lawrence Survey, June, 1911

results. It would be possible for a farmer to fill in allowable values for the various items that would give him a fair indication of many of the good and bad features in his own dairy.

Some of the items that are listed pertain to the location of the dairy, the amount of milk produced, or bought, the water supply and method of cooling — all of which is useful information for comparing one dairy with another or for tracing a milk epidemic, but the principal features that make up the total score pertain to elements that may be explained in a general way by describing what would be especially required in a dairy that scored seventy points out of a possible one hundred. Such a dairy should have a well-lighted stable — preferably four square feet of glass per cow — better lighted than a house cellar and about equal to an ordinary kitchen; there should be enough cubic feet of space to provide the right breathing space for each cow — 500 to 1000 cubic feet per cow is recommended. Small top milk pails should be used. See types shown in photo on page 157. These pails exclude a surprising amount of dirt that otherwise drops into the milk; with them no cloth strainer is needed while milking. A separate room should be provided for milk. This need not be an expensive building or room. See photo on page 190, which shows a good type of inexpensive milk room. In any dairy, however, of first importance is method. First-class cleanliness of cows counts eight points out of the 100; of stable, six points; freedom from dust and odors, six points; care and cleanliness of milking utensils and men engaged in milking, seventeen points; similarly of milk room, attendants and methods of handling the milk, nineteen points. Thus, by maintaining excellent care and cleanliness, it would be possible for even an old and poorly equipped dairy to obtain a score of sixty points out of a possible 100. This places a premium, as it should, on method rather than on equipment.



TYPES OF MILK PAILS. NARROW-TOP PAILS ARE BEST.

One copy of the score sheet as made out for each dairy inspected has been furnished to the owner or lessee of the dairy, and when there was a milk contractor one copy has been sent to him, and one copy of each inspection has been kept on file at the office of the Survey. These inspections have all been made by two persons, the writer covering thirty dairies, and Mr. G. S. Miller 120 dairies. In order that our methods might be fairly comparable, Mr. Miller at first inspected in company with me, and together we compared notes and scores until we were assured that our complete scores when added up checked within two per cent.

At the completion of our inspection of farms on the South of the Merrimack a report was sent to each farm indicating the averages of all results obtained to that date. Similarly, at the completion of all inspections, the following letter was sent to the remaining farms:—

SEPTEMBER 15, 1911

Dear Sir:

I am sending to you herewith a copy of the report of our inspection of your dairy. You may be interested to compare the conditions as indicated by your Score with those that we have found in other dairies. For that purpose I am including a summary result of all dairies that we have inspected. This includes at least four-fifths of all dairies that are located within a radius of fifteen miles of Lawrence and which supply milk to this City.

Number of dairies in all,	148	
Number of dairies supplying directly to consumers,	52	
Number of dairies selling milk to contractors,	96	
Number of dairies out of the 148 that have at least 4 sq. ft. of glass per cow,	36	or 24.3%
Number having 500-1000 cu. ft. of space per cow,	111	75.0
Using small top milk pails,	16	10.8
Washing udders of cows before milking, or wiping with a moist cloth,	8	5.4
Cooling milk below 55 F. at date of inspection,	80	54.0
Using ice for cooling and storage,	84	56.7
Having a separate milk room that is used for washing the utensils, handling the milk and storage,	49	33.1
That remove milk immediately from the stable,	52	35.1
Average score of the 148 dairies, for equipment	21.2	
Average score of the 148 dairies, for method	32.3	
Average total score,	53.5	
Lowest total score of any dairy,	24.0	
Highest total score of any dairy,	92.5	

A Dairy to be classified as having especially good qualities, and able to furnish a superior milk that could be classified as an Inspected Milk selling for nine or ten cents a quart, should have a Score of at least sixty-five; and if the bottling station is in another plant, that also should have a Score of at least sixty-five.

We expect to publish a list of dairies and bottling stations supplying Lawrence that now score sixty or more. Should you carry forward improvements which materially change your score, please notify us and we will credit the report that we have on file.

The object of this investigation is to secure an improved quality of milk. It is a movement for Clean Milk and a Fair Price to the Farmer. May we include your name in a list of those who are willing to coöperate in carrying forward such a movement?

Yours truly,

FRANK B. SANBORN, *Engineer*

Tabulated sheets have been made out showing for each farm the general condition of its equipment and method, and the sum total of all these sheets has given the following summary results for the different towns:—

Results of dairy inspections of 150 farms, summarized by towns.

	Total No. of milk farms	Total amt. of milk produced per day	Average amount per cow	No. of farms selling direct to consumers	No. selling to con- tractors	Average score of all
Andover	25	2240	7.8	9	16	52.0
Boxford	8	745	8.1	1	7	57.1
Haverhill	3	300	—	—	3	—
Lawrence	1	150	—	1	—	—
Methuen	47	7700	9.2	27	20	55.3
North Andover	27	2560	7.9	3	24	56.4
Pelham, N. H.	10	595	9.2	0	10	43.9
Salem, N. H.	20	1350	9.4	11	9	52.3

15640

Boxford, Methuen and North Andover lead in standards of dairies and methods of producing milk.

Total amount of milk supplied to Lawrence.

From farms within seven miles of the City, Derry, N. H., and Vicinity, delivered by H. P. Hood & Sons, about	15,640 quarts daily 965 " "
Vermont and New Hampshire towns included between Newport, Vt., and Wells River, Vt., also de- livered by H. P. Hood & Sons,	2550 " "
Ten towns in Maine located in the vicinity of Rumford Falls, and delivered by the Turner Center Dairying Association,	4000 " "
	<hr/> 23155

In our inspections we have included farms which deliver some milk in Andover, North Andover and Methuen. This amount, however, is estimated at less than ten per cent of the total and is probably about balanced by farms which have been overlooked.

Total supply to the city would appear to be approximately 24,000 quarts daily.

Total number of farms that send milk to Lawrence.

Number of farms near Lawrence, Determined by field inspections of this Survey,	155
Around Derry, N. H., Reported by H. P. Hood & Sons, and in part verified by inspections of farms,	45
In Vermont (and border towns in New Hampshire) Reported by H. P. Hood & Sons, as furnishing the milk from which their supply for Lawrence is taken,	63
In Maine, Reported by Turner Center Dairying Association, as furnishing the milk from which the supply for Lawrence is taken,	281
	<hr/> 544

This list does not include all miscellaneous farms that supply small quantities of milk — ten to twenty quarts per day — nor those that supply the cream that comes from Boston.

In all over 600 different farms doubtless send milk to the City.

Examples of dairies, good and faulty: —

The statement is often made that dairies which fulfill modern sanitary requirements can be maintained only by rich people — that the common farmer cannot afford to equip and run his dairy in that way.

I wish to show, however, by the following views and descriptions that some of the farms that we have credited with high scores are not exceptional ones. It is true that modern requirements call for some up-to-date dairying methods and the farmers to pursue them must have sufficient funds to make a small investment. Two or three hundred dollars in many instances, would be sufficient to meet all requirements, and many of the farms that have been inspected and have scores of fifty or thereabouts, could easily raise those scores to over sixty by merely changing some of their methods, without added expense. For example:

By having the milkmen wash their hands before milking; wipe the udders of the cows with a moist cloth; remove the milk

from the stable immediately after milking; and by washing the floors and walls of the milk room and white-washing the tie-ups in the stables. These are improvements that can readily be made with little or no expenditure.

Although modern dairying methods do require some outlay and the farmers must be sufficiently well-to-do to spend a small amount, these requirements seldom prevent an ordinary farmer from fulfilling them. The difficulty usually is that the farmer, who does not improve, is one who is either too indifferent to pursue dairying methods or too conservative to adopt modern methods. One of the dilapidated, neglected farms that was visited belonged, I was informed, to "the richest man in town."

Examples of good dairies:

The following cuts show some of the creditable dairies. A few of these have expensive equipments and excellent methods maintained at great expense as model farms; others represent the dairy of the ordinary farmer who is carrying on his business primarily for the reasonable profit that it returns to him.



View of an excellent farm which evidently would produce milk under sanitary conditions.



Cow stable, well lighted, ample space. Cleanliness of cows, buildings and utensils, excellent.



Modern stable with tie-up in basement, yet ample light and air space. Good conditions throughout.



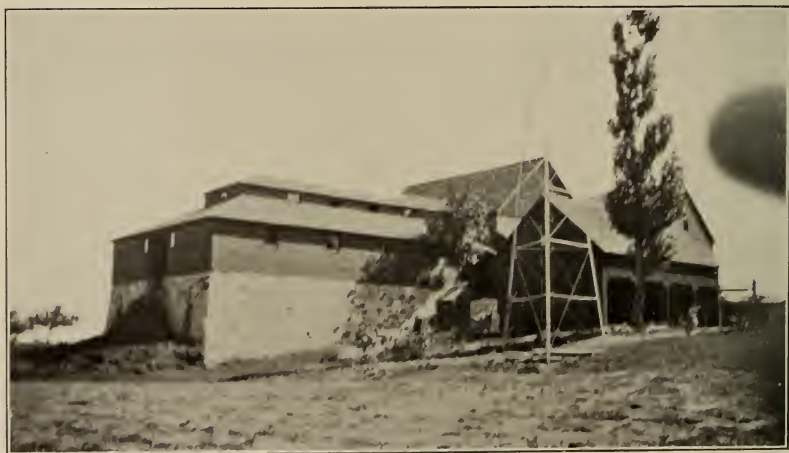
Same farm as preceding. A herd at pasture under favorable conditions.



Common farm buildings. A few years ago this farm was converted into a milk farm under modern requirements. A run-about automobile provided with an enclosed top serves for delivering milk quickly.



Modern one-story dairy built especially for milk business and maintained under good conditions.



Special form of cow stable.



Stable yard and herd of excellent dairy that is maintained at greater expense than possible on most farms.



Common farm buildings having ample means of light for the cows and good conditions maintained throughout with small outlay.



Newly constructed sanitary milk farm under the very best conditions; excellent equipment and methods throughout. Photo shows milk house and loading platform in foreground.



Up-to-date farm with modern construction and equipment. Progressive methods readily adopted.

EXAMPLES OF FAULTS IN DAIRIES.

The following farms illustrate certain of the objectionable features that have been noted during our inspections. It will be appreciated by every intelligent reader that without question, the most serious fault existing in these farms is that attributed to lack of cleanliness. Neglect in methods of handling milk entirely transcends the advantages of first-class equipment. An old farm scrupulously clean is better than a modern dairy carelessly maintained. It is true, however, that neglect more commonly goes with the old dilapidated places.

Some of the lowest scoring dairies are shown herewith.

It is not my desire to point out by referring to these dairies individual instances of neglect. Instead, I wish to show characteristics, and in some of the views that have been selected as illustrating objectionable features, the owner, or manager, at the farm agreed with me perfectly in recognizing these objections, and in several instances expressed the intention to remedy the faults.



Ample light is as important for cows as it is for poultry and horses. Formerly very little attention was paid to window space for cow barns. This photo illustrates a barn that has only one-fourth enough window space.



This place is run by men of foreign birth who have no one to keep house for them, and there were many evidences of lack of cleanliness.



The leanto on this barn makes a covered space for cows when in the yard but seriously interferes with light so that the interior of the stable is dark and objectionable. A new barn is contemplated, and should be built at once.



Noticeable lack of equipment and method at this farm,—as the picture indicates.



Similarly, conditions at this dairy are plainly told by the photograph; they are seriously objectionable.



Illustration of an old and cluttered farm. Will modern methods be adopted here?



Insufficient light, no milk room.



Insufficient light; no milk room; improvements needed which possibly would be made if properly urged.



Large and adequate farm buildings may be run without sufficient regard to modern requirements. This farm does not need new buildings, but with improvements in methods high-class milk could be produced here.



A typical view of conditions which would be objected to by many people; but one-half of the farms that supply milk to Lawrence are no better.



Piles of manure at times extend to windows. Conditions inside similarly neglected.



The milk bottles and wash-tub occupy the only milk room in use at this dairy. This is out-of-doors and near a brook. Here the bottles are rinsed after washing in a tub with water that is brought from the house kitchen. Three hundred quarts of milk are sent from here to Lawrence each day.



This box made of rough boards loosely put together, allowing dust and rain to penetrate, is the only place for storage of milk. Open cans filled with milk were found to contain specks of dirt, while in one can there was a live frog. Extended improvements were recommended to the owner who said that he would see that they were made. A second visit a few weeks later showed a small beginning.

LIST OF GOOD DAIRIES : —

When we consider the means of improving the dairies, two alternatives are usually open;—To condemn the bad dairies and compel the owners to better the conditions or go out of the milk business; or instead, to approve the good dairies, publish a list of them and thus give the consumers an opportunity to buy the best quality. The proper authorities should doubtless prohibit the sale of milk from some of the worst of the dairies, but for the purposes of this investigation I have decided to designate only the good dairies, and I am including herewith a list of twenty-eight dairies that were found to be supplying milk that is produced under especially good conditions. Any farm that is included in the following list has obtained a score of at least sixty points out of a possible 100 and either delivers milk directly to consumers or sells to a contractor who has a bottling plant that also has been found to have a score of sixty or more.

Several high-grade farms are omitted because at present they sell milk to contractors who have bottling plants that score under sixty. A few other farms contemplate making improvements which would materially increase their scores, but, as these farms are now a little below sixty they are not included in this present list. A few farms have followed the suggestions made in our reports on their dairies and have accordingly raised their score above sixty since our first inspection.

Following is the corrected list of names with the quarts of milk produced at the time of inspections in the summer : —

ANDOVER : — Shattuck Bros. produce 400 quarts daily; sell direct to consumers. Wm. M. Wood produces 160 quarts; 40 of which are delivered to the Wood Mill Restaurant; rest, not sold.

BOXFORD : — J. W. Chadwick produces 300 quarts and sells direct to consumers; Thomas Downes, 50 quarts and sells to C. D. Glennie, contractor; J. Henry Nason, 100 quarts and sells to C. D. Glennie.

DERRY, N. H. : — H. P. Hood & Sons deliver six to ten quarts of special milk, and designated " Hood Farm Milk " to distinguish from their general supply.

NORTH ANDOVER:—Chas. Appleton produces 30 quarts; James Glennie, 150 quarts; North Andover Town Farm, 30 quarts; Wm. H. Phelps, 35 quarts, and all sell to C. D. Glennie, contractor.

LAWRENCE:—Theobald Daley produces 150 quarts, sells direct to consumers.

METHUEN:—All of the following producers sell direct to consumers:—E. L. Bragdon, 325 quarts daily; L. S. Cox, 250 quarts; D. F. Connelly, 200 quarts; W. M. Dooley, 220 quarts; G. E. Flanders, 160 quarts; Fred L. Gardner, 130 quarts; F. H. Giles, 140 quarts; Harnisch Bros., 300 quarts; John Hoh, 190 quarts; Fred Miller, 375 quarts; E. D. Taylor, 450 quarts; W. E. Williams, 450 quarts; G. K. Webster, 250 quarts; and F. L. Currier produces 35 quarts and sells to F. L. Gardner; Chas. Kitchin produces 100 quarts and sells 50 quarts direct.

SALEM:—P. H. Caron & Son produce 160 quarts and sell direct to consumers; R. H. Dunbar, 200 quarts and sells direct to consumers.

The foregoing farms furnish a grade of milk that would be classified as Inspected Milk. In addition there are a few sources of Certified or Special milk as follows:

The Walker-Gordon Laboratory Company furnishes special or modified milk that is sold principally by prescription and for infants. Price eighteen to fifty cents a quart taken in Boston.

Certified milk is furnished by H. P. Hood & Sons, from the Middlebrook Farm, Dover, N. H. This milk is certified by the Milk Commission of the Suffolk District Medical Society. Retail price is sixteen cents a quart.

Certified milk is also available from the farms of J. A. and W. H. Gould. The milk is certified by the Medical Milk Commission of Boston. The Messrs. Gould have three certified farms: one in Reading with about forty-five cows, another in Beverly, with 180 cows, and one in Essex with 100 cows. Milk would be delivered by express and price would be sixteen cents a quart.

INSPECTION OF THE HOOD FARMS:—

From farms located in towns of Londonderry, Hudson and Windham, all within six miles of Derry, N. H., about 965 quarts of milk at the time of our inspection were being shipped to Lawrence daily. This milk is collected by three teams which take it to the plant of H. P. Hood & Sons at Derry Depot. There it is pasteurized, bottled, and afterwards sent to Lawrence by railroad milk cars. The writer visited this plant August 15th and 16th and on the 18th visited some of the farms that produce this milk.

Milk is received at the bottling plant from many farms in surrounding towns, which make up the general supply for both Lawrence and Boston, Mass., but the three routes referred to above constitute in ordinary cases the supply for Lawrence. Forty-five farms make up this supply. The writer selected ten from the list as typical ones to visit and made a personal examination of them, filling out a score-sheet for seven, which enabled him to compare with the conditions that were found in farms nearby Lawrence.

Before inspecting these farms, the writer was informed by milk contractors and disinterested parties that farms at a considerable distance from a city would be found to score less than those nearby; whereas representatives of H. P. Hood & Sons said that they regarded the dairies in Vermont, the most distant they have, as being better than those near at hand; but of all their sources they considered the farms around Derry, N. H., the best because those farms were within the influence of their own model farm, and therefore of the highest excellence. Milk from these farms near Derry is bottled to supply the family trade, while milk from Vermont is sold in eight-quart cans at wholesale. For these reasons it seemed desirable to make as fair a comparison as possible between the conditions at Derry and those near Lawrence.

As a result of an inspection of these farms, it appears that conditions there are not greatly different from those in the farms that are nearer Lawrence. The Derry farms are slightly better than dairies in Pelham, N. H., and inferior to those in Salem, N. H.; they are decidedly below those of Boxford, Methuen and North Andover.

Milk is taken from the above farms to the plant at Derry in eight-quart cans of ordinary construction, many of which by hard usage have become battered and rusted, and transportation is by ordinary open wagons, in which the cans are covered with blankets. The maximum haul is about seven miles, over roads fairly free from dust, and better than found in many country districts. The residences of two of these teamsters were visited, and the teams of empty cans and cans of sour milk were found without any special sanitary protection. In fact, in the transportation of this milk and the methods of handling by the teamsters, there was no apparent advance over the ordinary methods of thirty years ago.

After the milk is delivered at the Derry plant, about seven o'clock each morning, each can is sampled by an inspector who takes out a spoonful and tastes of it, rejecting any can of milk that is sour. A number of ordinary spoons are used for this method of sampling, and commonly each spoon is dipped in a dish of water after each sample is taken and before it is used again. Milk that passes this inspection is poured into a heater where the temperature is raised to 146° F. It is then pumped through pipes to a heating tank in a separate room in the third story. It flows through this tank slowly, taking about twenty-five minutes to pass through. It then passes over a large cooler in a separate room directly beneath the holding tank. Here it is quickly cooled to about 40° F. It then flows through pipes to rooms in the first story where it is either bottled or put in cans. This process constitutes one form of pasteurizing milk in bulk.

The milk from the Vermont supply, also received at the Derry plant, is generally used for wholesale trade in both Lawrence and Boston. The milk that goes to Lawrence comes principally from farms that are located between Newport in the extreme northerly part of Vermont, and Wells River, Vermont. From this source about 2550 quarts per day were reported as being shipped to Lawrence at the time of the writer's visit in August. This milk comes in milk cars, in eight-quart cans. It was found to be thoroughly iced, and at a temperature of below 50° F. when received. In the same way as for the milk described above, this supply when

received is first sampled by tasting for sourness, then heated to 146° F., cooled to about 40° F., and put in cans ready for shipment to Lawrence the same day, and delivered to customers the following day. The interval from the time that milk is produced on farms around Derry to the time of its delivery to consumers in Lawrence is from thirty-six to forty-eight hours; and the corresponding interval from the farms in Vermont to consumers in Lawrence is from sixty to seventy-two hours.

In order to secure desirable improvements in conditions at the dairy, it is necessary to have a working spirit of coöperation between the farmer and the milk contractor. This coöperation is not as evident at Derry as in the places near Lawrence. Many of the farmers have outspoken grievances; some were considering selling their milk to other contractors, and others were disposed to abandon milk production unless they could realize better returns.



The Bottling Plant of H. P. Hood & Sons at Derry, N. H.

Besides the milk supplies from farms around Derry, and the supply from Vermont, H. P. Hood & Sons also have a farm of their own at Derry and the milk from this place is sold as the Hood Farm Milk, a special milk, at twelve cents per quart. The main stable contains eighty cows. It is a two-story building, the upper story being used for hay, the first story for cows, the cellar for manure which is removed daily. Although this building is not of modern construction, an effort has been made to bring conditions

up to a high standard. Besides this main stable, there are two others associated with this Hood Farm, the Bradford, about half a mile away, and containing twenty-seven cows; and the Clark, one mile away, and containing twenty-five cows. These two farms are now conducted by the superintendent of the main farm. Milk is all brought to the bottling station at the main farm, where it is bottled without pasteurizing and shipped to various cities. Six to ten quarts a day are sent to Lawrence.

TURNER CENTER DAIRYING ASSOCIATION:—

The milk that comes to Lawrence from the Turner Center Dairying Association of Auburn, Me., about 4000 quarts, constitutes a sixth part of the total amount that is used in the City. It is received at the plant of the Association here in Lawrence as skim-milk, cream, and buttermilk. About one-half is sold as skim-milk, 800 quarts per day as ordinary milk, prepared by blending cream and skim-milk, and the rest as buttermilk and cream. Only a small amount is sold at retail; but mostly to hotels, restaurants, stores, and milkmen, many of whom buy here when their regular supply runs short.

The Turner Center milk comes largely from farms in ten towns around Hartford and Livermore Falls, Maine, constituting what is known as the Rangely division of the Turner Center dairies. The Association has furnished a list of these farms, together with score cards made by their inspectors.

The average scores as here credited are apparently higher than scores obtained by our methods here in Lawrence. This is due to the fact that a form of card has been used that is less exacting. Also, different inspectors are likely to have different standards, and in order to make a fair comparison of the score of one district with that of another, either the same inspector should do the work, or the different inspectors should be guided by one common method. It is noted in the Turner Center score cards, that two farms were inspected by a different inspector from all the rest and these farms have particularly low scores.

It is claimed by this Association that they make a special point of cooling the milk, that their "farmers have ice, and the milk is

put in ice water as soon as it is drawn, and never gets warmed up." This is a requirement that probably would not be fully lived up to by all the farmers. The importance of cooling milk, and keeping it cold by proper icing is doubtless well appreciated by the Association, and the necessity is evident when one considers the time,—not less than three days—that must elapse between the production of this milk and its delivery in Lawrence.

Milk is taken from the farms to the various railroad stations, then transported by cars to Auburn, Maine, where it is pasteurized and clarified through separators, brought to the required standard of fats, drawn into cans, put in storage, and later shipped by railroad to Lawrence. This is the usual procedure for the Lawrence supply; but at times when railroad trains are off schedule, and during certain of the hot spells, the usual order of shipment is disarranged, and milk from various other sources which is received at their Auburn plant must be sent forward.

MILK BOTTLING PLANTS FOR LAWRENCE.

Out of the total amount of 15,640 quarts of milk per day that is supplied to the city of Lawrence from nearby towns, 7688 quarts or about one-half is received by contractors, and bottled near the City before being delivered to consumers. There are twenty-two of these bottling plants, thus supplying milk to the City.

The standard of methods used in bottling should correspond with the requirements in the dairies. A dairy that has excellent equipment and maintains excellent methods should have associated with it a bottling plant of equal standards.

In order to determine the qualities of the various bottling plants a form of inspection sheet or score card has been prepared as shown herewith. The values assigned to the various items correspond with those recommended by the United States government. This score card has been used for fifteen of the above bottling plants and the results have been tabulated. The following is a summary of these results:

Number of plants inspected,	15
1 has a separate handling room.	
8 have hot water heaters.	
13 have apparatus in good condition.	
2 are free from odor and flies.	
10 have floors clean.	
10 receive and store milk below 55° F.	
Total quarts of milk furnished daily by these 15 plants,	6855
Average score for equipment,	18.8
Average score for method,	26.8
Average total score,	45.6
Lowest,	26.0
Highest,	62.0

INSPECTION OF MILK BOTTLING PLANTS

BY

THE LAWRENCE SURVEY, 520 BAY STATE BUILDING

Owner or manager Plant No.

Trade name State of

City or town Date of inspection

Permit or License No.

Business of plant: Bottling milk, separating cream, preparing butter,
making ice cream

Milk is furnished by

In summer is received packed in ice: comes by team, refrigerator cars,
freight cars:

Temperature of newly received milk

Exposure of milk to contamination:

Water supply is from covered well, spring, pond, city pipes

Supplylikely to be contaminated

Privy vaultsprotected against flies

Drain pipes connect to public system, to cesspool, to river,
cases of typhoid, scarlet fever, diphtheria, tuberculosis,
tonsilitis, or among employees at this plant

What cases during the past year?

Inspector's recommendations:

Minor improvements suggested

Important improvements especially recommended

Inspector interviewed at plant owner, lessee, laborer

Sketch or photo of plant and surroundings.

CITY MILK PLANTS—SCORE CARD

RECOMMENDED BY THE UNITED STATES GOVERNMENT

BUILDING		BUILDING	
EQUIPMENT	SCORE	METHOD	SCORE
Location: Free from contaminating surroundings	2	Cleanliness:	
Arrangement:		Floors	3
Separate receiving room	1	Walls	1
Separate handling room	2	Ceilings	2
Separate wash room	1	Doors and windows	1
Separate sales room	1	Shafting, pulleys, hangers, pipes	1
Separate boiler room	1	Freedom from odors	2
Construction:		Freedom from flies and other insects	3
Floors tight, sound, cleanable	1	Drainage	2
Walls tight, smooth, cleanable	1		
Ceilings smooth, tight, cleanable	1	APPARATUS	
Provisions for pure air	1	Cleanliness:	
Screens	2	Thoroughly washed and rinsed	6
Minimum of shafting, pulleys, hangers, exposed pipes, etc.	1	Sterilized in live steam 30 minutes	5
Provisions for light	1	(Thoroughly scalded after washing with water over 200° F. or live steam, 3)	
APPARATUS		Boxes, papers or caps sterilized	3
Boiler	2	Protected from dirt	2
(Hot-water heater 1)			
Milk cooler or ice-cream machine	2	HANDLING MILK	
Refrigerator	2	Received below 50° F.	5
Appliances for cleaning bottles and utensils	2	(50°-55°, 4; 55°-60°, 3)	
Racks, etc., for utensils and bottles after cleaning	1	Rapidity of handling in plant	3
Sterilizer for utensils and bottles	2	Freedom from undue exposure to air in plant	2
Bottling or package machine	1	Capping bottles by machine	1
Wash bowl, soap and towel for attendants	2	Bottle top and cap protected by covering	2
Protection during delivery	2	Storage 45° F. or below	3
Condition of apparatus		(45°-50°, 2; 50°-55°, 1)	
(Make deduction for inaccessible parts, open seams, rusty ware, decayed or battered tables or sink, milk-carrying pipes with rough interiors and lack of frequent hand couplings, and for badly worn and poorly repaired material)	4	INSPECTION	
Laboratory and Equipment	2	Bacteriological work	4
Water Supply:		Inspection of dairies supplying milk	5
Clean, fresh, convenient and abundant	1	(Once a year, 1; four times a year, 4)	
Score for equipment	40	MISCELLANEOUS	
		Cleanliness of attendants	2
		(General Appearance, hands, etc., 1; clean washable clothing, 1)	
		Cleanliness of delivery outfit	2
		Score for method	60
		Total Score	
		Inspector	

There is even greater need of raising the standards of these city bottling plants than of improving the conditions at the farms. A bottling plant may receive milk from a dozen farms, and if conditions at one of those farms are unsatisfactory, milk from that farm can be excluded without disturbing the supply from the other eleven farms. But when the conditions at the bottling plant are unsatisfactory, a discontinuance of milk from that station or plant cuts out the supply from all twelve farms. Further, it is not fair to ask a farmer to maintain excellent conditions and then have the quality of the milk that he furnishes vitiated by careless handling in the bottling plant. The sanitary conditions at the bottling plant should be in every case equal to or even better than those at the farms. The standard should be maintained as a protection to the city's health; but it is also needed as an object lesson for the farmer, who can then well understand that he is only expected to satisfy requirements similar to those that are in force at the milk bottling plant.

Unfortunately, many of the existing bottling plants are inferior in standards to the farms from which they receive milk. In some cases, there is also more discredit and disapproval of modern methods at the bottling plant than at the farm. There has been a wide movement by State and Nation to develop and improve farm conditions, but little attention has been given to milk handling methods as practised by small milk contractors for cities.

Here in Lawrence wholesale prices vary today from four to five cents per quart; and instead of prices being governed by quality, the two principal causes of variation now are length of haul; and, as one of the contractors has put it, "sharp trading."

Improvement is needed in the Lawrence bottling plants. Enforcement of proper city requirements is one means of securing this improvement. Another, is by more general pasteurization of milk. A third is by a greater union of bottling plants and contractors, so as to substitute improved conditions for the small bottling plants, and unite the fifteen that now exist into about three first-class groups.

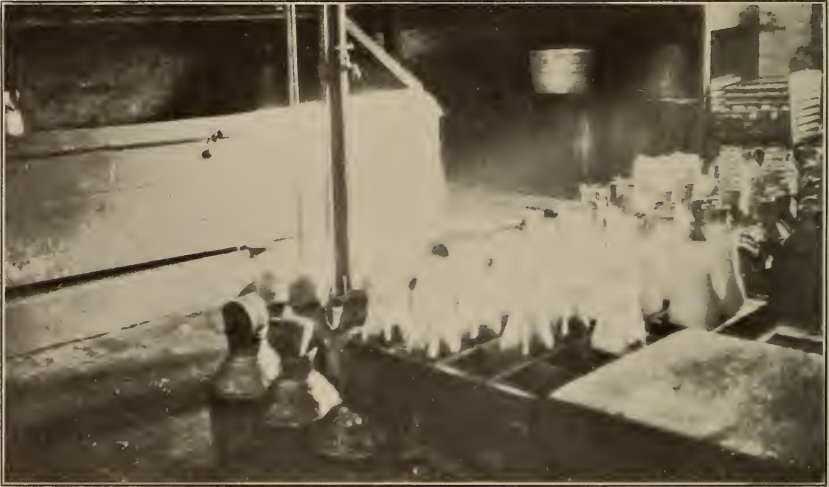
The following bottling plants have been credited as scoring over sixty points out of a possible 100:

C. D. Glennie, North Andover, inspected.

H. P. Hood & Sons, Derry, N. H., inspected.

Turner Center Dairying Association, Auburn, Maine, not inspected.

Objectionable conditions found in many of the milk bottling plants



A milk bottling room in the basement of a dwelling-house. In the foreground are cans and bottles of milk left around in disorder; in the background is the tub that is used for washing the bottles and cans. There is no sink nor provision for floor drainage, nor stove nor heater. Hot water is brought here in eight-quart cans. The ice-chest is dirty and foul—conditions resembling those that are sometimes found in dark corners of neglected cellars or basements.



A bottling room in a shed. Milk is received here from some of the best farms that send milk to Lawrence. The quality of this milk, if judged by the cream line, would be rated very high; but any neat housekeeper would object to conditions here existing. A milk bottling-room should certainly be kept as clean and orderly as a kitchen. The floor here is broken and dirty. The stove as arranged is a poor substitute for a water heater. At the end of the ice-box is seen the sink where the cans and bottles are washed and over the sink is the soiled and sour cloth that is used for washing the utensils.

ICE-CREAM PLANTS IN LAWRENCE.

Besides a general supply of milk for both stores and houses, there is another note-worthy means of distributing milk, namely, through the medium of ice-cream. Although milk for ice-cream in some cases is cooked sufficiently during manufacture to destroy most of the disease germs, very few of the plants that supply ice-cream for the open market make any attempts to cook the ingredients.

Cream and skim milk are bought up at wholesale and combined by a manufacturing and freezing process into a great variety of flavors and qualities, and usually sold within a day or two after it is manufactured, although in some few cases ice-cream is kept in storage at zero temperature for many days. In this freezing process the germs of disease, or of fermentation and organic change, are retarded in development, but the cold does not kill all of them

nor prevent later growth at a higher temperature. Typhoid and other diseases may be transmitted by ice-cream. After being held for three months frozen in ice, typhoid germs have been found to be alive and able to transmit disease. The importance of ice-cream as a factor affecting public health has become greatly increased recently on account of the extensive sale of ice-cream at soda fountains and in ice-cream cones. It seemed important to make an examination of plants that supply Lawrence. For the purposes of this inspection Mr. A. R. Miller was employed and he, or the undersigned, visited all of the principal plants in the City, examined the conditions in detail, and filled out a score sheet that was adapted from the form recommended by the United States government for city milk plants. Copies of these sheets are shown on a preceding page under Milk Bottling.

This score sheet was found to satisfy the proper requirement fairly well. It does not, however, readily permit of high scores nor of low scores so that the range of variation between the best plants and the lowest is not as marked as might have been desired. It has served, however, to point out many features that must necessarily have important bearing on the equipment and methods of first-class plants.

Summary of Inspection of Ice Cream Plants.

Number of plants in all, 16.

1 has a separate handling room.

7 have hot-water heaters.

5 have apparatus in good condition.

10 are free from odors and flies.

11 have floors clean.

8 store milk below 50° F.

Total quarts of milk and cream used daily in summer, about 2000.

Average score for equipment,	20.1
Average score for method,	30.6
Total score,	50.7
Lowest,	40.5
Highest,	65.5

Further improvements can well be made in the sanitary conditions of making and handling ice-cream and moreover, the conditions that exist in some of the inferior places are alarmingly bad. In many of these the ice-cream manufacturing is done in rooms connected with tenement houses. Ice-chests or refrigerators for family food are commonly kept in the same room. Children from the house or from the streets pass in and out of these manufacturing rooms without restriction. Ventilation and lighting are neglected. Screens are seldom provided. In many places the people speak poor English and are wholly unfamiliar with the dangers of disease or the probability of infection through milk. Nearly all of the ice-cream makers visited, however, showed a willingness to improve their methods. Their interest impressed the writer and Mr. Miller, who inspected most of the plants, more favorably than did the attitude of the milk bottlers.

MILK AS A CARRIER OF DISEASE.

I have indicated that milk at the dairy, at the bottling station, or at ice-cream plants may easily become infected and transmit disease.

Why is milk an effective carrier of disease?

Because,

1. It is an important article of food, in fact next in importance to air and water.
2. As a beverage and in the form of cream, butter and cheese, it is more extensively used than any other article of food.
3. It is commonly consumed in a raw state which favors the development of germ life.
4. Bacteria grow in it so rapidly that frequently when consumed it is "richer in bacteria by far than the sewage of our large cities."
5. The fact that it is a fluid, and not a solid, intensifies it as a carrier of disease.
6. It is difficult to see impurities in milk. It is opaque. As an experiment, add half a dozen teaspoonfuls of dirt to a jar of milk; shake thoroughly, and see if the dirt is discernible.

7. Thus the germs of disease grow profusely in milk, transmitting typhoid fever, diphtheria and many abdominal diseases, especially among infants, and we cannot, as a rule, detect the presence of this infection by taste, odor or color.
8. Neither can infection in milk be detected quickly even by experts. It requires from twenty-four to forty-eight hours to test milk chemically and bacteriologically. When disease is discovered it is often too late to stop an epidemic.
9. Milk transmits disease many times elusively, concealed and without detection. If babies that die each year by disease and impurities in milk were instead scalded to death, there would be a popular uprising against such barbarity. Why not eliminate disease-laden milk?

RECOMMENDATIONS FOR IMPROVING THE MILK SUPPLY:

Classification of Milk:

The farmer classifies apples as No. 1 and No. 2's; and the run of the orchard he may classify as just apples. So it should be with milk. The farmer that can "raise" all No. 1 milk should get the highest price for it; if he does not care to go to the expense and bother required in raising No. 1 milk he could classify nearly all as No. 2; or, he may decide to have but one common market grade, just milk. For apples or milk undoubtedly the grades should be distinct and the farmer should receive a price according to the grade he produces.

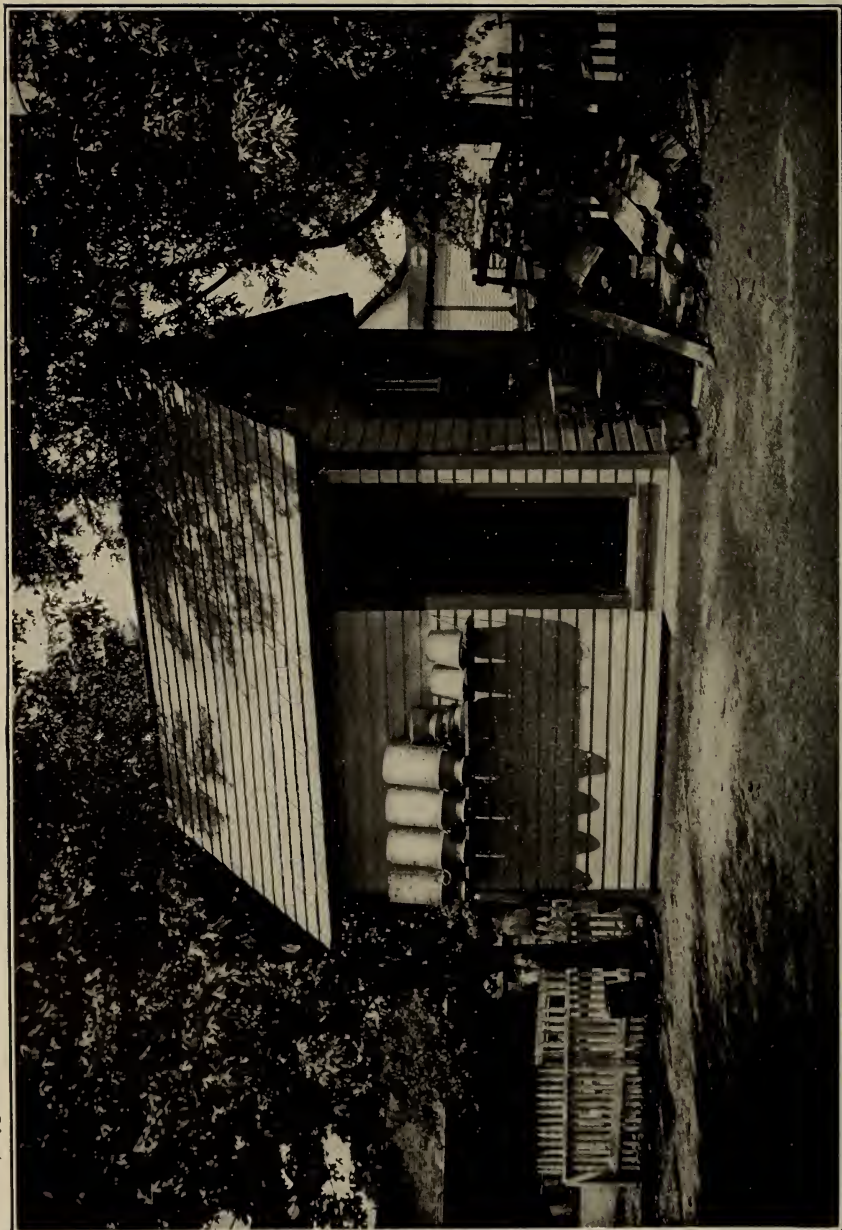
For the No. 1 grade I have adopted the name of *Certified Milk*. This should be milk of excellent quality, produced on farms scoring over ninety from a healthy mixed herd of cows which are tuberculin-tested once a year when no tuberculin cows are found, or twice a year when tuberculin cows are found and removed. This milk should show in fats about four per cent and 13.5 per cent in total solids, and have a bacterial count of 10,000 or less when it is delivered in the City. It should be certified by a medical commission in accordance with the Massachusetts law and plainly

labeled as Certified Milk. Such milk should sell for a price of fifteen to eighteen cents per quart.

Inspected Milk Heated. This includes milk that is produced under reasonably clean and careful conditions, in dairies that are better than the ordinary, but not necessarily having expensive outfits and using extra precautions and great care as must be done in Certified dairies. To come in the Inspected class a dairy should have a score of at least sixty-five when marked rigidly as we have done or 75, when marked leniently as is done in some cities. On a preceding page we have given a list of twenty-eight dairies that have scored over sixty and probably nearly all have now made further improvements which would raise their scores to sixty-five or more. These are dairies that have willingly and voluntarily adopted improvements on their own initiative. They are the progressive dairies. But there are also other farms that could easily come in the Inspected class. Some would merely need to sell their milk to a contractor who has an approved bottling plant, others now have scores of fifty to sixty and could make certain improvements at small expense that would raise their scores to sixty-five. Recommendations for improvements have been made to them and I believe that the city authorities would do well to publish at intervals additional names of dairies that come into this class.

Further requirements of inspected milk should be the standards for fats and solids as fixed by the State and when the milk leaves the dairy it should not contain over 100,000 bacteria per cubic centimeter.

Furthermore, before the milk is delivered to the consumers it should be further safeguarded against contamination and infectious diseases by being scientifically heated. This process may be called Pasteurization and closely resembles what the house-keeper calls parboiling. The milk is brought to a temperature of 145° F., held at that temperature for twenty minutes, then suddenly cooled to 40° F. and should be kept at about that temperature until it is used by the consumers. This process of Heating or Pasteurizing I shall refer to more fully after describing the next grade of milk. The price of Inspected Milk Heated should be nine to ten cents per quart.



A GOOD TYPE OF INEXPENSIVE MILK HOUSE.

Market Milk Heated: When dairies that produce Certified Milk and Inspected Milk have been deducted from the total supply of a large city like Lawrence we have left many ordinary dairies of fairly acceptable qualities — dairies that would have been considered as good enough ten years ago, but which have not adopted modern methods and do not appreciate the advance that is rapidly being made; there will also be many dairies that are trying to produce large quantities of milk and do not care to adopt any improvements which they regard as “frills.” They prefer to keep cows that give twelve to twenty quarts of milk a day and wish to put this milk into the market with the least possible labor and expense and the minimum regard to regulations and rules. They wish to run their business exactly as does a grocery man who keeps a cluttered, disorderly store, but sells a large amount of goods.

These methods cannot all be condemned, nor forbidden. A fair-minded inspector would find that many of these objectionable dairies are in the hands of owners who are competent to improve. They would listen to suggestions. But there are some dairies, undeniably bad and a menace to public health, whose owners would not make improvements. Such owners should be persuaded, if possible, to adopt passable methods of cleanliness; but where changes are hopeless, in some cases bluntly opposed, then unquestionably the public should first of all be protected by excluding such milk from the city. Every farm should have a score of at least forty points out of a possible 100 and the milk should have a bacterial count of not over 500,000 per cubic centimeter.

HEATING OR PASTEURIZING.

Finally, it must be acknowledged that it takes a long time to bring about material improvements in the dairies and bottling stations that supply milk to a large city. Are the methods at dairies and bottling plants for Lawrence today much better than they were five or ten years ago? Five or ten years can easily pass without marked changes; meanwhile what of sickness and disease that is being unnecessarily transmitted through the City by the medium of milk? About how many children and adults per year must we

allow to contract sickness or death by disease in milk? We have in Lawrence 1500 deaths per year, and we have 12,000 to 15,000 cases of pronounced sickness. Other cities which have been carefully studying the causes of sickness find that a surprising amount of the reported cases and deaths can be directly traced to milk. If in Lawrence one-fiftieth of the sickness is due to milk — 250 cases of scarlet fever, typhoid, diphtheria, septic sore throat, dysentery and other diseases — and if one-half of that sickness can be prevented by reasonable means, should we not expect it to be done and done quickly?

As a practicable and reasonable way of eliminating much of this sickness, lessening the death rate, and improving the public health of the whole City, I wish to urge that all milk that is not Certified, be heated, or pasteurized, before it is sold to consumers. I have come to this view-point not by a hasty glance over the field of possibilities, but by trying to consider carefully during the past nine months, the various interests of farmer, milkman, and consumer. The milk question is a complicated one; it will not be settled quickly. Pasteurization can be applied as an immediate remedy; and as filters are unquestionably needed for the Lawrence water supply, so I believe is pasteurization for the milk supply.

The process of scientifically heating, or pasteurizing, consists of heating the milk at a temperature of 145° F. for twenty minutes, then suddenly cooling it to about 40° F. This treatment destroys any disease germs that may be in the milk, while leaving its quality as a food nearly or quite unchanged. Raw milk is an excellent culture medium for a great range of organic growth. It normally contains lactic acid bacilli, which cause its souring, yet which are helpful in the digestion of the milk after it has been taken into the stomach. Raw milk may, however, contain a great variety of other organisms, derived from dust in the air, from dirty utensils, dirty flanks of cows, dirty human beings who handle the milk, and who may infect it with the germs of many diseases.

Pasteurizing has become an approved method of treating milk because it destroys disease germs that the milk may contain, yet it does not impair the quality of the milk; but in pasteurizing — it

is necessary not only to parboil, or cook, the milk for twenty minutes, but afterwards to cool it rapidly to a temperature of fifty degrees or less. If the milk were allowed to remain warm, lactic acid, or souring bacilli, which remain alive after the heating, would cause the rapid souring of the milk. The cooling is, therefore, a preservative measure, adopted for the same reason that ice is used to preserve raw milk.

Pasteurizing is a very effective process when properly done. For example: it has been found that temperatures higher than about 145 degrees lead to changes in the chemical character of milk, and therefore in its food characteristics. Absolute freedom from living germs can of course be assured by the boiling of milk; but milk that has been boiled is very different both in taste and in other respects from either raw or properly pasteurized milk, and generally speaking, it is not suitable as food for young children. The most important changes in the milk, produced by excessive heating, are changes in the character of the proteids which are the tissue forming substances that give milk its peculiar value as a food. Long and careful experiments have seemed to prove that properly pasteurized milk comes through the process with its proteids practically unchanged, so that it is for all persons, except possibly a few babies (who might in any event furnish digestive puzzles) as good a food as before it was heated. Properly pasteurized milk, and there is need of emphasizing the word "properly," is not distinguishable from raw milk by either its taste or appearance; and even the chemist has great difficulty in detecting any difference between raw milk and pasteurized milk.

In the bulk process of pasteurization, that is extensively used, milk is run through a heater and thus raised to the required temperature; it is then run into a tank where this temperature is maintained for twenty minutes; afterwards it is drawn through cooling tubes which quickly reduce its temperature to the proper point. When this process was first started twelve years ago, many people thought that it was affecting the taste of the milk, and that the cream line in milk jars was less noticeable after pasteurization. As a substitute Flash Pasteurization was tried. By this method

the milk was heated to a temperature of 140° to 145° just for a minute or two; but this brief interval did not prove to be sufficient to destroy disease that the milk contained, and in place of Flash Pasteurization, the Bulk process has been generally adopted.

But, within the past two years, a new process has been developed by which milk is pasteurized in sealed bottles. This method has been used for many years in the best processes of manufacturing beer. Strange as it may seem, it remained only to apply to the purification of milk these scientific and hygienic standards that have been thus used for beer. But the milk bottle must have a water-tight cover and commonly this is made of tin foil, crimped as for ginger ale and birch beer bottles. The bottles are filled with milk and tightly covered; then subjected to a shower of water the temperature of which is gradually raised by the admission of steam. Pasteurization is completed in about one hour. Then the steam is shut off and water, continuing to run in a few minutes, becomes cool and the sealed bottles can afterwards be removed and placed in ice or immersed in ice water.

This method affords the best possible protection to good health. After the bottle is sealed, the milk is not again exposed. Possibility of disease transmission is reduced to a minimum, and the expense involved is not increased seriously. The principal increase is in the price of the bottle. The common form of bottle is not air-tight or water-proof, and so far no practicable way has been devised for adding an air and water-tight cap to the present style of bottle. Instead, a new form has been developed that has a projecting bead at the top of the bottle on to which an overlapping cap of tin foil is forced by a special machine. A milk jar with this form of cap is a little more difficult to open than one with the pasteboard cap and it will not stand hard usage as well, since chipping of the glass bead may render the bottle defective. The advantages of pasteurizing in sealed packages, however, are very evident, and doubtless this method will soon become the most acceptable one. Manufacturers claim that within the year 1911, the process has been introduced in over one hundred towns and cities.

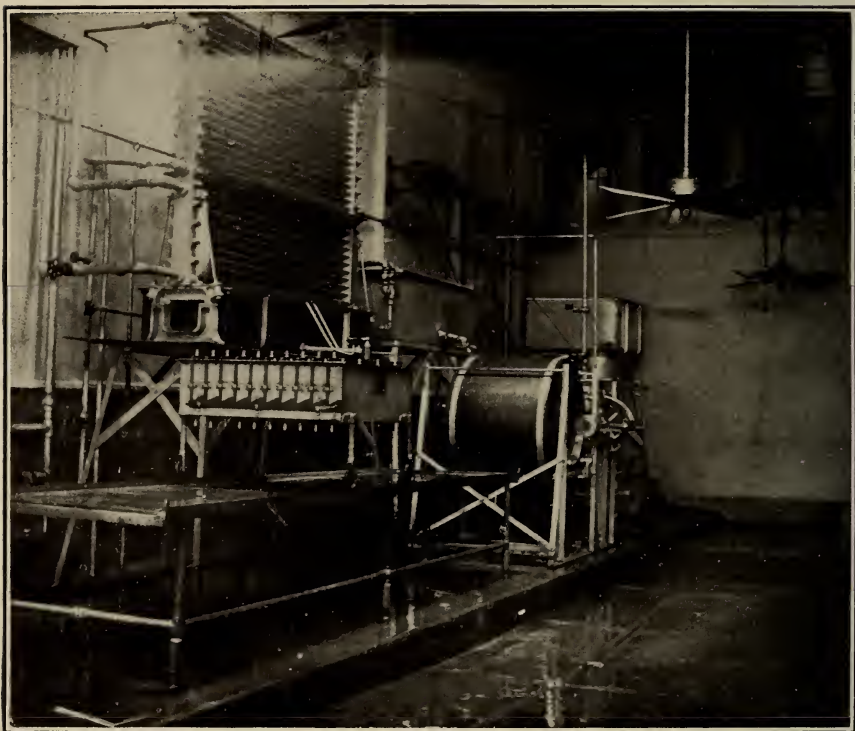
Pasteurizing by the consumer, in his own house, is possible, but difficult to accomplish satisfactorily. The milk bottle should be

placed in a kettle of cool water and the temperature gradually raised until a test thermometer indicates 145° on a Fahrenheit scale, or 60° on a Centigrade scale. It should not be raised more than a degree or two above this temperature. After being heated or cooked at this same temperature for 20 or 30 minutes the bottle should be removed and immediately cooled, preferably by immersing it in ice water or by packing in chopped ice. The process cannot be left to the manipulation of a careless cook or maid; commonly the milk is heated too high and is not rapidly nor sufficiently cooled. The required temperatures — just 145° F. for heating and 50° F. or less for cooling — can only be correctly determined by actually testing with a thermometer.

The process can be somewhat improved by using one of the small pasteurizing outfits that can be bought in the open market. Home pasteurization, however, should not take the place of public or commercial pasteurization on a larger scale. It can be used in special circumstances to advantage; for example, when a family buys dirty or disease-laden milk, (just as many families are now doing in Lawrence), until a better supply can be obtained, home pasteurization should be employed; also, in certain cases of sickness, or infant feeding, whenever emergency precautions are called for, home pasteurization is to be recommended; but when we consider the best means of advancing public health as a whole, there are urgent reasons for a large and general pasteurizing plant that will be equipped with the best of apparatus and produce effective and reliable results, just as a city plant for filtering and purifying an impure water-supply is recognized to be an indispensable public utility. Both are invaluable safeguards of public health. In Lawrence the water supply has been protected, but the milk supply has not. An effective and urgent remedy, I believe, exists in the process of pasteurization. It has been used for years in Denmark and Germany, has lately been introduced in Chicago, recently adopted in New York and at present is used by the large milk contractors that supply Boston and by H. P. Hood & Sons and the Turner Center Dairying Association for milk that they deliver in Lawrence. I recommend that milkmen and contractors adopt pasteurization as a means of promoting their business interests and safeguarding their

trade, and that the City authorities pass necessary ordinances thereby to require the pasteurization of all milk, except Certified Milk, beginning 1914.

Bull. 56, Hygienic Laboratory.



A MODERN HIGH-CLASS PASTEURIZING PLANT.

The following manufacturers and agents deal especially in pasteurizing apparatus:—

BARRY-WEHMILLER MACHINERY CO., 21st & Walnut Sts., St. Louis, Missouri.

Makers of Continuous machines for Pasteurizing bottles filled with milk and sealed tight. These machines have been extensively used heretofore for Pasteurizing beer. Adaptations of the same for Milk Pasteurization is a new development.

CORNISH, CURTIS & GREENE MFG. CO., Fort Atkinson, Wisconsin.

Makers of the Farrington Pasteurizing Machine. No reply received to recent letter of inquiry concerning their machine.

CREAMERY PACKAGE MFG. COMPANY, Albany, New York.

Makers of the Wizard Pasteurizing Machine. Used for Bulk Pasteurization and consists of three sanitary vats identical with each other and each equipped with a spiral disc coil for heating and agitating and is usually associated with a Continuous Cooler of the disc type that has three compartments, the first two being used for cooling with water and the last for brine.

CROWN, CORK & SEAL CO., Baltimore, Maryland.

They make a form of seal for special bottles that render them air-tight and permits the bottles thus sealed to be emersed in water or subjected to vapors of steam. This form of seal is used in the process of Pasteurization known as the Spray System where water is heated and pumped over cases of bottled milk, stacked one upon the other. This company furnishes bottles and seals and has agreements with certain manufacturers of Pasteurizing machines for furnishing complete outfits.

DAIRY MACHINERY & CONSTRUCTION CO., Derby, Connecticut.

Makers of the Progress and Willmann Regenerative Pasteurizers, which are used for Bulk Pasteurization and consist of a heating cylinder and a holding machine.

JENSEN MANUFACTURING CO., 154 Lake St., Chicago, Illinois.

Reported to be manufacturers of machines used for pasteurizing cream for butter-making purposes. No reply received to recent letter.

THE LOEW MANUFACTURING CO., Madison Ave. and W. 90th St., Cleveland, Ohio.

Makers of Intermittent machines for Pasteurizing bottles filled with milk and sealed tight. These machines have been extensively used heretofore for Pasteurized beer, but a few plants have lately been equipped for Milk Pasteurization. Experiments are now being made for the company by Dr. Charles North, New York City.

MILLER PASTEURIZING MACHINE CO., Canton, Ohio.

Makers of the Miller Pasteurizing Machine. No reply received to recent letter.

A. H. REID CREAMERY AND DAIRY SUPPLY CO., 69th and Haverford Ave., Philadelphia, Pennsylvania.

Makers of Regenerative and Continuous Pasteurizers. The Continuous Pasteurizer consists of a vat, Pasteurizer (which is a cylindrical vessel of three copper cases), and an aerator or a Combination Expansion Cooler, the upper section of which is used for milk and the lower section for brine or ammonia.

HENRY E. WRIGHT & SONS, 50 Spice St., (Charlestown Dist.),
Boston, Mass.

Agents for pasteurizers. Also agents for coolers, milk bottles,
fillers, washing powder, separators, bottle caps, Babcock testers;
and they manufacture a variety of cans, milk pails, bottle fillers,
milk chests.

P. R. ZIEGLER & COMPANY, 7 Merchants Row, Boston, Massachusetts.
Various forms of apparatus for the supply of dairies and cow
barns. Special agents for D. H. Burrell & Co. of Little Falls,
N. Y. Milking machines and dairy apparatus.

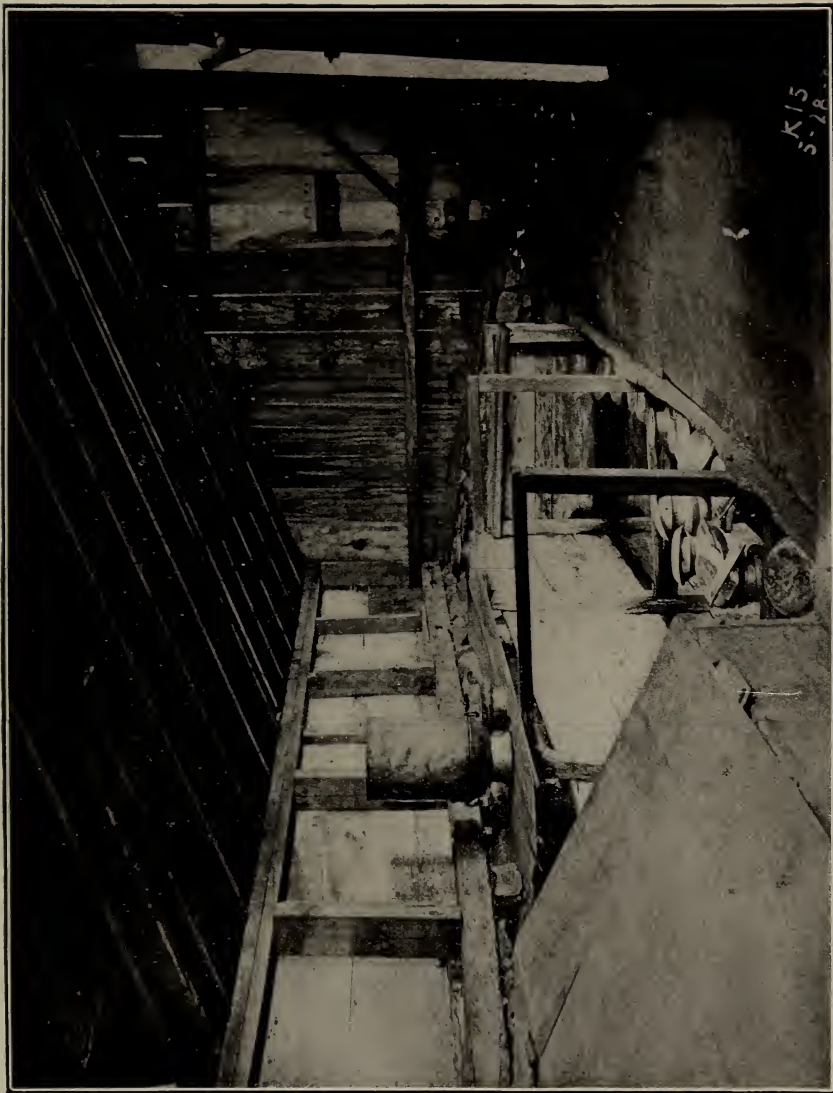
SUPERVISION OF BOTTLING AND PASTEURIZING PLANTS:

Bull. 56, Hygienic Laboratory.



A VERY NEAT, INEXPENSIVE, SMALL, BOTTLING ROOM.

By the present methods of supplying milk to Lawrence a Bottling plant usually serves for several farms; one, in fact, serves for twenty-eight farms. For reasons that I have tried to point out, it is more important even to have the Bottling plant safe than the farm. The Bottling plant is an intermediary between the farmer and the consumer.



A MILK ROOM WITH ROUGH WALLS AND POORLY LOCATED TANK.



BOTTLING ROOM IN A HIGH-CLASS CITY DAIRY.



A STERILIZATION OVEN USED IN BEST BOTTLING PLANTS.

The Bottling plant should receive, bottle and transmit milk without adding any form of impurity or contamination. The responsibility it bears in relation to public health should be evident to the milk contractor who runs the Bottling plant and especially should this responsibility be appreciated by the City Board of Health, which heretofore in Lawrence has done practically nothing in inspecting or investigating these plants which contribute favorably or unfavorably to Public Health. I earnestly recommend that more attention be given to the sanitary conditions of milk Bottling plants.

Plate 3 shows a proposed plan for a Modern Milk House. This is intended to be a practicable and reasonable lay-out, suitable for an average-sized milk farm. Milk is received at one end of the building, passes in order through cooling, bottling, pasteurizing, iceing, storing, and afterwards to the delivery door. Here also are received empty bottles which in turn are washed, sterilized and passed along to the Bottling room. The arrows indicate the order of passing milk and empty bottles through the various processes.

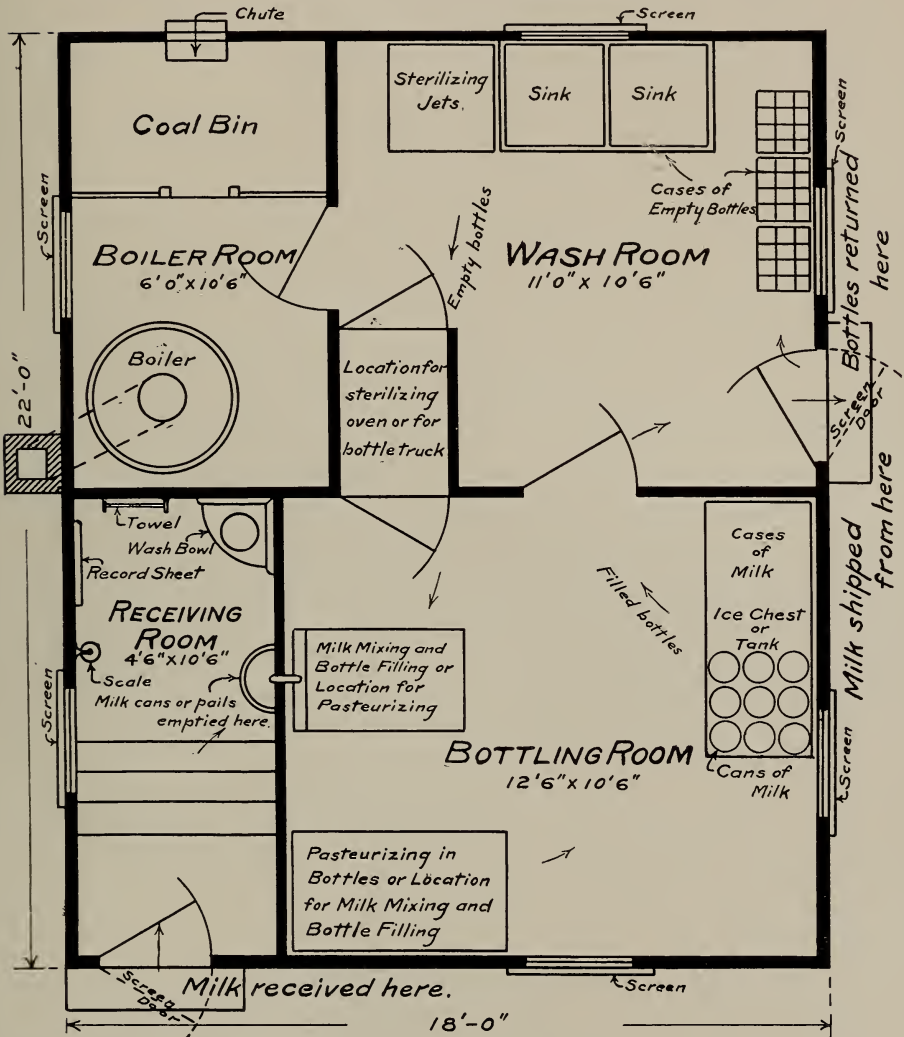
INSPECTION OF DAIRIES.

The City can properly supervise Bottling and Heating plants but it is expensive and inexpedient for any city to inspect all the milk plants that send milk to that city. As we see in the case of Lawrence a large number of these farms are 150 to 200 miles away and in the states of Maine and Vermont. Large contractors who handle these distant supplies buy in large quantities and from many farms; then, they mix the supplies in pasteurizing and blending processes and deliver part of the general supply to Lawrence and perhaps part to Boston or other cities.

Thus, for Lawrence to inspect these supplies at regular intervals and for Boston to do the same thing would involve duplication. I should recommend that, for the present, inspection be made of these distant dairies sufficient to ascertain their general sanitary qualities, thus to obtain assurance that these supplies are acceptable. But, finally, these inspections should doubtless be made by State Inspectors and it is recommended that the City urge the enactment of laws that will authorize inspection by State authorities.

A MODERN MILK HOUSE

Proposed floor plan and arrangement of equipment.



The size here shown would be suitable for handling from 300 to 700 quarts of milk daily.

For CERTIFIED MILK the walls, floors, and ceilings should be faced with plaster cement or similar material that can be washed and kept clean.

For INSPECTED, and MARKET MILK a smooth interior surface of wood would be satisfactory. A white surface assists in detecting dirt.

THE LAWRENCE SURVEY - REPORT ON PUBLIC HEALTH

Lawrence, Mass., March, 1912

F. B. Sanborn, C. E.

Geo. W. Hinchcliffe, Del.

LABORATORY TESTS.

Inspection of the dairies reaches to the very source of pollution. Milk that starts in a pure and clean condition from the farm should reach the consumer in a safe and healthful condition. Through the bottling station or in transportation, however, impurities are likely to enter the milk, and one way of detecting either dilution or pollution in milk is by Laboratory tests. Such tests are common procedures in nearly all large cities. The chemical tests can be easily made but the bacterial tests are more difficult and really require the skill of a physician or bacteriologist. The laboratory in Lawrence is very well equipped and for a short time two years ago it was run effectively, but during the past year the Board of Health dismissed the City Bacteriologist and practically closed the laboratory.

It should be used each day for tests of milk. Samples should be taken by the City Inspector of Milk, from delivery teams, from stores, railroad stations, hotels and ice-cream plants. These samples should show by tests a quality equal to the standards set by law. Laboratory tests afford a convenient way of testing the quality of milk that is being sold. By such tests poor quality or neglect in cleanliness can be detected, and sometimes the beginnings of an epidemic can be accurately forecast.

Not only should laboratory tests of milk be made but as with dairy inspections I believe that the public should know the results of these tests.

PUBLICITY AND PRICES.

I recommend that the City adopt the method of publishing the results of dairy inspections and laboratory tests that has been used in Wheeling, West Virginia; Rochester, N. Y.; Richmond, Virginia; South Orange, New Jersey and elsewhere.

Similarly in the way of publicity I recommend that all milk that is offered for sale in bottles, or cans, be plainly labeled as Certified Milk, Inspected Milk Heated or Market Milk Heated. The object of labeling would be primarily to inform the consumers of the grade of milk that is being sold; but it would have

another object: It would enable the producer who supplies a first-class grade of milk to get more for it than for a common grade. Should not some advantage thus come to the farmer who has a clean barn, a clean milk room, and sells clean milk?

Furthermore to encourage the safe farmer and restrain the reckless one it is believed that licenses, or permits, should be required as carefully of milk dealers as of plumbers or chauffeurs—in fact, milk dealers may offer a greater peril to public health than any of the other public servants. During the years 1910 and the first half of 1911 few milk licenses were issued in the City. Many of the milkmen claim that they called twice or three times at the City office but could not obtain licenses. The importance of the milk business demands licenses if they are to be required for any public health measures.

SAMPLE FORM OF PUBLICITY REPORT.

BOARD OF HEALTH

REPORT OF MILK EXAMINATION, JUNE 1, 1913

Name of Milkman: John Smith, East Dracut.

This is a small place. New barn is needed. 14 cows. Good care is maintained.

1913	Fats	Solids	Bacteria	Dairy Score
	%	%	per c. c.	
January	4.2	14.63	80,000	72.5
February	4.1	12.75	500,000	
March	3.9	12.95	95,000	
April	4.1	13.02	65,000	75.4
June	4.3	12.66	100,000	
July				
August				

NOTES Butter fats and solids: The Massachusetts State requirements are for fats 3.25 per cent; for solids, 12.15 per cent. The cream line and butter fats are less important than total solids, and both are less important than cleanliness.

Bacteria: Milk containing large quantities of bacteria turns sour more quickly than clean milk. A high bacterial count may occur from accidental causes in a single sample without condemning the general quality of the whole supply, but, if habitual, it indicates unsanitary methods on the part of the milkman. Milk produced under good sanitary conditions should not show more than 35,000 bacteria to the cubic centimeter. To obtain a low and favorable bacterial count, have clean conditions everywhere, remove the milk from the stable immediately after milking and keep it on ice.

Dairy score: A perfect score is 100 points. 40 is the lowest score that is passable. 90 is required for a dairy to be classed as "Certified," and 65 as "Inspected."

BUSINESS ORGANIZATION OF PRODUCERS.

Many of the foregoing recommendations of this report could be embodied in City ordinances and enforced by the Board of Health, but often compulsory compliance with rules and regulations does not lead to complete success, and furthermore suggestions that involve much outlay could not be expected of some of the small farms. For example, I have recommended that all milk except Certified Milk be heated or pasteurized. That is a process that cannot be successfully accomplished at each farm. It should be done at some central plant. Such a plant could afford numerous advantages to producers, and the question arises, Could the producers own and operate this central plant themselves? The difficulties in organizing the producers seem to be a drawback. Several of them have said to me, "the producers will not pull together"—and undoubtedly there is some truth in the statement. But Erie, Pennsylvania, has a central Producer's Association that is claimed to be successful and ought it not to be possible to have similar success in Lawrence? In Homer, New York, there is also an organization of milk farms which is being directed by Dr. Charles North of New York along a mutual, or cooperative, basis.

The Association in Erie, I am informed by the President, was started twelve years ago. Sixty-five farmers formed a Stock Company and signed a five-year contract to deliver all their milk to one central plant. An old market house was first utilized, but later a special building was erected in the center of the city, convenient to steam and electric cars. Milk as received here is inspected for odor, and at least once a week it is tested for butter-fats, solids, adulteration and impurities. After being sampled the milk is filtered, or passed through a separator, then heated or pasteurized. Afterwards, a large part of it is bottled and delivered to customers the day received, or the day following. Besides selling common milk and cream, the Association makes butter, dry curd, schmier-käse, and considerable ice-cream. All deliveries throughout the city are made from this central Plant.

About 10,000 quarts of milk are received daily, much of which comes from non-members and in some cases forty miles by

trolley. Fifty men are employed, twenty-three being regular drivers and five special. During the first year, in 1900, the business amounted to \$100,000. During 1909 it was \$225,000. The association handles now about one-half of the milk business of the City. Each month the producers receive \$10,000 for milk. The stock originally sold for \$50 per share, but, I understand that it cannot be purchased for anything like that amount at present.

The plan of organization was to issue stock to the producers. If a man had a milk route his business was taken over at the value of \$3 a quart and in payment stock was given him at \$50 a share. Each share entitled the holder to deliver into the Association 16 2-3 quarts of milk per day.

The advantages in having an association of this sort are:—

- (a) A gain in standardizing the products—milk, butter and ice-cream.
- (b) An improvement in quality.
- (c) Cooperative inspection of dairies and methods of handling milk.
- (d) Economy in delivery and number of employees.
- (e) Better market and better prices for producers than now exist.
- (f) Satisfactory provision for surplus of milk in rush seasons and for shortage in scant seasons.

The President of the Erie Association believes that such an organization of producers could be formed to advantage in a city like Lawrence. There should be a central building that should have especially: A cement floor; abundant supply of pure water; rooms conveniently arranged; an equipment, for a plant of three to four thousand quarts daily, of a 25 horse-power boiler, 12 horse-power engine; a separator of capacity 700 to 800 pounds an hour; a pasteurizer large enough to handle the whole supply of milk during the rush season; butter-making machinery of capacity at least for 100 pounds of butter; machinery for making dry curd, schmierkäse, buttermilk, and especially modern appliances for making ice-cream which adds materially to the income. Such a building should be located near electric and steam railroads, and might serve

for supplying, and washing, all milk cans and pails, and there should be a distinctiveness to the whole affair. The delivery wagons should be painted a uniform distinctive color; distinctive suits should be worn by the drivers; there should be distinctive cleanliness of the apparatus and the products furnished by the Association should be distinctively reliable; there should be distinctive sanitary rules and regulations effectively enforced, thus to build up a business profitable to the farmer and helpful to the City.

An association as described above, similar to one that has been tried and succeeded in another city, if put in operation in Lawrence should solve the major part of the milk question. It should afford the farmer a direct share in the whole profit from dairy to household; it should especially benefit the small producer who now claims to be sometimes "squeezed" by the milk contractor; it should provide for surplus milk and for shortage — two of the most troublesome phases of the milk business and especially troublesome for small dealers; it should reduce the cost of delivery, now placed at two cents a quart, by one half; instead of a dozen different milk teams racing up and down a street and drivers taking empty bottles from any or all of the back door steps, one team and one driver should cover all of one section; thus less noise and less vexation to residents; but such an association should be favored by the City authorities; it would tend at once to better sanitary regulations. The small milk dealer, who has perhaps a dozen cows and a kitchen or a cellar for a bottling room cannot be expected to put in appliances for bottle washing, sterilizing, or moreover for pasteurizing which undoubtedly is going to be required in the near future, but an association controlled by fellow producers of which he owns a part would ensure him a good market and fair treatment, and enable him to comply with modern demands.

Can such an organization be formed? It seems possible to me but, as I have said, some of the producers doubt if many of their number would agree to unite. In order to ascertain what can be done, I would suggest that a canvass be made among the producers interested and should it finally be found impracticable

to organizers the producers, I would suggest that a similar consolidation of interests be effected by the milk contractors. At present there are fifteen or more such contractors supplying milk in Lawrence. I believe that better results could be obtained in the healthfulness of products, and in economy of collecting, bottling and delivering by having modern apparatus, fewer and larger plants. Instead of fifteen, three to five would be preferable. The advantages of consolidation and a central plant will doubtless be quickly appreciated by contractors, but in proposing the plan I have had foremost in mind the interests of the producers. They should benefit first and it is to be hoped that they will be leaders in promoting the movement, yet it would seem to be practicable and in fact advisable to include in the association contractors and business men of the city who could aid in managing and financing the undertaking in the best possible manner. I earnestly advise the producers to discuss the plan as outlined above, to appoint a committee to examine into the feasibility of it, and to ascertain exactly what farmers are willing to coöperate.

LIST OF PRODUCERS WHO SUPPLY MILK TO LAWRENCE: —

(The towns are arranged alphabetically and in each town the names of producers are given alphabetically.)

These farms are shown on Plate II, that is designated Milk Farms near Lawrence. They include all farms from which milk is delivered by teams to Lawrence. Greatest distance of any farm from the center of the city is seven and a half miles. Total amount of milk supplied by these farms, about 16,000 quarts per day.

ANDOVER		Qts. daily
C. J. Bliss,	Sells to C. D. Glennie,	50
E. W. Burt,	C. D. Glennie,	25
Sam. D. Berry,	C. A. Stone,	30
Jno. J. Crowley,	Sells to various stores,	75
Geo. M. Carter,	C. D. Glennie,	100
W. J. Clark,	J. L. Noyes,	30
Luke Collins,	H. Taryzian,	30
J. Dagdigian,	Sells to H. Taryzian,	98
Dan. F. Donovan,	G. C. H. Dufton, and C. D. Glennie,	100

LAWRENCE SURVEY

		Qts. daily
Dan. Fitzpatrick,	Sells to C. D. Glennie,	50
J. W. Godin,	Sells to C. D. Glennie,	80
A. Kasabian,	Sells directly to consumers,	150
Jos. T. Lovejoy,	Sells to C. D. Glennie,	80
P. E. Livingstone,	Sells to C. D. Glennie,	60
J. L. Noyes,	Sells directly to consumers,	40
	Receives from another dairy,	30
Shattuck Bros.	Sells directly to consumers,	400
Manuel Silva,	Sells to Antonio Mello,	85
James Sutor,	Sells directly to consumers,	120
Frank Smith,	Sells to J. Robinson,	175
Chas. A. Stone,	Sells directly to consumers,	40
	Receives from other dairies,	150
A. R. Stevens,	Sells to C. A. Stone,	70
Hudson E. Wilcox,	Sells to Antonio Mello,	100
R. A. Watson,	C. D. Glennie,	60
George D. Ward,	Wood Mill Restaurant,	40
	(160 qts. produced in all)	

AUBURN, ME.

Turner Centre Dairying Association,	
Receives from other dairies,	4000
(See Contractor's List for statement regarding the supply.)	

BOXFORD

J. G. Chandler,	Sells to C. D. Glennie,	30
J. W. Chadwick,	Sells directly to consumers,	300
Thomas Downes,	Sells to C. D. Glennie,	50
Charles Gardner,	C. D. Glennie,	60
Charles M. Moulton,	C. D. Glennie,	55
J. Henry Nason,	C. D. Glennie,	100
Myron Pearl,	C. D. Glennie,	100
J. C. Whitney,	C. D. Glennie,	50

DERRY, N. H.

H. P. Hood & Sons,	Sell directly to consumers from the Hood Farm,	10
(See Contractor's List for statement of the balance of their supply.)		

DRACUT

Kelle Brox,	Sells directly to consumers,	100
	Receives from other dairies,	200

THE MILK SUPPLY

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HAVERHILL

		Qts. daily
E. S. Blodgett,	Sells to W. O. Putnam,	50
G. A. Mills,	S. Taylor,	100
E. M. Nason,	W. O. Putnam,	150

LAWRENCE

Theobold Daley,	Sells directly to consumers,	150
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METHUEN

Geo. M. Adams,	Sells directly to consumers,	70
	Receives from M. Garabedian and S. Garabedian,	55
E. L. Bragdon,	Sells directly to consumers,	325
	Receives from another dairy,	30
B. Boornazian,	Sells directly to consumers,	130
	Receives from G. O. Stevens,	80
Jos. Bedard,	Sells directly to consumers,	380
	Receives from Cyril Bedard,	60
Batty Bros.	Sells to J. T. Roche,	225
Cyril Bedard,	Jos. Bedard,	60
Mrs. A. Ball,	Chas. Nimmo,	60
Wm. Bodwell,	A. C. Clough,	25
Barker Estate,	J. B. Richardson,	40
Bishop,	Sells directly to consumers,	30
Louis S. Cox,	Sells directly to consumers,	250
Patrick Cox,	Sells directly to consumers,	140
	Receives from another dairy,	20
F. L. Currier,	Sells to F. Gardner,	35
D. F. Donnelly,	Sells directly to consumers,	200
A. C. Clough,	Sells directly to consumers,	95
Frank Dietzel,	Sells to C. Bleicher,	50
J. F. Donovan,	Sells directly to consumers,	130
	Receives from another dairy,	30
W. M. Dooley,	Sells directly to consumers,	220
Joseph E. Dowding,	Sells to Peter Alford,	120
Wm. P. Fogg,	Sells to W. E. Ralton,	80
G. E. Flanders,	Sells directly to consumers,	160
	Receives from J. E. Merrill,	35
F. W. Foster,	Sells to W. E. Ralton,	40
Fred L. Gardner,	Sells directly to consumers,	130
	Receives from F. L. Currier,	35
Frank W. George,	Sells to C. Bleicher,	120
Henry Griffin,	Peter Alford,	110

		Qts. daily
F. H. Giles,	Sells directly to consumers,	140
J. E. Griffin,	Sells to Peter Alford,	80
Harry Harris,	Sells directly to consumers,	350
	Receives from C. W. Colburn, Ar- thur Emerson, Chas. Fossie, John Quigley, Patrick Quigley, H. S. Russ, G. B. Smith, and John Mansfield,	390
Hurzenger Bros.,	Sell to C. Bleicher,	60
M. S. Hill,	Sells directly to consumers and to John Hoh,	200
Harnisch Bros.,	Sell directly to consumers,	300
John M. Hoh,	Sells directly to consumers,	190
	Receives from M. S. Hill,	40
Jarman,	Sells to Frank Duffin,	40
Chas. Kitchen,	Sells to druggist, (100 produced in all)	50
Fred H. Miller,	Sells directly to consumers,	375
Edward Moreau,	Sells directly to consumers,	190
J. T. Merrill,	Sells to G. E. Flanders,	35
Gustave Miller,	Sells directly to consumers,	40
Meth. Town Farm,	Sells to E. Moreland,	120
Morse Bros.,	Sell to R. W. Carleton,	200
I. Nelson,	Sells to R. E. Carleton,	35
Charles Nimmo,	Sells directly to consumers,	70
	Receives from Mrs. A. Ball,	60
Frank C. Perley,	Sells to S. Taylor,	80
Petzold Bros.,	A. C. Clough,	70
J. B. Richardson,	Sells directly to consumers,	60
	Receives from other dairies,	40
Edmond Richardson,	Sells to Jos. Edwards,	100
J. A. Shea,	Sells to C. Bleicher,	55
G. Simonian,	A. Torisi,	125
Scannell Bros.,	Sells directly to consumers,	175
	Receives from other dairies,	30
C. A. Stevens,	Sells to F. Duffin and J. Edwards,	160
G. O. Stevens,	Sells to B. Boornazian,	170
E. D. Taylor,	Sells directly to consumers,	450
G. Taylor,	Sells to S. Taylor,	80
W. E. Williams,	Sells directly to consumers,	450
Horace Whittier,	Sells to R. E. Ralton,	280
G. K. Webster,	Sells directly to consumers,	250
A. G. Wood,	Sells directly to consumers,	50
	Receives from other dairies,	45
J. H. Welch,	Sells to Moreland,	20
Walter Welch,	Sells to Moreland,	20

NORTH ANDOVER

Qts. daily

Chas. Appleton,	Sells to C. D. Glennie,	30
Jacob Barker,	M. McDermott,	90
Jesse Coe,	P. J. Doherty,	120
Mrs. James A. Davis, (A. M. Robinson, Mgr.)	Sells directly to consumers,	240
John Driscoll,	Sells to C. A. Stone,	50
George Eglofe,	Sells directly to consumers,	40
	Receives from A. N. Talbot,	130
J. F. Foster,	Sells to C. D. Glennie,	120
Chas. D. Frost,	C. D. Glennie,	70
Bes. W. Farnum,	P. F. Doherty,	30
Miss C. A. French,	M. McDermott,	240
Orrin Foster,	C. D. Glennie,	100
Nathan Foster,	C. D. Glennie,	50
James Glennie,	C. D. Glennie,	150
E. F. Leland,	W. O. Putnam,	100
N. A. Town Farm,	Sells to C. D. Glennie,	30
C. A. Newhall,	P. J. Doherty,	125
Wm. W. Phelps,	Sells to C. D. Glennie,	35
J. C. Poor,	Otto Mitzner,	275
Calvin Rea,	Sells to C. D. Glennie,	100
George A. Rea,	G. Hatem,	100
Orris Rea,	P. Doherty,	55
A. Rogers,	W. Putman,	120
Richard Russell,	M. McDermott,	290
A. M. Robinson,	(See Mrs. James A. Davis.)	
L. R. Starrett,	Sells to P. J. Doherty,	25
E. R. Tucker,	Sells to C. D. Glennie,	50
A. N. Talbot,	Geo. Eglofe,	90
H. M. Whittier,	C. D. Glennie,	50
Mrs. H. M. Whitney,	M. McDermott,	25

PELHAM, N. H.

Chas. W. Coburn,	Sells to Harris Bros.,	55
Arthur Emerson,	Sells to Harris Bros.,	50
Charles Foisie,	Sells directly to consumers,	30
	Receives from other dairies,	300
John Mansfield,	Sells to Harris Bros.,	70
W. Morrison,	Sells to R. E. Carlton,	20
Patrick Quigley,	Sells to Harris Bros.,	40
John Quigley,	Harris Bros.,	60
H. S. Russ,	Harris Bros. & Moreland,	90

		Qts. daily
Geo. B. Smith,	Harris Bros.,	40
Henry E. Titcomb,	R. E. Carlton,	50
Edward Young,	R. E. Carlton,	110
SALEM, N. H.		
Margaret Barry,	R. E. Carlton,	80
Samuel Beauche,	R. E. Carlton,	15
George A. Brown,	R. E. Carlton,	40
Brady Bros.	H. P. Findeison,	160
F. H. Coran & Son,	Sells directly to consumers,	160
B. E. Davis,	Sells to D. Hird,	45
R. H. Dunbar,	Sells directly to consumers,	200
Isaac Emerson,	Sells to R. E. Carlton,	50
S. W. Forsythe,	Sells to R. E. Carlton,	30
H. P. Findeison,	Sells directly to consumers,	30
	Receives from Brady Bros., A. G.	
	Kelley, Albin Kinzler,	250
M. Garabedian,	Sells to G. M. Adams,	30
S. Garabedian,	G. M. Adams,	25
David Hird,	Sells directly to consumers,	20
	Receives from A. E. Davis, J. C.	
	Hazeltine, E. J. Manor,	145
J. C. Hazeltine,	Sells to David Hird,	50
A. Kinzler,	Sells to H. P. Findeison,	45
A. G. Kelley,	H. P. Findeison,	45
Kachadorian Bros.	F. Jedziniak,	90
J. Learmonth,	Sells to R. E. Carlton,	50
W. A. Littlejohn,	Sells directly to consumers,	85
	Sells to another dairy,	30
L. A. Machan,	Sells to R. E. Carlton,	10
Arthur Mitzner,	H. P. Findeison,	50
J. A. C. Machay,	R. E. Carlton,	60
E. J. Manor,	D. Hird,	50
William Turner,	Sells to R. E. Carlton,	50
F. L. Woodbury,	Sells to R. E. Carlton,	35

LIST OF CONTRACTORS WHO BUY ALL OF THE MILK THAT THEY SUPPLY: —

(Names are arranged alphabetically by towns in accordance with location of bottling plants.)

ANDOVER

G. Dufon buys from D. F. Donovan 50 quarts daily.

Antonio Mello buys from Manuel Silva 85 quarts daily; from H. E. Wilcox, 100. Total, 185.

H. E. Wilcox, 100; Total, 185.

H. Taryzian buys from John Dagdigian 90 quarts daily; from Luke Collins, 30. Total, 120.

AUBURN, MAINE

Turner Center Dairying Association receives milk from 281 dairies in the vicinity of Rumford Falls, Maine. (See Plate I.) (Milk as shipped to Lawrence is mostly skim-milk, and cream.) Total, 4000 quarts daily.

BOXFORD

No contractors located here, who buy all of their supply.

DERRY, N. H.

H. P. Hood & Sons receive milk for Lawrence and Boston from 45 dairies in Londonderry, Hudson, Windham and Pelham and deliver of this amount in Lawrence, 965 quarts daily. They also receive milk from 63 dairies in towns between Newport and Wells River, Vermont, and deliver in Lawrence, 2550 quarts daily. (See Plate I.) Total, 3515.

HAVERHILL

No contractors located here, who buy all of their supply.

METHUEN

Peter Alford buys from Jos. R. Dowding 120 quarts daily; from Henry Griffin, 110; from J. E. Griffin, 80. Total, 310.
 C. B. Bleicher buys from Frank Dietzel, 50 quarts daily; from Frank W. George, 120; from Huizinger Bros., 60; from Mrs. J. A. Shea, 55. Total, 285.
 A. C. Clough buys from W. Bodwell 25 quarts daily; from Petzold Bros., 70. Total, 95.
 R. E. Carleton buys from Isaac Emerson 50 quarts daily; from Samuel Beauche, 15; from G. A. Brown, 40; from J. Learmonth, 50; from J. A. C. Mackay, 60; from H. E. Titcomb, 50; from Wm. Turner, 80; from F. L. Woodbury, 35; from Edward Young, 110; from Morse Bros., 200; from L. A. Mecham, 10; from J. S. W. Forsythe, 30; from M. Barry, 80. Total, 810.
 F. Duffin buys from C. A. Stevens 170 quarts daily; from Jarman, 40. Total, 210.
 Jos. Edwards buys from G. O. Stevens 80 quarts daily; from Edmond Richardson, 100; from Joseph Barrie, R. Griffin, C. Young. Total, 310.
 F. Jedziniak buys from Kashadoorian Bros. 90 quarts daily.
 Henry Jacob & Son buy from Edmond Richardson 35 quarts daily; from Long, 50; from Whittaker Bros., 140; from Geo. A. Trumpold, 13. Total, 238.
 Otto Mintzner buys from J. C. Poor 275 quarts daily.
 E. Moreland buys from Methuen Town Farm 120 quarts daily; from J. J. Welch, 20; from Walter Welch, 20; from H. S. Russ, 45. Total, 205.
 S. Taylor buys from George Taylor 80 quarts daily; from G. A. Mills, 100; from F. C. Perley, 80. Total, 260.

NORTH ANDOVER

- P. J. Doherty buys from Jesse Coe 120 quarts daily; from B. W. Farnum, 30; from C. A. Newhall, 125; from Orris Rea, 55; from L. R. Starrett, 25. Total, 355.
- C. D. Glennie buys in Andover, from C. J. Bliss 50 quarts daily; from E. W. Burt, 25; from G. M. Carter, 100; from D. F. Donovan, 50; from D. Fitzpatrick, 50; from J. W. Godin, 80; from P. E. Livingstone, 60; from J. T. Lovejoy, 80; from G. D. Ward, 40; from R. A. Watson, 60.
- In Boxford, from J. G. Chandler, 30 quarts daily; from Thos. Downes, 50; from Chas. Gardner, 60; from C. M. Moulton, 55; from J. H. Nason, 100; from M. Pearl, 100; from J. C. Whitney, 50.
- In North Andover, from Chas. Appleton, 30 quarts daily; from J. F. Foster, 120; from N. Foster, 50; from O. Foster, 100; from C. D. Frost, 70; from J. Glennie, 150; from N. A. Town Farm, 30; from W. W. Phelps, 35; from Calvin Rea, 100; from E. R. Tucker, 50; from H. M. Whittier, 50. Total, 1825.
- Michael McDermott buys from Jacob Barker 90 quarts daily; from Miss C. A. French, 240; from Richard Russell, 290; from Mrs. H. M. Whitney, 25. Total, 645.
- W. C. Putnam buys from E. S. Blodgett 50 quarts daily; from E. F. Leland, 100; from E. M. Nason, 150; from A. Rogers, 120. Total, 420.

LAWRENCE

- G. Hatem buys from George A. Rea 100 quarts daily.
- J. T. Roche buys from Batty Bros. 225 quarts daily.
- W. E. Ralton buys from W. C. Fogg 80 quarts daily; from F. W. Foster, 40; from H. Whittier, 280. Total, 400.
- A. Torisi buys from G. Simonian 125 quarts daily.
- Wood' Mill Restaurant buys from Wm. M. Wood 140 quarts daily.

PELHAM, N. H.

No contractors located here who buy all of their supply.

SALEM, N. H.

No contractors located here who buy all of their supply.

Total amount of milk furnished to Lawrence by the above contractors is 15,193 quarts per day; or five-eighths of the total milk supply.

THE WATER SUPPLY OF LAWRENCE AND ITS RELATION TO THE PUBLIC HEALTH*

BRIEF STATEMENT OF CONDITIONS:

Lawrence takes its water from the Merrimack River; a very foul source, but, by excellent methods of filtration, it is made, not only equal in purity and healthfulness to the water supply of the average Massachusetts city, but it is superior to many. The percentage of sickness and death by diseases that are transmitted by water has materially decreased since filtration was started.

SOURCE OF SUPPLY:

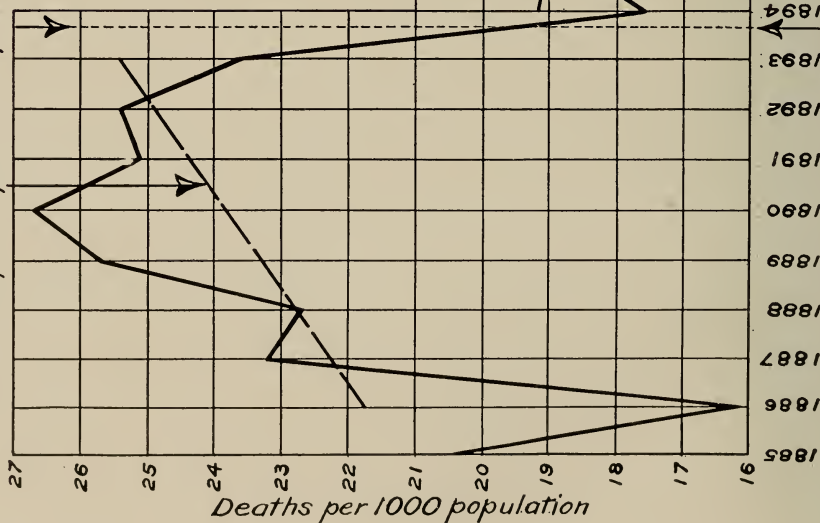
The Waterworks plant is located on the north bank of the Merrimack River, and about three quarters of a mile above the dam and South Broadway, which connects North and South Lawrence. The river water carries many impurities, a serious part of which is sewage that enters the river from cities upstream. These cities include Franklin, Laconia, Manchester and Nashua in the State of New Hampshire, and Fitchburg, Leominster and Lowell in Massachusetts. These towns and cities have an aggregate population of two hundred and fifty thousand and none of the sewage is purified before it enters the river. Lowell, with its population of 107,000 is located eleven miles above Lawrence. It has been estimated that the amount of sewage that enters the river and its branches is over one gallon per six hundred gallons of water flowing.

FILTRATION:

The problem of transforming this impure and dangerous water supply into a potable and safe drinking water was in reality solved in 1893 when Slow Sand Filters were first installed. Previously, typhoid fever and death rates in Lawrence had been alarmingly high, but immediately after the filters were put in

* Many of the facts in this chapter were compiled by Mr. J. J. Haley in an engineering thesis taken in conjunction with this Survey.

Line shows Average Death Rate
BEFORE FILTRATION OF WATER
 First Filter put in operation Sept. 20 1893



THE LAWRENCE SURVEY
 By Appropriations from the White Fund

Diagram showing DEATHS PER 1000 POPULATION

Prepared for
 Report on Investigation
 of

PUBLIC HEALTH

Sept. 1911

Frank Belanborn, C. E.

Line shows Average Death Rate
SINCE FILTRATION OF WATER
 From 1894 to 1910

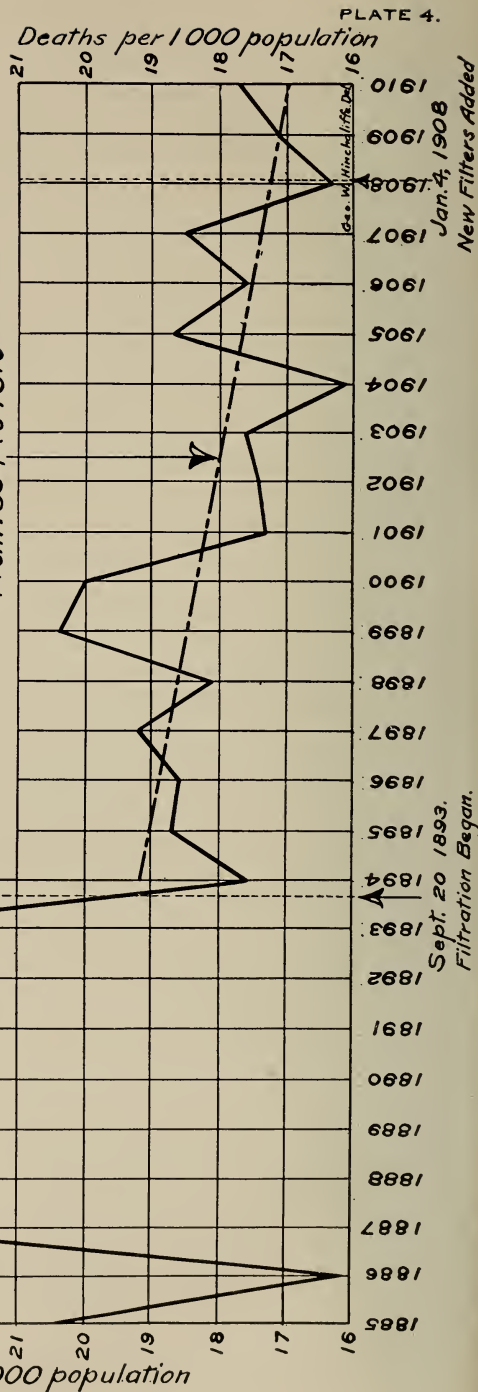


PLATE 4.

Jan. 4, 1908

New Filters Added

operation, both the cases of typhoid and the total deaths from all causes were materially reduced. The death rate and averages are clearly shown by the diagrams of Plate 4. The increase in rate from 1886 to 1893 is indicated by the first straight line of averages that is shown steadily ascending. Similarly the decrease in rate since 1894 to the present time is shown by the second straight line of averages steadily descending.

Comparison of the death rate in Lawrence with that of other Massachusetts cities is given by the U. S. Census. For Lawrence the rate in 1910 was 17.7 per cent per 1000 population; and of the fifty-five largest cities in the State ten have equal, or higher death rates as follows: Chelsea 18.8; Fall River 18.4; Holyoke 17.7; Lowell 19.7; Milford 18.3; New Bedford 18.6; Newburyport 18.7; Northampton 18.9; Taunton 23.3, and Westfield 18.7. The average of the fifty-five cities is 15.9. The lowest is that of Winthrop, 10.2.

The reduction in death rates in Lawrence compares favorably with results that have occurred in other cities where changes have been made from a polluted to an unpolluted water supply. The following interesting comparison has been made by Mr. Allen Hazen, Engineer of New York:

Reduction in death rate per 100,000 population by changing from a polluted to an unpolluted water supply:

City	Location	How changed	Date of change	5 years before change	5 years after change	Reduction in 5 years
Hamburg	Germany	Filtration	1892	2400	1770	630
Albany	New York	"	1899	2330	1840	390
Newark	New Jersey	River water to upland water	1892	2510	2200	300
Jersey City	"	"	1896	2540	1930	610
Lowell	Mass.	River water to ground water	1893	2510	2050	460
Lawrence	Mass.	Filtration	1893	2440	2000	442
					Average,	472

A reduction in the death rate of 442 for five years with a population of 100,000 corresponds to 359 for a population of 81,200 as Lawrence has averaged for the past five years. I believe that it does not overstate the facts to say that, with the

present population, filtration is saving from 350 to 400 lives every year, besides a greater saving would occur in years that might have epidemics as were common before the filters were installed.

Not only has filtration reduced in measurable terms the total death rate of the City and the sickness and death due to typhoid fever, but unquestionably many minor ailments; diarrhoea, dysentery, stomach disorders have been greatly reduced and the health and working strength of all the people have been promoted by having a water supply that is made reasonably pure. Confidence in the quality of the water, however, is not as general throughout the City as it should be, and, in many offices, stores, and residences, spring water, or pseudo-spring water, is drunk instead of city water. This water is delivered in bottles from a variety of places and with very little sanitary oversight on the part of the farmer or dealer supplying it, the consumer, or the Board of Health. I believe that these supplies have become so extended that all of them should be examined and regulations prescribed and enforced that will insure more protection of the public health against possible epidemics.

In addition to the direct benefits that the City has derived from filtration, there are several indirect benefits that should be mentioned.

The filter of 1893 was the first noteworthy one used in this country for the removal of bacteria. The following excellent results were obtained even from the beginning:

Year	In water applied to filters	In effluent of filter at pumping pumping station	Per cent of reduction by passing through filter
1894	10,800 per cc.	150 per cc.	98.6
1895	11,000	120	98.9
1896	7,600	110	98.6
1897	10,900	57	99.5
1898	4,400	65	98.5
1899	5,800	55	99.1

Many engineers of this country and from abroad, came to investigate the filters. They published reports and spoke far and wide of the methods and success of the Lawrence filters. This all benefited the City.

THE VALUE OF PURE WATER.

Sanitary engineers agree that sickness and death in any community should not increase above reasonable limits and whenever the percentage becomes abnormal, it means an economic loss that generally must be charged to the water supply. A common method of estimating the expense of impure water is by means of the typhoid death rate. For example, the death rate by typhoid fever from 1885 to 1893, before filtration was introduced, was 91.8 each year for 100,000 population; from 1895 to 1910, after filtration was put in operation, the death rate became 24.4, or a saving of 67.4 lives per 100,000 population. This would correspond to a saving of 44.2 lives each year for an average population of 65,780, as in Lawrence. A human life is estimated at an average value of \$10,000 by some of the best authorities, but placing it conservatively at \$5,000, the saving of 44.2 lives should mean a money value of \$221,000 per year. But accompanying each death by typhoid, there are on the average 4.5 cases of sickness and recovery. Each of these cases costs someone on the average \$125 for medicine, nurses, and loss of wages, a total of $4.5 \times \$125 \times 44.2$, or \$24,862. Thus in reducing the typhoid death rate of 91.8 before filtration to 24.4 since filtration, a conservative estimate of savings to the citizens would be about \$220,000 per year for deaths and \$25,000 per year for sickness, and this would be for one disease. The total cost of installing all of the filters and their accessories is given as \$140,000; this outlay has been more than justified by the reduction of typhoid in a single year. The cost of operating the filters is recorded as \$9,000 to \$10,000 a year; even \$10,000 a year since 1893 would mean \$180,000, approximately making a total cost of \$370,000, which the savings by typhoid alone would provide for in one and a half years.

Second only to quality of a water supply comes the question of quantity. Every town and city puts forth the common appeal for "an abundant supply of pure water." The adequacy of the present source of supply for Lawrence is unquestioned; so long as the Merrimac River has sufficient flow to furnish power for manufacturing, there should be ample amount of water to satisfy reasonable demands of a public water supply. But as the population up

stream increases and more sewerage is added, will the supply continue to be acceptable for drinking purposes? What deterioration has already been observed?

The State Board of Health is engaged in an extended investigation of the Merrimac River, and it appears from results so far announced that important changes in the quality of the water have not taken place in the past ten years. It is certainly undeniable, however, even if the processes of filtration are an effective barrier against sickness and disease, that a river which furnishes drinking water should not be used as an open sewer and a common dumping ground for two hundred and fifty thousand population. It is foolish to add sewage and pollution to a river and then proceed a few miles down stream to filter out this same pollution; yet this is exactly what is being done in the Lawrence case. Unfortunately, the same condition exists in many other localities in the United States, and a question before engineers at the present time is to provide reasonable means of sewage and refuse disposal for those large cities that now get rid of sewage by disposal without purification into rivers or other public waters.

The present filters could be enlarged to meet the increasing need for more water. In fact, the Superintendent believes that the present filters are being operated about to their limit. He estimates that the open filters are doing about one-third and the new covered filters about two-thirds of the filtering, and that more filters will immediately be needed if the city is to continue to grow at its present rate. Considerable increase in the capacity of filters could be obtained by thoroughly overhauling the old filter and adding a masonry cover to obviate ice and increase its winter efficiency. Treatment of water by hypochlorite of lime is another possible way of allowing an increase in the rate of filtration. These matters, however, are principally engineering features and involve financial considerations. The adequacy of the pumping plant has recently been the subject of heated controversies in the City, and it has been decided to add a centrifugal pump that is to afford three million gallons a day additional capacity. The capacities of reservoirs, stand-pipes, and street mains do not directly affect public health and are not included in this investigation.

Conclusion:

In conclusion, I wish to emphasize the success that has attended the methods of filtration that have been used here in Lawrence. The mortality rates have greatly improved since filtration began; serious epidemics of water-borne diseases have been eliminated, and many good reports have been sent out that show the results of the old and new filters. Such a record is creditable and helpful to the City. Those citizens that urged the installation of a filtration plant should feel satisfaction in witnessing the improved health conditions that have resulted; and especially should citizens, who, with honest purpose, at first opposed the proposed methods of filtration, now give proper credit for the distinct advantages that have accrued to Lawrence and other cities.

THE SANITARY SURVEY OF 1850

A Sanitary Survey of Lawrence would not be complete without some reference to the excellent survey of the State that was made in 1850 under the leadership of Lemuel Shattuck. This survey included the City of Lawrence, which had then been incorporated but three years. Throughout the report of the survey, which was published in a volume of 544 pages, there is expressed a keen appreciation of good health, its value to the individual, and to the city, its value morally, physically, and even financially. A better presentation of the importance of public health is seldom found, as the following paragraph will show:

“We believe that the conditions of perfect health, either public or personal, are seldom or never attained, though attainable;— that the average length of human life may be very much extended, and its physical power greatly augmented;— that in every year, within this Commonwealth, thousands of lives are lost which might have been saved;— that tens of thousands of cases of sickness occur which might have been prevented;— that a vast amount of unnecessarily impaired health, and physical debility exists among those not actually confined by sickness;— that these preventable evils require an enormous expenditure and loss of money, and impose upon the people unnumbered and immeasurable calamity, pecuniary, social, physical, mental, and moral, which

might be avoided;—that means exist, within our reach, for the mitigation or removal;— and that measures for prevention will effect infinitely more than remedies for the cure of disease.”

Prevention undoubtedly will effect more benefit to all citizens than remedies, but prevention is difficult to instill into human practice. The person who has escaped scarlet fever, typhoid, or diphtheria, is apt to believe that others could escape in the same commonplace way that he has, provided they were willing to follow the same methods; whereas, the person who has been afflicted by any one of these diseases will usually admit the difficulty of escape and the ease of catching such infectious diseases. So that the question for governing bodies to decide is, “How shall the people as a whole be properly educated in means and methods of prevention? How shall the benefits be secured of:

A safe water supply?

A safe milk supply?

Proper disposal of waste?

The water supply of Lawrence I believe to be as favorable to public health as could be reasonably demanded. The milk supply, I believe, needs material improvement in the interest of public health; and the sewage and garbage disposal methods are to be discussed in the pages that immediately follow.

SEWAGE AND GARBAGE DISPOSAL*

BRIEF STATEMENT OF CONDITIONS.

The sewage and garbage disposal methods involve two aspects of the question of Public Health that are of importance. The first is in regard to the disposal of sewage and waste into the Merrimack and Spicket Rivers, and the second is in regard to the disposal of ashes and rubbish on dumping grounds, and of kitchen refuse to swine. The present methods are the result of old customs that have been in use fifty years and more without noteworthy improvement. The chief objections to them now come from the fact that we know the causes of disease far better than we did fifty years ago.

THE SEWERAGE SYSTEM.

The sewerage system consists of a network of pipes that join into trunk sewers which empty either into the Merrimack River or its tributary, the Spicket River. See Plate 5. Most of these pipes receive both surface drainage and house sewage, although about one-eighth of the area within the limits of the City of Lawrence is on what is known as the "separate system," and receives only house sewage. Sewerage of Methuen joins with the Lawrence system principally at a point near the Arlington Mills, and flows through an intercepting sewer along the general course of the Spicket River, and empties into that river at the Garden Street bridge, a few hundred feet back from the outlet of the river. Thus into the Merrimack River from nine principal outlets, this sewage is discharged. There are a few outlets, however, that are indefinite as to size, location, and contents. At the Pemberton Mill, there is one of the original sewers as put in by the Essex Co., that empties either into a race-way, or into one of the recently constructed sewers, and there is some doubt as to which of these hidden connections is at present being used.

* Many of the facts concerning Garbage Disposal and the Disposal of Sewage into the Merrimack River were compiled by Mr. C. E. Williams in an engineering thesis taken in conjunction with this Survey.

Besides the regular sewer outlets as shown on the drawing, it was found by our inspection along the river banks that there are many other small drains that discharge into the rivers. Some are at the embankment walls above the water level, and others extend part way to the water's edge through pipes and various forms of open and closed channels. There seem to be no limitations in the use of this river for sewage purposes. From bank to bank, 1000 feet in width, it is veritably an open depository for sewage and manufacturing waste. At the time of our inspection, in July, a boat was used to go from place to place, and by wearing rubber boots, we were able to enter some of the outlets, and traverse the river banks. These banks in many cases were coated with sludge and dried sewage which, besides being objectionable on account of offensive odors, afforded breeding-places for flies which, according to recent disclosures, are a greater menace to good health than has heretofore been understood. In many localities the sewage was observed in a decomposing state on the surface of the ground where it had been deposited by some outlet that did not properly extend to running water. These conditions would doubtless be alleviated after a high run of water had scoured the river banks, but, during the summer months, the conditions become offensive, and to a considerable extent dangerous to the health of mill operatives and employees who are required to work in such localities.

SEWER OUTLETS.

The following pictures, taken in July 1911, show some of these outlets:

The first view is an outlet at the rear of the Washington Mills that is believed to serve now one of the original sewers that was put in about 1848. As the photograph shows, the banks of the river near this outlet, at the time of our inspection, were cluttered with rubbish, pieces of wood, stone, tin cans, and vegetation; much of which was exposed to filth from sewage. This sewer does not extend beyond the river wall and the channel from the wall to the river is one of the most neglected of any.

The Lawrence Street outlet is at the rear of the Pacific Mills.





As in the case of many other sewers the wall has been changed near the outlet—the keystone in place is dated 1874, and was formerly in another location. The sewer as now existing also took the place of one of the original sewers that was referred to in the Report of the Sanitary Commission of 1850 as “a large common sewer that admits surface drainage and underground sewerage, being in size six and one-half feet high, three feet wide, allowing a man to walk erect, and constructed of brick laid in

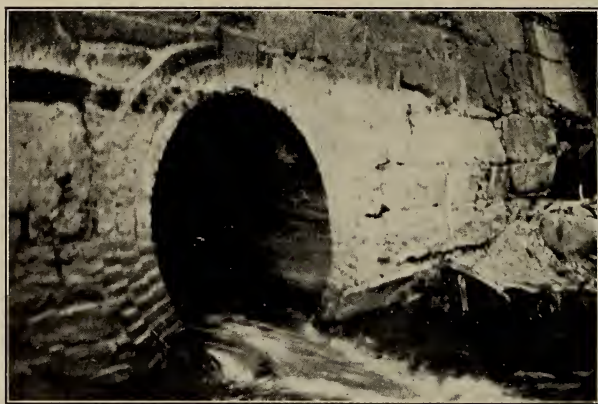


Outlet of an Original Sewer; put in about 1848. Banks nearby are much cluttered

cement, and of stone masonry, passes under, and four feet below, the bed of the canal,” following the course of a natural ravine. Sewage from this outlet—shown on the next page—goes directly into river water which extends up to the sewer at all times and obviates any serious objections.

The principal outlet for the section of Lawrence that is north of the Merrimack River and west of the Boston and Maine Railroad is under a fishway at the north end of the Broadway bridge. It is called the Water Street outlet. An open channel extends

about 200 feet to the low-water course of the river. This channel becomes obstructed by the high run of the river nearly every Spring, and the City fails to keep it properly cleaned out. Its condition has caused objections in years past. At the time of our inspection I noted that: pools of stagnant sewage exist; the channel is more or less divided so that it is difficult to trace the exact course that is followed by the sewage from the outlet to the River; many of the rocks and ledges are moist and slimy, and some have thick coatings of dry and hardened sewage.



A Sewer Outlet in the rear of the Pacific Mills. This Sewer took the place of the old Stone Sewer that was built by the Essex Company about 1848 or earlier

Across the river there is an outlet known as the South Broadway or Shanty Pond sewer outlet. From this outlet a cast iron pipe extends part way out to deep water. The purpose of this 30-inch pipe is to serve for ordinary flows. During storms, when the sewer runs more than half full, it discharges through the upper portion of the cross section directly at the river wall. Thus this extension improves conditions somewhat, and undoubtedly has advantages over the method of extending an open channel as in the case of the Water Street sewer. Yet, for low water conditions, this extension does not reach to running water. Further instances of bad conditions along the banks of this River are shown by the following photographs: One represents the condition at the Os-

good Street Sewer Outlet, the other the south bank of the river near this same outlet. These are not exceptional localities, but typical of many places; vegetation, earth and rocks are coated with sewage deposit.



A Sewer Outlet at Osgood Street

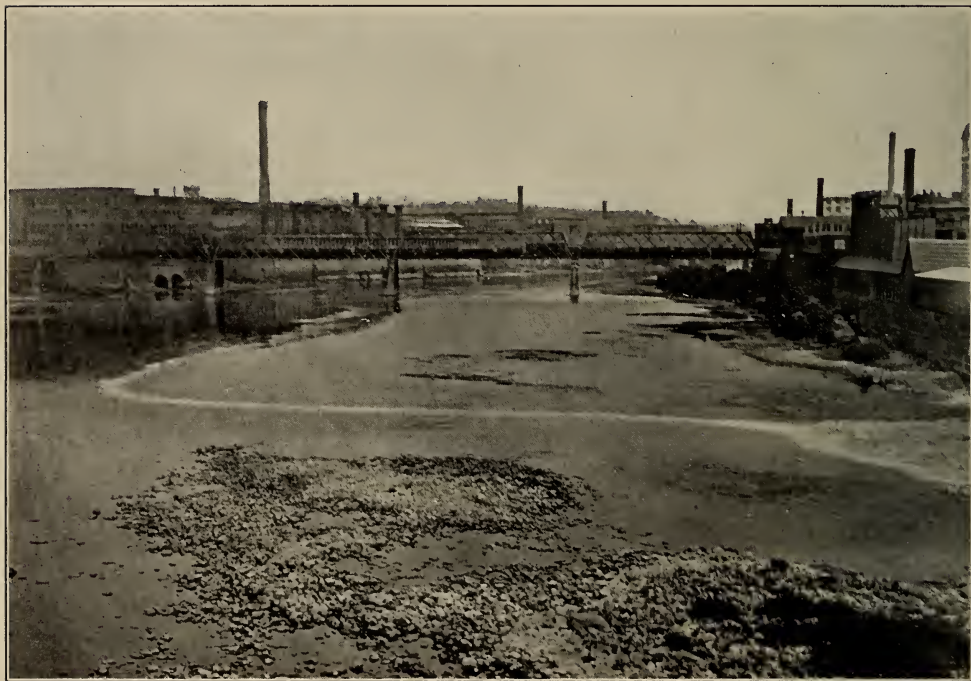


Vegetation, earth and rocks are coated with sewage deposit

It is impossible to examine the sewage disposal system in a manufacturing city without being seriously impressed with the importance of providing some improved method of taking care of the extensive wastes from manufacturing plants.

Here in Lawrence these wastes come from a variety of

industries, and are augmented by the wastes from three leading types, namely, from dyehouses, paper mills, and wool scouring plants. It is difficult to show without artificial colors the characteristics of these waste products. At times they are a pronounced dark purple color that affects the shade of the water even to the middle of the stream. This color was particularly noticeable at the time the wall photograph was taken of the Parker Street Outlet.



View from Upper Railroad Bridge looking down stream, July, 1911, during dry weather flow and showing exposed banks and bed of River

Again even with equal pollution, the color is lighter in shade and less noticeable. Most of these liquid wastes mingle with the water so that the discoloration extends to considerable depth. One of the serious forms which remains a long while on the surface is that from wool scouring. The general view of the river shown by the photograph taken from the upper railroad bridge, and looking down the river, indicates plainly the white

streak of wool scouring waste that extends from the shore down the stream several hundred feet.

Another photograph shows wool scouring waste from the new Wood Mill of the American Woolen Company. Even in this modern mill with its excellent equipment, it has not been found practicable to dispose of this wool grease in any better way than discharging it into the open river.

The whole question of economical and reasonable disposal of waste from manufacturing plants is an engineering problem that has grown in importance tremendously in the last few years. Regulation or supervision of some sort is almost certain to come in the near future. The Massachusetts State Board of Health is studying the question, and especially in connection with the sanitary questions that concern the disposal of sewage for the cities of Lowell, Lawrence and Haverhill. Immediate restrictions are not likely to be enacted, but some improvement will doubtless be asked for.



Wool scouring waste from the rear of the Wood Mill shown by the scum and white streak far out on the River



Colored Dye Waste and Sewage flowing onto the River Bank
near Parker Street

OUTLETS FOR SEWAGE AND MANUFACTURING WASTES

SOUTH SIDE MERRIMAC RIVER	Size	Area Drained Sq. Miles	Approximate Resident Population
Culvert for Wood Mill, (Manufacturing waste)	27 in. x 24 in.		
Sewer Pipe in rear of Wood Mill	5 in. diam.		
Osgood Street	54 " "	0.27	3,645
Waste Outlet rear E. Frank Lewis Scouring Mill	44 " "		
Parker Street	30 " "	0.31	4,275
Outlet below upper R. R. Bridge	18 " "	0.045	572
South Broadway (Shanty Pond)	70 " "	0.29	4,121
	(extension 30 in.)		
NORTH SIDE MERRIMAC RIVER			
Water Street	2 of 30 in.	0.64	10,663
Upper Pacific			
Lower Pacific	60 in. diam.	0.29	16,291
Washington Mills	60 " "	0.095	3,466
Garden Street in Spicket River	69 " "	2.166	44,764
Canal Street	24 in. x 30 in.	.085	500
High Street	12 in. diam.	.006	60
River Street	32 in. x 40 in.	.08	870
Poor Farm	10 in. diam.	.22	1,140

Conditions above the dam where the water is held at more nearly a constant level, the river banks are not so objectionable. It will be seen that only a few sewers empty into the river above the dam. These are mostly of six and eight-inch sizes, and serve for street drains, carrying no house sewage. This part of the

River is used less than formerly for boating, but on the south side there is still a building for a canoe club that serves as an important center. Should boating again come more in favor, this part of the river is likely to become far more popular. Below the dam, if the channel should be dredged to the sea the river would be much used for boating. It is possible, as the city grows, the banks could be used for esplanades or parkways or playgrounds for children. The need of improvement along these banks is almost certain to become more pressing each year, and, in the immediate future, the City must doubtless take action in the matter.

THE SPICKET RIVER.

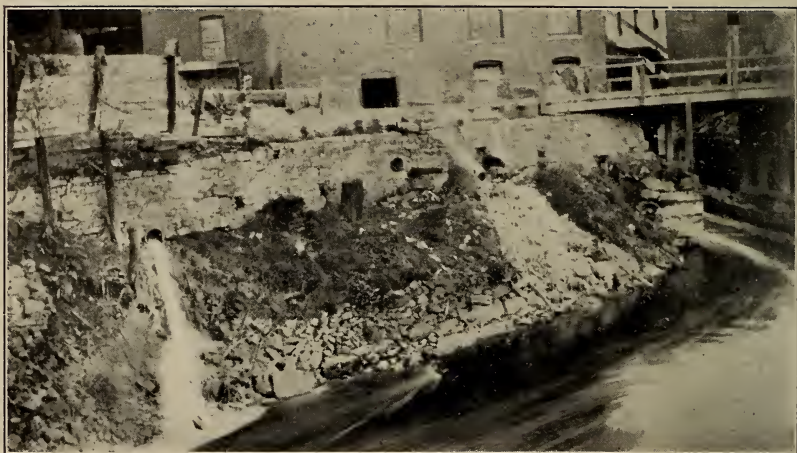
The Spicket River, which flows from the Arlington Mills at the Methuen line through North Lawrence and joins the Merrimack just below the principal industries of the city, has been the cause of complaint and criticism during the past twenty years.

After the completion of the intercepting sewer along its banks in 1886, for several years the river was not offensive, but remained clean and unobjectionable. But as the Arlington Mills prospered and enlarged, they entirely outgrew the drainage that had been provided for them, and, instead of dyehouse wastes flowing into the intercepting sewer as originally planned, these wastes were allowed to flow directly into the Spicket River. This added more pollution than the volume of water in the River could carry away, and conditions previous to 1910 became almost unbearable, especially during summer months. In 1911, however, changes have been completed in the sewerage system so that the dyehouse wastes from the mill now all run into the main intercepting sewer, and none of the mill wastes reach the Spicket above the sewer outlet at Garden Street.

As a result of this improvement hardly any odor has been noticeable during the past summer from this water. Below Garden Street, improvements, however, are still needed.

I have made a personal examination of the conditions along the River by traversing its entire length within the city limits.

The following photographs will give some idea of the conditions. Below the outlet at Garden Street, the River carries a



There are two Sewer Outlets and general waste along the Bank at the Paper Mill near Marston Street



Overflow Sewer and Main 69-inch Sewer Discharge under the Garden Street Bridge. On opposite side of the River is the Outlet of the Sewer from the Lawrence General Hospital

large amount of pollution. The water has a foul odor under ordinary conditions. The banks are also foul and obnoxious. They are used as dumping grounds for rags, paper, bricks and piles of dirt, much of which is thrown out from paper mills along the river.

Adjoining the International Paper Mill and opposite Marston Street there are two sewer outlets onto the banks of the river, and the photo on page 234 shows the way waste materials litter the banks in many other places.

At the Garden Street outlet, at the time of my visit on Saturday afternoon, September 30th, 1911, a considerable part of the river was dry. The rocks and shores were slimy and slippery due to the foul condition of the water. Upstream from the sewer outlet, at the time of my inspection, October 12th, the water of the river was fairly free from sewage and without serious odor. The principal objections were along the banks of the Spicket. These were unprotected over most of the distance and were cluttered by all sorts of rubbish and filth. In many places, not only are the banks of the river used as waste grounds for back yards of tenements, but besides, the city is using one portion



Refuse Dumping Grounds of City in rear of tenements at Brook Street

as a dumping ground for ashes and rubbish. This is at Brook Street, and the photo, taken in the rear of several tenement houses, shows the cluttered condition of ashes, rags, papers, and tin cans.

I counted thirty children trying to use these banks as a playground. Amid these cluttered surroundings, they necessarily expose themselves to diseases that are transmissible through dirt. As in the case of the Merrimack, important objections to conditions along these banks concerns the question of breeding-places here afforded to flies. In many places there were decaying fruit and vegetables, and piles of manure, which would form suitable places for flies, and, in providing for the extinction of flies, sufficient improvement should be made to insure the health of children, and both of these improvements can be brought about without large expenditure.

Although the public health is not directly affected by the clutter of bricks, wood, iron, old trees, tumbled-down shanties, tall weeds, and bushes, as found along this river, yet, it is believed that these conditions do, however, materially lessen the value of adjoining property, and, from the investment side alone, it should pay to clean up these banks and maintain them in conditions which would attract residents. The banks should be cleared, rubbish removed, weeds cut, and all combustibles burned, the earth graded off, and grass slopes maintained, so that mosquito breeding-places would be lessened and opportunity provided for children to play along the river banks without undue danger of catching disease.

The view on next page shows the varying width of the river east from Newbury Street; and lastly is shown a section of the river east of Bennington Street. This illustrates the possibility of improvement. Here the channel has been straightened, the banks graded, and willow and birch trees are growing. It has been fenced in, and is not used for a dumping ground.

I believe that similar improvements can well be made the entire length of the river, and it would then be known as an attractive stream, rather than a disagreeable open sewer, as it is now regarded.

GARBAGE DISPOSAL.

Garbage commonly includes waste pieces of vegetables, fruit, meat and spoiled foods taken from kitchens of dwellings, restaurants, hotels or stores.

Previous to the year 1904, various methods were tried for



Varying width of Channel east from Newbury Street

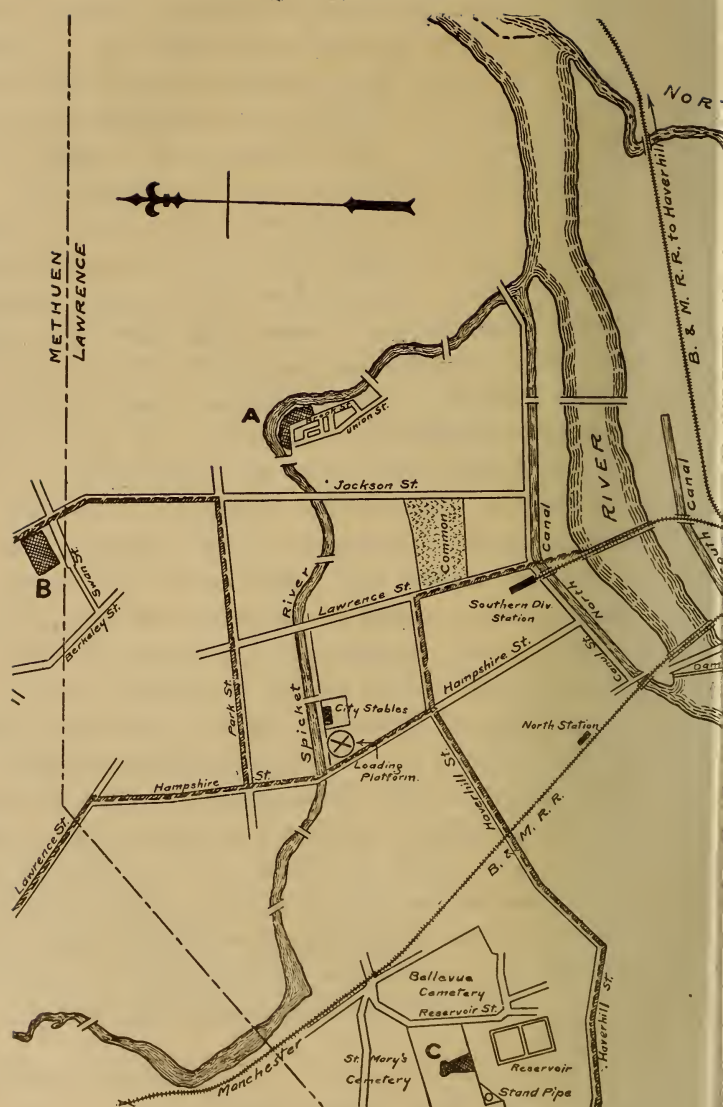


The Banks have been straightened, Willow and Birch Trees allowed to grow and the area has been fenced in and no longer used for dumping

disposing of garbage. The records of the Board of Health for 1881 state that the garbage was sold for \$4.67 per cord; in 1888, for \$2.25; in 1897, it was given away and the receiver did the collecting. In 1900, the City was obliged to pay \$1150 for having it carted away, and not including the collection of it from houses. But beginning in 1904, a less expensive plan for disposing of it was adopted. The present method is to collect the garbage in city teams, deliver it to the city stables, from there it is taken by a contractor who bargains for the year's supply. Collections are made from residences once a week, and the city is using for this purpose five teams with water-tight tanks. Two thousand dollars a year is paid to the city for the garbage as delivered at the city stables. The contractor feeds a small part of it to his own swine, and sells the rest to farmers in Methuen. Considerable garbage, however, from hotels, boarding-houses and restaurants is sold by the proprietors directly to individuals independently of the City. These collectors are required to have a license, and they must have receptacles or wagons that do not leak. The present method of disposing of the garbage for a revenue of \$2000 a year appears to be all that could be expected at the present time. From a sanitary point of view, however, it will be readily understood by good housekeepers that once a week is not often enough for collections. Decay and putrefication is apt to become a serious menace when a garbage pail with its kitchen swill is left standing for a week in hot days. In cities that are making crusades against the house fly, as in Brooklyn, N. Y., Brookline, Mass., and a great many of the Southern cities, garbage is removed, at least, twice a week. Garbage pails of metal with tight-fitting covers are used and chloride of lime or similar purifier is applied to any decaying materials that cannot be put in cans or covered with earth.

DISPOSAL OF STORE WASTES.

The city has at present three teams, that collect waste paper from stores and shops, and deliver it to a shed at the city stables. Here enough assorting is done to separate dirt and valueless waste from the rest of the material. This portion is taken away by a contractor, who disposes of it, if he so desires,



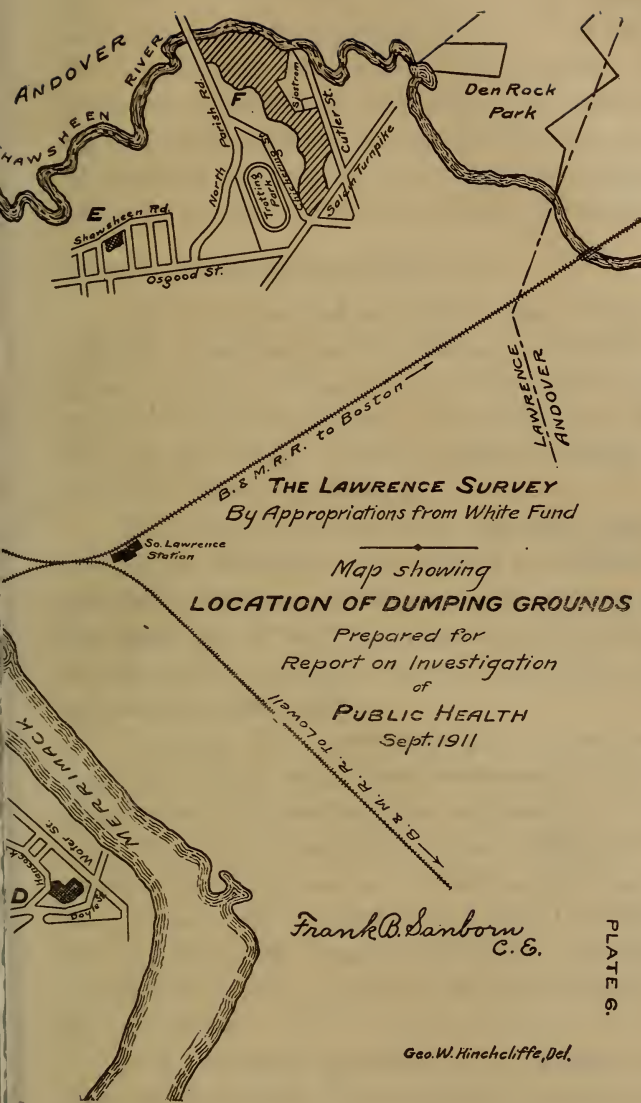


PLATE 6.

on dumps that are being used by the City. The same contractor also removes from here all paper, rags, strings, burlap, excelsior and store waste, just as it is collected. For the privilege of having these materials, he removes the valueless wastes to dumping grounds as mentioned above, and, for consideration of receiving the rest of the material, he pays the city \$505 per year. The amount of valueless store waste is so large that serious attention must be given by the City to obtain available dumping grounds.

DUMPING GROUNDS FOR REFUSE:

The City has had no definite plan in disposing of ashes and rubbish; it has been used for filling various lots of land in different parts of the city. The general plan has been, as the city has grown, to each year find some space that would serve as a dumping ground for the time being. The sites that are being used at the present time are shown on Plate 6.

B, D, and F are the most important places that are available for future dumping. B is located on Jackson Street just across the line in Methuen and serves for the eastern part of the City, but the space that it was first proposed to fill has been covered, and it is only by an extension beyond these limits that additional space is obtained temporarily.

D serves for the westerly part of the city, and, although it has been a large area, it was estimated in July that its remaining capacity was 10,000 loads or one-fourth of a year for the whole city. If used for sections that now dump at B and C, but which must immediately use new localities, this space would serve less than a year. The neighborhood near D is materially depreciated for residences by disagreeable odors emanating from materials dumped here, and on account of the prevalence of flies that breed in such places.

The dumping grounds at F, located in North Andover near the Shawsheen River, are the ones that are counted upon for future dumping. The property belongs to a man who is allowing the ground to be filled in, and will probably permit a continuance. There are no houses in the immediate neighborhood, and dumping would not be as objectionable as at D, for instance. The distance

of this dumping ground from City Hall is two miles, and it is proposed to haul here by auto trucks.

The space here available was estimated by the owner and my assistant, as seventeen acres, with a fill of twelve feet, and five acres, with an average fill of four feet.

In 1908, there were removed 38,595 cartloads of ashes and refuse; in 1909, 38,104; in 1910, 38,471. Allowing 1.8 cubic yards per load, would mean that the grounds at F would serve the whole city approximately five years.

Thus it is seen that another question of importance before the City is the provision for adequate disposal of refuse. Shall dumping grounds be maintained, and even a greater haul than two miles be planned for, or shall the City establish some form of incineration? The proper disposal of waste materials through sewers, from factories, and by ash barrels, and garbage pails, involves sanitary questions that should not longer be met by primitive methods. A city of the size of Lawrence cannot afford to pursue those methods of sewer and garbage disposal that are fast being displaced in other cities. I believe that the engineering problems incident to the Merrimack River, the Spicket River, and the present garbage disposal methods must all, in the next few years, have thorough overhauling and distinct improvements.

Better sanitary conditions of the milk supply, better garbage disposal, and more healthful conditions along the Merrimack and the Spicket Rivers are improvements that depend primarily upon accomplishments of the Board of Health.

BOARD OF HEALTH

GENERAL DUTIES OF A BOARD OF HEALTH:

The Board of Health should be especially charged with the care and promotion of public health; but in a broad sense almost every act of a human being is related, in one way or another, with "health;" and evidently some limit must be set to the duties that are assigned to the average Board of Health.

THE DUTIES OF BOARDS OF HEALTH:

In general the duties include principally those questions that relate to sickness and health of the individual, singly and collectively, but in some cities, the Health Department includes, not only the multifarious duties incumbent upon ordinary Boards of Health, but, besides, regulations for the location of soap factories, tanneries, horse and cow stables; the blowing of steam whistles; the ringing of church bells; and the smoke and soot from chimneys; the size of yard spaces; widths of alleys and streets; the heating facilities in public halls, and dwelling houses; the amount of window space and means of artificial lighting; the ventilation of public halls, work rooms, and sleeping-rooms; and, in some cities, the duties of the Street Department devolve upon the Board of Health. It has been believed that dust of the street may transmit tuberculosis, sore throat, pink eye, colds, scarlet fever, mumps, and diphtheria, and thus very properly come under the control of the Health Department, but scientists now place less weight on the dust theory. We are finding that these diseases are transmitted, either by direct contact, by flies, or through milk, water, raw vegetables, and so on, and that street dust has little direct relation to disease.

THE LAWRENCE BOARD OF HEALTH.

In Lawrence, the Department has in previous years included: teams and men employed in the collection of garbage, ashes and waste papers from stores and dwelling houses; the removal of waste fish, rotten eggs, and decayed vegetables from wholesale houses; dead dogs and cats from streets and alleys, the emptying of private-privy vaults and cesspools; men employed as inspectors of plumbing in new buildings and in old buildings; of drains between street sewers and buildings; men employed in tracing out infectious diseases; posting notices of these diseases at the dwellings; afterwards fumigating the premises; men at the general office of the Board making a record of diseases, issuing licenses or permits for cemeteries, slaughter houses, stables, for places to keep live fowl, for the privileges of street peddlers to sell vegetables and fish; others to carry on the business of undertakers, or plumbers, of drain-pipe layers, and so on; and issuing licenses for the privilege of making ice cream that is to be furnished to the public, and for selling milk; finally, a corps of school physicians who examine the eyesight, teeth, sense of hearing, and cases of infectious diseases as found among school children.

Here are far too many and diversified duties for a Board of Health to administer properly and still have time and money left for its legitimate field. In American cities, our Boards of Health are not composed of specialists; we have plain, every-day citizens who take up the duties for a few years, then give way to new members. This is particularly true in Lawrence. We have had eighteen different members of the Board since the beginning of 1900,—in twelve years,—and nine different chairmen. Of the eighteen members, seven had some previous experience as physicians; at one time one was a drug clerk; but, of the other ten, none are reported to have had any training that specially qualified them for passing upon matters of Public Health.

List of members of the Board of Health since the beginning of 1900:

1900 — Dr. F. W. Kennedy, chairman; Emil C. Stiegler, furniture dealer; Aime D. V. Bourget, clothing salesman.

- 1901 — Dr. F. W. Kennedy, chairman; Emil C. Stiegler, Aime D. V. Bourget.
- 1902 — Aime D. V. Bourget, chairman; Dr. F. W. Kennedy, Emil C. Stiegler.
- 1903 — Aime D. V. Bourget, chairman; Dr. F. W. Kennedy, William Burger, cigar manufacturer.
- 1904 — William Burger, chairman; Dr. F. W. Kennedy, Aime D. V. Bourget.
- 1905 — Dr. Frederick W. Kennedy, chairman; Dr. Carl H. Eidam, Aime D. V. Bourget.
- 1906 — Dr. Carl H. Eidam, chairman; Dr. F. W. Kennedy, Aime D. V. Bourget.
- 1907 — Aime D. V. Bourget, chairman; Dr. Carl H. Eidam, Dr. F. W. Kennedy.
- 1908 — Dr. Carl H. Eidam, chairman; Aime D. V. Bourget, William H. Fennell, pharmacy business.
- 1909 — Charles H. Bossler, provision business, chairman; Dr. Peter L. McKallagat, William H. Fennell (to March 2), Ralph A. Brackett, plumbing business (March 2 to end of year).
- 1910 — C. H. Bossler, chairman; Dr. Peter L. McKallagat, Ralph A. Brackett (all removed April 11); no board from April 11 to June 22; Dr. William J. Sullivan, chairman; William A. Meagan, foreman paper mill; and one vacancy, June 22 to end of year.
- 1911 — William A. Meagan, chairman to October; Dr. J. H. Tobin to July; Charles P. Garneau, clerk, provision business, to October; Dr. Patrick J. Hughes, September to end of year; Henry Ragot, driver, October to end of year.
- 1912 — Joseph Harris, jeweler, chairman; Charles H. Petit, clothier; Dr. George W. Dow, City Physician.

Associated with the Board of Health have been the following Inspectors of Milk since 1900:

- 1900-1905 — M. A. Scanlon, real estate and insurance business.
- 1906 — Dr. Patrick J. Hughes, physician.
- 1907 — Dr. Fred G. Bushold, physician.
- 1907-1908 — Eugene A. McCarthy, insurance business.
- 1909-1911 — Dr. Thomas H. Collins, physician.
- 1911 to date — Dr. John H. Tobin, physician.

The records of the Board of Health show that, in 1910, there were forty meetings, occupying sixty-nine and one-half hours, an average of one and three-quarters hours each. One member (Dr. McKallagat) was absent ten full meetings and two parts of meetings out of nineteen. Otherwise, there were no absences of any members during the year. In 1911, there were forty meetings, occupying about sixty-one hours, or an average of one and one-half hours each. There have been but four absences and no member absent more than twice. The time thus devoted to meetings should have been ample to produce definite and valuable results.

An examination of the records show that foremost in the deliberation of the Board has been the subject of licenses for stables. Whether Polando Abrahams shall be allowed to keep two horses or three? That's a question to incite even a dormant Board of Health. In 1910, of thirty-six hours used in meetings, over half of the time was given to questions of stables, and, in 1911, nearly one-half of the time was similarly used. It would appear that the Boards had gone daffy over the question of the number of horses, hens or goats that citizens should keep. Contrast the above with the time and effort given to essential Board of Health matters:

During 1910 and 1911, the subject of milk has received attention at five meetings each year, and ten hours in the two years; three-fourths of that time was consumed in discussing the question of inefficiency of Dr. Collins as milk inspector. At one meeting, it was argued, at another argued and postponed because of insufficient notice, at another, because of death in his family, finally a hearing given, then his removal effected, and another inspector

elected. An efficient Board would have required not over two meetings to have acted upon that whole matter.

Any Board must be willing to stand upon its record; and its record must be held open to the public. I have examined with an open mind the records of each meeting for the past two years. I have talked with city officials and many citizens, and I must admit that I can find little to commend, but much to criticise. The time and energy of the various Boards have evidently been given to matters of small importance. There has not been a broad view, a survey of essentials that control public health. The view point has been in the small, individual, restricted way. For years, Lawrence has not had what we should at the present time consider an efficiently organized and conducted Board of Health, and that leads us to an important question for brief consideration: What should a Board of Health accomplish?

To accomplish the most, it is acknowledged that politics and Board-of-Health measures should be distinctly and positively separated. Past members of the Board — some of them excellent men — assert that politics has often been a hindrance to the proper work of the Board; that the best possible plans would be thwarted by some one "higher up." After a careful study of the situation during 1911, for the purpose of eliminating politics and improving general conditions, I suggested to the new government the establishment of a department of Sanitation and the transference to another department of the Inspection of Plumbing. This re-organization is indicated by the next page, which shows the duties of the City departments divided in accordance with the new charter beginning 1912.

LAWRENCE CITY DEPARTMENTS

MAYOR	FINANCE AND	Treasurer
	PUBLIC AFFAIRS	Auditing Purchasing Assessing Sinking funds Tax collection Claims Registration of voters City clerk Legal
	ENGINEERING	Highways and other ways Street watering Sewers and drains (including licenses to drain-pipe layers) Water and water works Bridges Engineering
	PUBLIC SAFETY	Police Fire Lighting Wiring Weights and measures Conduits
	PUBLIC PROPERTY	Buildings Parks Public grounds Inspection of buildings Inspection of plumbing 1
	PUBLIC HEALTH AND CHARITIES	Sanitation 2 Removal of ashes and waste material Removal of garbage, dead animals and decayed vegetables Cleaning of privy vaults, cesspools Poor Board of Health City Physician Public Hospitals Diseases Foods ; meats, provisions Licenses ; stables, peddling fish and vegetables Milk ; inspection and regulations Reports on cases of infectious diseases, of births and deaths

1. Inspection of plumbing has heretofore been under the Board of Health.

2. Suggestion for the establishment of this department has been adopted.

AN EFFICIENT BOARD OF HEALTH :

The specific duties of a Board of Health, organized with a view of concentrating its work solely on essential elements of Public Health, should be :

To determine the extent of disease.

The distribution of disease over the City, and among nationalities.

To examine into the diseases of children and infantile mortality.

The origins and causes of smallpox, tuberculosis, typhoid fever, scarlet fever, infantile paralysis, and other communicable diseases.

To determine the means by which each epidemic of any of the above diseases is transmitted — by flies, pet animals, through the medium of water, milk, raw vegetables, raw oysters, and so on.

To advance methods to prevent the recurrence of epidemics of communicable, or “catching,” diseases.

To prevent the adulteration of foods and drinks.

To bring to the notice of the prosecuting authorities all failures to comply with measures that have been lawfully prescribed for the promotion of public health.

To regulate the milk supply, approve of sources of production, the methods of handling, of distributing to consumers, prescribe standards of quality, make laboratory tests, issue licenses for the sale of milk.

To regulate similarly the ice-cream supply.

To prescribe and enforce sanitary requirements for creameries, bakeries, stores and markets.

To secure reports of infectious diseases, of births, and deaths.

What sort of men are needed to carry forward effectively a city Department of Health :

Not merely the family doctor, a detective of disease, a quarantine officer; medical training alone does not fit men for this service. The work is not primarily curing disease, it is that of prevention. Men are needed who know; (a) mathematics,—to analyze statistics relating to the sick and the dead, thus to show what forces of disease are prevailing, and where the attack is next

likely to be made; (b) engineering,—to provide against impure air and infected water, to dispose properly of garbage and sewage, and to maintain clean streets and alleys; (c) chemistry,—to protect the public against the sale of adulterated and poisonous foods or beverages; (d) bacteriology,—to discover the germs of disease, provide antitoxins, and detect impurities in milk and other food; (e) law,—to interpret common law, to prescribe rules and regulations that can be lawfully enforced. And withal the duties of the health officer, there should be education, that the people may learn the arts of hygiene, and the principles of right living.

“Perfect health,” says the Report of the Survey of 1850, “gives to its possessor strength, energy, power, buoyancy of spirit, happiness. . . . It is under the control of public authority and public administration that life and health may be saved or lost, and they are actually saved or lost, as this authority is wisely or unwisely exercised.”

Lawrence has been a leader in methods of water filtration; why should it not become a leader with an effective Board of Health — to prevent disease, advance the principles of hygiene, and direct the people in ways of better health?

INFECTIOUS DISEASES BY WARDS.

A study of the prevalence of infectious diseases has been made for the purpose of determining whether these diseases are more common in densely-populated wards or in thinly-settled and residential wards. The three diseases selected were typhoid fever, scarlet fever, and diphtheria. The records of the Board of Health, although brief and unsystematic, were fairly definite and complete regarding these three diseases. An attempt was made to include also tuberculosis, but the records of that disease, even for 1910, show 122 deaths against 121 cases reported, and I was told by a district nurse of one of the life insurance companies that, in her experience, tuberculosis is insufficiently reported, and the dangers of the disease are constantly ignored. Diphtheria and typhoid run more virulently and are reported more thoroughly. Scarlet fever is commonly recognized as a communicable, or “catching” disease, and is reported better than measles or whooping cough.

In order to determine the distribution of these diseases — typhoid, scarlet fever and diphtheria — a chart of large size was first plotted, showing the cases for 1910. Wherever the plotting showed a cluster of diseases, the question of relation of such to density of population was investigated. Eight sections were selected over various part of the city, the number of cases counted, — ranging from six to thirty-four, — and compared with the population, giving the number of cases from 2.1 to 33.1 per 1,000 population. To my surprise, for all of the sections thus examined, the percentages ran higher for the thinly settled areas than for the densely populated. Although this unexpected result was not decisive, still it seemed to call for further investigation. I, therefore, plotted a map — see Plate 10 — to show the Density of Population for the whole City. This map was made from data obtained from insurance maps and from the Housing Survey of Mr. Todd. It was found that nearly half of the total population of the city live within half a mile of the Common. Ward 1 contains one crowded section, but the greater part of the ward is residential; Wards 2, 3, and 4 are crowded and are considered congested; Ward 5 comprises a large area and is less crowded; while Ward 6 has been recently built up and contains practically no congested areas. To show the rates of cases of the above diseases in these Wards, I next plotted Plates 7 and 8. These diagrams cover the years from 1905 to 1910. The average number of cases per 1,000 population is shown by the heavy line; above the heavy line means a higher rate; an unfavorable condition, represented by the dark area; below the heavy line, a favorable condition, represented by the light area. The anomalous answer is here noticeable again; namely, Wards 3 and 4, crowded wards, have the smallest number of cases; Wards 2 and 5 have average amounts; and Wards 1 and 6, residential wards, have had excessive amounts, especially Ward 1, which has exceeded the average each year.

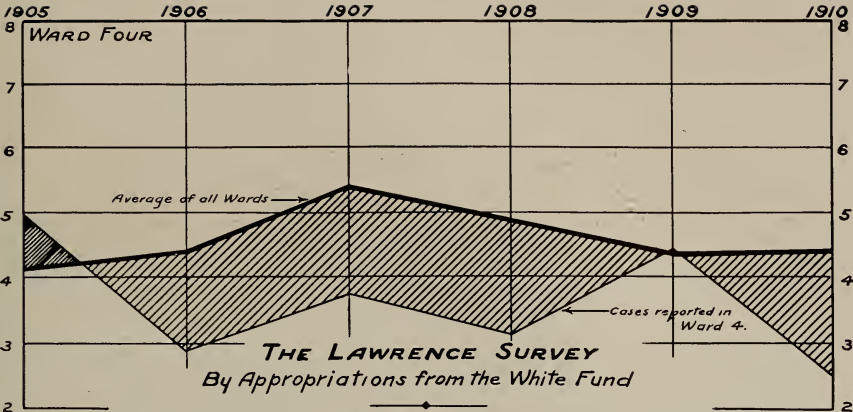
To verify these results still further, I had the records of the Board of Health re-examined, a careful curve plotted to show the probable population of years between census takings, and again the evidence was plain that the residential Wards 1 and 6 show greater rate of these diseases than the crowded Wards 3 and 4; and to



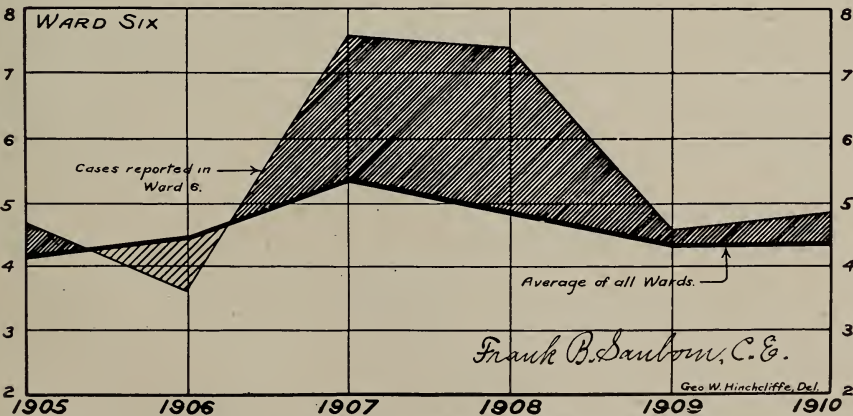
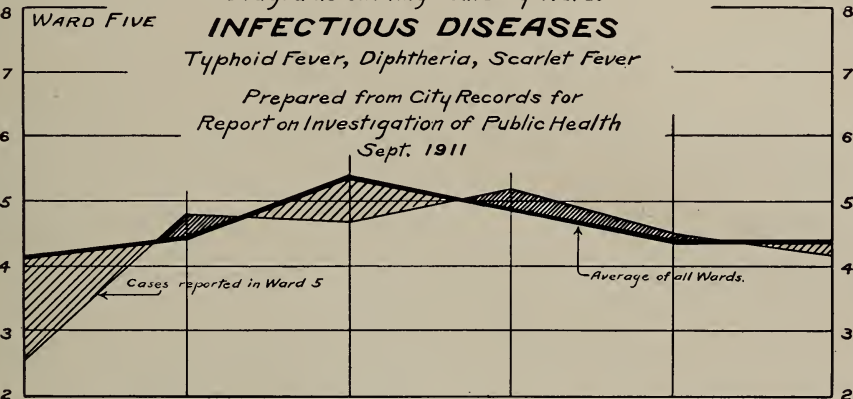
Dark shaded areas indicate an increase in the rate of cases as reported, above the average of all Wards—An unfavorable condition.

Total Number of Cases of Typhoid Fever, Diphtheria, and Scarlet Fever per 1000 Population

Total Number of Cases of Typhoid Fever, Diphtheria, and Scarlet Fever per 1000 Population



Diagrams showing Rate by Wards
INFECTIOUS DISEASES
Typhoid Fever, Diphtheria, Scarlet Fever
Prepared from City Records for
Report on Investigation of Public Health
Sept. 1911



Light shaded areas indicate a decrease in the rate of cases below the average of all Wards. A favorable condition.

ascertain if these diseases are reported as well in one ward as another, I consulted the agent of the Board of Health, who has had many years of experience in investigating diseases, and he believed that the various wards report equally well; a district nurse corroborated that view, and also some of the physicians of the city.

It is not claimed that the foregoing analysis offers conclusive proof that infectious diseases are more prevalent in outlying districts than in crowded; it does seem, however, to indicate positively that in Lawrence for the past six years, the thinly settled wards have had more cases of these diseases — scarlet fever, typhoid, and diphtheria — per 1,000 population, than the crowded wards.

This result is contrary to generally accepted rules; it disturbs some of our popular theories, and it calls for explanation. The answer seems to be that these three diseases enter the human body, not through dust and vitiated air of tenements, but probably through the medium of water and milk. And water and milk would be just as plentiful and just as much infected with disease in outlying as in crowded districts. If the transmission of these diseases can thus be traced to water and milk,—which is the conclusion of modern science,—can we not find by similar investigations the medium for tuberculosis, for pneumonia, and for infantile paralysis? Are these diseases more frequent in crowded tenements or in outlying sections? These are questions that deserve prompt attention of our Boards of Health. What answers shall we have from the Lawrence Board? What will it do in the immediate future to discover the causes of diseases, to check their transmission, and to establish Lawrence as a leader in the promotion of public health?

RECOMMENDATIONS FOR THE BOARD OF HEALTH:

The following recommendations are submitted for the attention of the Board of Health, and for such effective endorsement as may be found practicable:

Keep the work of the Department limited and free of politics.

Concentrate half of time and expenditure, for the next few years, on the Milk question.

Make sanitary inspections of milk bottling and ice cream plants.

Have farms inspected by own inspectors, by the State's, or by other means that may become practicable.

Classify milk as certified, inspected milk heated, and market milk heated.

Require all milk that is not certified to be scientifically heated, or pasteurized, beginning 1914.

Advocate a central milk plant for heating, or pasteurizing of milk, bottling it, and from which it may be delivered to consumers.

Ascertain the principal breeding-places of flies, at garbage dumping grounds, sewage banks of the Merrimack and Spicket Rivers, vacant lots, back yards of dwellings.

Find where, in the city, each disease prevails most; which parts of the city have least sickness, and which most.

It is believed that the Board of Health can profitably investigate the above questions, that it is possible to produce results along many of these lines that would be of benefit to the city, but for material success, two important conditions will be necessary:

1. An efficiently organized Health Department.
2. Support from the general public.

Regarding (1) the organization of the Department, it is fair to say that the beginning of 1912 under the new charter indicates an improvement; there seems to be a broader policy, more activity and business-like methods. The results of public officials can best be judged near the end of their term of office. Pressure upon pressure is brought to bear that will swerve many an office holder from the straight and true course that he had planned in the beginning. Sharp and insistent criticism is needed when city officials let go their grip, put aside their promises, and allow their department to collapse, but also commendation should be given freely and liberally when officials are honest, straightforward, and stand up boldly against intrigue.

Before the present Board of Health was appointed to office, the writer suggested that it would be well to have members who possessed the following qualifications, and, whenever it is found

to be practicable, these qualifications can well receive favorable consideration:

Have one member who is competent and willing to devote himself principally to questions that concern Vital Statistics and records of the office.

One member who is familiar with the Milk Question, and will consider broadly and effectively both the farmers' side and the consumers'.

One member who will investigate diseases, sanitation of buildings, healthfulness of various modes of life.

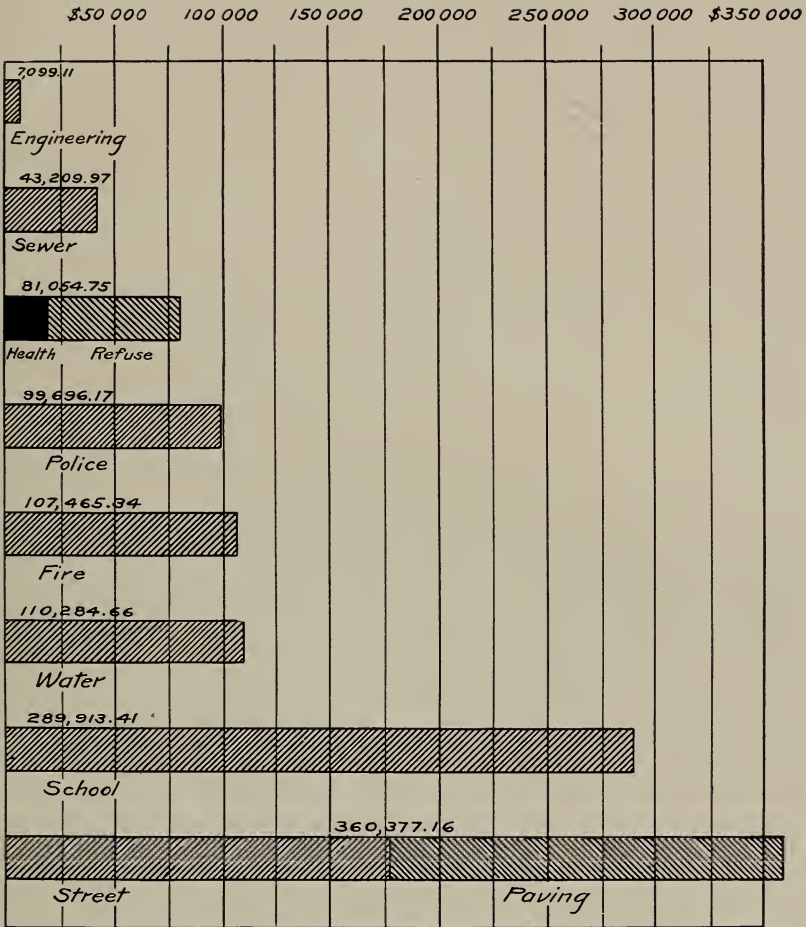
Each year a member should be chosen for a term of three years. Also there should be in the employ of the Department a few men as field inspectors or laboratory assistants who have been trained as sanitarians. As explained in a preceding paragraph, the men needed to carry forward effectively a City Department of Health should in these days have special training. Two employees thus trained could, at the present time, be profitably employed in the field, and laboratory.

(2) Support from the general public is necessary in the case of the Health Department. Poor streets mean inconvenience, financial loss to the city, but poor health means stupor, loss of life. The public in Lawrence have not, heretofore, watched with sufficient care the acts of the Boards of Health, nor the relation of the Department to the rest of the city.

I submit in Plate 9 a graphical representation of the expenditures of the City for 1910. Note the black area which shows the relatively small amount that was expended strictly for public health. For that year, streets and paving together received \$360,377.16; less than one-fourth of that amount, or \$81,054.75, was spent by the Health Department, and, finally, excluding the cost of disposing of ashes and garbage, the expenditures for essential health measures is estimated as \$20,000, or one-eighteenth of the amount for streets and paving.

In 1911, the appropriations for the Department were \$65,000, but the expenditures were \$106,478.30, of which about \$25,000 was for essential public health measures. The Department of

PLATE 9.



1910

EXPENDITURES OF CITY DEPARTMENTS

From Special Auditor's Report

The black area shows the relatively small amount that is expended for essential Public Health measures

Health does not need large appropriations; \$50,000, or one-half of the amount that is provided for Police, for Fire, or for Water, carefully expended, would place the Department to the front in service for the city, but the public has a right to expect the money to be properly expended for the general up-building of health conditions throughout the whole city; rich and poor should be benefitted, native-born and foreigners must be protected; "public" means the whole people; the service of the Department must be for all, and the success or failure of the Board must be judged by all. It is Public Health that concerns us and to emphasize this inter-dependent relation between the public and health is an important purpose of this Survey. The new health department has excellent opportunities, and the people can justly expect results that will be noteworthy and generally beneficial.

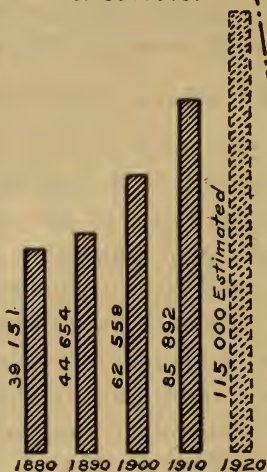
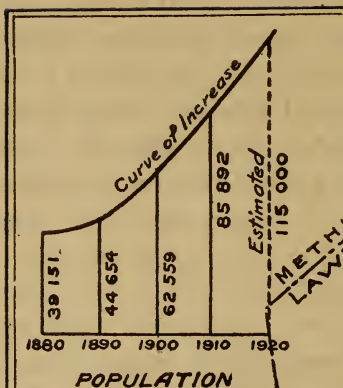
POPULATION AND ITS RELATION TO PUBLIC HEALTH:

A SAFE MILK SUPPLY, and an efficient BOARD OF HEALTH, would seem to be reasonable demands that could be secured in any city. But of Lawrence we hear the excuse: It is a manufacturing city, containing many foreigners, who cannot speak English, who know little of our laws and customs, who do not care to become Americanized, and who frequently are indifferent to the rules of good health and the prevention of disease. Therefore a study of population and the relation of foreigners to public health becomes of moment to Boards of Health.

In fifty years Lawrence has grown from a city of 17,639 population to one of 85,892, and the increase has been surprisingly uniform in different parts of the city.

POPULATION BY WARDS SHOWING GROWTH OF CITY SINCE 1880

Wards	1	2	3	4	5	6	Total Population
1880	6818	6086	8184	7214	6579	4270	39151
1890	102% 6952	104% 6338	102% 8368	127% 9147	120% 7888	139% 5961	114% 44654
1900	141% 9804	135% 8537	120% 10159	128% 11722	150% 11821	177% 10516	140% 62599
1910	144% 14186	158% 13571	140% 14236	116% 13581	136% 16180	134% 14138	137% 85892
Average	142%	142%	130%	122%	141%	155%	139%



KEY

- A Less than 50000 per Sq. mile
- B 50000 to 100000 " " "
- C 100000 to 150000 " " "
- D 150000 to 200000 " " "
- E 200000 to 250000 " " "



METHUEN
LAWRENCE

PLATE 10.

WARD 1
Pop. 14186
737 Acres



*THE LAWRENCE SURVEY
By Appropriations from the
WHITE FUND*

*Map showing
DENSITY OF POPULATION
Prepared for
Report on Investigation
of
PUBLIC HEALTH
Dec. 1911.*

Scale 1 inch = 2400 feet.

F. B. Sanborn, C. E.

WARD 6
Pop. 14138
2097 Acres
So. LAWRENCE
STA.

1910 U.S. Census 85 892
4 313 acres.

of Merrimack River
total population live within
Common.

Geo W Hinchcliffe, Del.

For the past twenty years the average increase in all wards has been 38 per cent each decade. Wards 3 and 4 have fallen slightly below and Ward 6 has risen above the average.

The growth of population is shown by Plate 10.

If the curve of increase continues in accordance with probability based on the growth during the past forty years, the population should become 115,000 in 1920. Plate 10 also shows the congested areas of population. Nearly half of the total population live within half a mile of the Common.

The ratio between native-born and foreign-born population from 1870 to 1910 is shown by the following table:

	Native Population	Foreign-born Population	Total Population	Increase in 10 Year Periods
1870	16,204	12,717	28,921	64 per cent
1880	21,885	17,266	39,151	35.4 "
1890	24,136	20,518	44,654	14.1 "
1900	33,982	28,577	62,559	40.1 "
1910	44,573	41,319	86,892	37.3 "
			Average,	38.2 "

In 1870 there were 3500 more native-born population than foreign-born, and at each census taking down to 1910 there have been between 3500 and 5500 more native population than foreign-born.

The foreign-born population is distributed according to country of birth as follows:

	Canada English	Canada French	England	Germany	Ireland	Italy	Poland	Russia	Scotland
1890	4459		4985	1830	7697	46		60	1079
1900	1683	6999	5131	2465	7058	936	411	780	1198
1910	1792	7696	5659	2301	5943	6693		4352	1336

During the past twenty years the population that was born in England has remained nearly stationary—about 5000; that born in Germany has remained close to 2000; Scotland about 1200; and the population born in Ireland has decreased from 7700 to 6000; while the number that were born in Canada has doubled and those born in Russia have increased from a mere handful to over 4000, and those born in Italy to over 6000. Russian and Italian-born now constitute one-fourth of the foreign population.

And besides the foreign-born a considerable portion of the population born in this country have foreign parents.

	Total Population	Persons of Foreign Parentage	Having Foreign Fathers and Foreign Mothers
1890	44,654	35,670 or 80 per cent	33,052
1900	62,559	51,999 " 83 "	47,279
1910	85,892	73,872 " 86 "	66,791

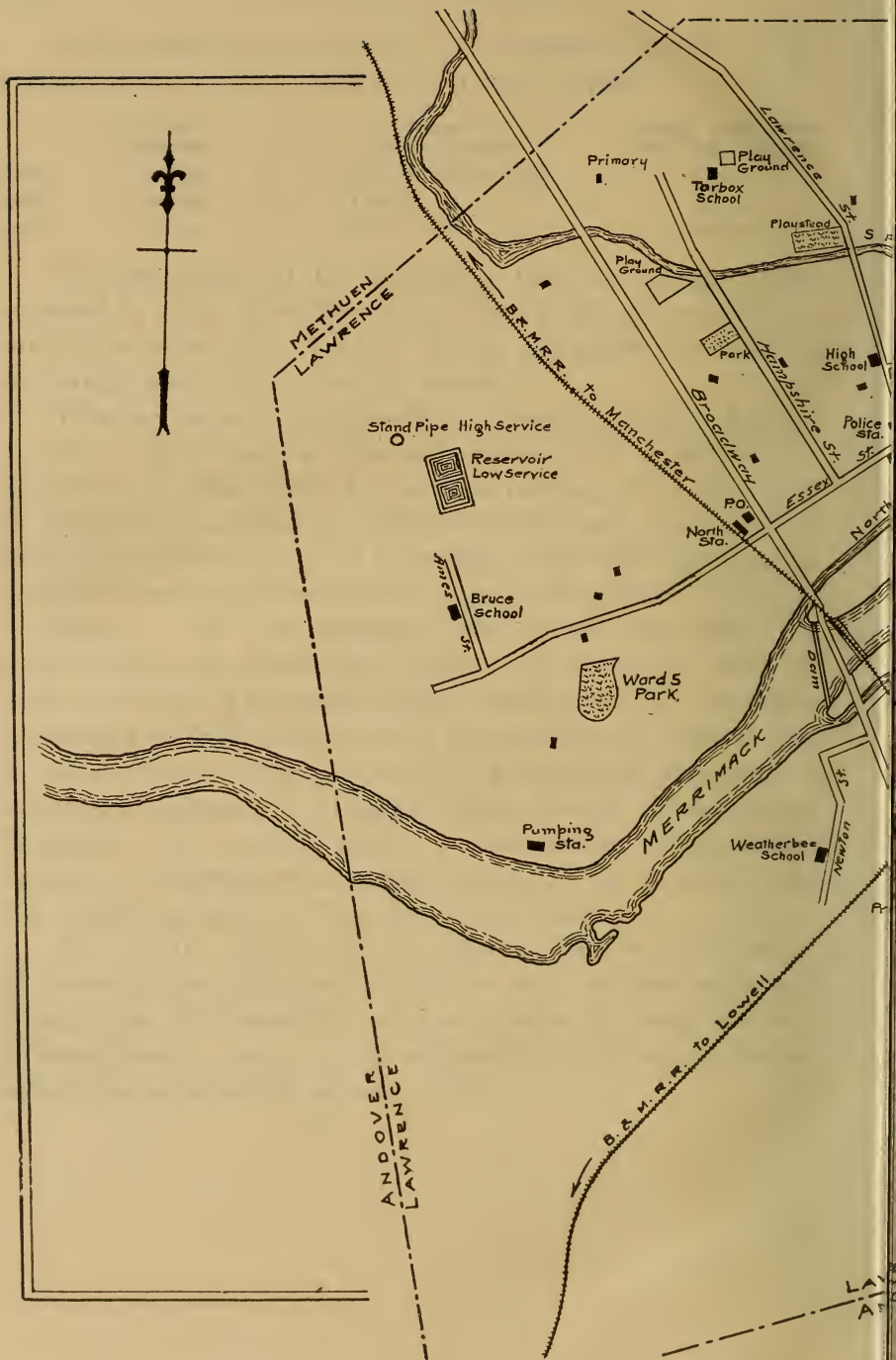
The percentage of the population that are foreigners has increased in thirty years from 80 per cent to 86 per cent, so that now in the whole city of nearly 86,000 population, seven-eighths are foreign-born or have foreign parents.

Whether native or foreign-born, American citizens look to the city of their residence for advancement, for protection, for education. To what extent Lawrence is fulfilling its responsibility of government, assimilating foreigners from many countries, and transforming them into good citizenship, could well constitute an extended investigation beyond the scope of the present Survey.

Many of the civic agencies—the schools, the parks, the police stations, the waterworks plants—are shown on Plate II. These are some of the agencies that benefit the City; the extent and variety of them is noteworthy, but this Survey indicates that the rapid growth of the City, its very prosperity in fact, beset it with cogent problems of Housing, Public Health, Education and Citizenship that must receive corresponding advancement. Agencies for betterment must keep abreast of the growth of the City, and the promotion of needed improvements.

It is not the work of the city officials alone, but churches of all denominations, clubs and associations with members native and foreign-born, all citizens are urged to consider the report herewith presented and by vote or public statement to endorse such recommendations as especially appeal to them.





Map showing
CIVIC AGENCIES
Prepared for
Report on Investigation
of

PUBLIC HEALTH
Scale 1 in. = 2400 ft
Sept. 1911

Frank B. Sanborn
C. E.
C. E. Hudson Del.

SUMMARY OF THE REPORT ON PUBLIC HEALTH

THE MILK SUPPLY:

The City has been giving practically no attention to the milk supply. Page 148.

Few citizens know where the milk that they drink comes from. Page 148.

One-fourth of it comes from Maine and Vermont towns 150 to 200 miles away. Page 152.

Milk is taken from the farms to the various railroad stations, then transported by cars. Page 180.

Forty-five farms make up this supply from Derry. Page 176.

Each can is sampled by an inspector who takes out a spoonful and tastes of it. Page 177.

Boxford, Methuen and North Andover lead in standards. Page 159.

In all over 600 different farms doubtless send milk to the City. Page 160.

About how many children and adults per year must we allow to contract sickness or death by disease in milk? Page 191.

If babies that die each year by disease and impurities in milk were scalded to death there would be a popular uprising against such barbarity. Page 188.

In any dairy, of first importance is method. Page 156.

An old farm scrupulously clean is better than a modern dairy carelessly maintained. Page 167.

The object of this investigation is to secure an improved quality of milk. It is a movement for Clean Milk and a Fair Price to the Farmer. Page 158.

The Farmer that can "raise" all No. 1 milk should get the highest price for it. Page 188.

A list of twenty-eight dairies that were found to be supplying milk that is produced under especially good conditions. Page 174.

A dairy that has excellent equipment and maintains excellent methods should have associated with it a bottling plant of equal standards. Page 180.

It is not fair to ask a farmer to maintain excellent conditions and then have the quality of the milk that he furnishes vitiated by careless handling in the bottling plant. Page 183.

Unfortunately many of the existing bottling plants are inferior in standards to the farms from which they receive milk. Page 183.

I earnestly recommend that more attention be given to the sanitary conditions of milk bottling plants. Page 202.

Plate 3 shows a proposed plan for a Modern Milk House. Page 203.

Ice Cream manufacturing is done in rooms connected with tenement houses. Page 187.

Children from the house or from the street pass in and out of these manufacturing rooms without restrictions. Page 187.

Not only should laboratory tests of milk be made but as with dairy inspections I believe that the public should know the results of these tests. Page 204.

As filters are unquestionably needed for the Lawrence water supply, so I believe is pasteurization for the milk supply. Page 192.

Pasteurizing has become an approved method of treating milk because it destroys disease germs that the milk may contain, yet it does not impair the quality of the milk. Page 192.

A new process has been developed by which milk is pasteurized in sealed bottles. Page 194.

Pasteurizing by the consumer, in his own house, is possible, but difficult to accomplish satisfactorily. Page 194.

Could the producers own and operate a central plant? Page 206.

The Association in Erie, (Penn.) I am informed by the President, was started twelve years ago. Page 206.

It should afford the farmer a direct share in the whole profit from dairy to household. Page 208.

THE WATER SUPPLY:

The problem of transforming this impure and dangerous water supply into a potable and safe drinking water was in reality solved in 1893 when Slow Sand Filters were first installed. Page 217.

The reduction in death rate in Lawrence compares favorably with results that have occurred in other cities. Page 219.

I believe that it does not overstate the facts to say that, with the present population, filtration is saving from 350 to 400 lives every year. Page 219.

The total cost of installing all of the filters and their accessories is given as \$140,000; this outlay has been more than justified by the reduction of typhoid in a single year. Page 221.

That measures for prevention will effect infinitely more than remedies for the cure of disease. Page 224.

The water supply of Lawrence I believe to be as favorable to public health as could reasonably be demanded. Page 224.

THE SEWAGE AND GARBAGE DISPOSAL METHODS :

Thus into the Merrimack River from nine principal outlets this sewage is discharged. Page 225.

There seems to be no limitations in the use of this river for sewage purposes. From bank to bank, 1000 feet in width, it is veritably an open depository for sewage and manufacturing waste. Page 226.

In many localities the sewage was observed in a decomposing state on the surface of the ground where it had been deposited by some outlet that did not properly extend to running water. Page 226.

It is impossible to examine the sewage disposal system in a manufacturing city without being seriously impressed with the importance of providing some improved method of taking care of the extensive wastes from manufacturing plants. Page 229.

Regulation or supervision of some sort is almost certain to come in the near future. Page 231.

It is possible, as the city grows, that the banks could be used for esplanades, or parkways, or playgrounds for children. Page 233.

From the investment side alone, it should pay to clean up these banks and maintain them in conditions which would attract residents. Page 236.

In cities that are making crusades against the house-fly, garbage is removed at least twice a week. Page 238.

The City has no definite plan in disposing of ashes and rubbish. Page 239.

Shall dumping grounds be maintained and even a greater haul than two miles be planned for, or shall the City establish some form of incineration? Page 240.

THE BOARD OF HEALTH:

Evidently some limit must be set to the duties that are assigned to the average Board of Health. Page 241.

Here are far too many and diversified duties for a Board of Health to administer properly and still have time and money left for its legitimate field. Page 242.

We have had eighteen different members of the Board since the beginning of 1900. Page 242.

An examination of the records show that foremost in the deliberations of the Board has been the subject of licenses for stables. Page 244.

During 1910 and 1911 the subject of milk has received attention at five meetings each year, and ten hours in the two years. Page 244.

For years Lawrence has not had what we should at the present time consider an efficiently organized and conducted Board of Health. Page 244.

What sort of men are needed to carry forward effectively a City Department of Health? Page 247.

Lawrence has been a leader in methods of water filtration, why should it not become a leader with an effective Board of Health? Page 248.

The thinly-settled wards have had more cases of these diseases — scarlet-fever, typhoid, and diphtheria — per thousand population than the crowded wards. Page 252.

The answer seems to be that these three diseases enter the human body, not through dust and vitiated air of tenements, but probably through the medium of water and milk. Page 252.

Could we not find by similar investigation the medium for tuberculosis, for pneumonia, and for infantile paralysis? Page 252.

For material success two important conditions will be necessary: An efficiently organized Health Department and support from the general public. Page 253.

The expenditures for essential health measures is estimated as \$20,000, or one-eighteenth of the amount for streets and paving. Page 254.

The new health department has excellent opportunities, and the people can justly expect results that will be noteworthy and generally beneficial. Page 256.

THE POPULATION AND ITS RELATION TO PUBLIC HEALTH:

But of Lawrence, we hear the excuse: It is a manufacturing city. Page 256.

In fifty years Lawrence has grown from a city of 17,639 population to one of 85,892. Page 256.

At each census-taking down to 1910 there have been between 3500 and 5500 more native population than foreign-born. Page 257.

Russian and Italian-born now constitute one-fourth of the foreign-born population. Page 257.

And besides the foreign-born a considerable portion of the population born in this country have foreign parents. Page 258.

Thus in the whole city of nearly 86,000 population seven-eighths are foreign-born or have foreign parents. Page 258.

The rapid growth of the City, its very prosperity in fact, beset it with cogent problems of Housing, Public Health, Education and Citizenship. Page 258.

All citizens are urged to consider the report herewith presented and by vote or public statement to endorse such recommendations as appeal to them. Page 258.

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