A TREATISE ON ENSILAGE.

ENSILAGE, or the method of preserving green crops in pits called silos, which was first made a practical success by AUGUSTE GOFFART in France in 1873, has at last taken such root in this country that there is inquiry throughout the land for information upon this subject.

The enormous increase of food which can be produced from the stalks of cereals, with all their juices preserved, whether it be forty tons or one hundred tons per acre over the one to two tons of hay, has excited all intelligent farmers to a greater pitch of interest than anything that has ever before been presented to them. There can be no doubt that it will become a permanent method. The pioneers of the system in this country since 1876, Mr. Francis Morris, of Maryland, and Mr. O. B. Potter, of New York, have increased the capacity of their silos year by year, and all farmers who have gone into it through the influence of my first publication upon the subject in 1878, also Mr. C. W. Mills, of Pompton, N. J., who made an independent discovery in 1879, are as confident and pronounced as to its great value to the world, as any of the writers are who have been accused of deriving their enthusiasm from the fact that they have something to sell.

THE CROP.

Maize is probably the largest, as well as the most satisfactory crop that can be raised for the purpose. If one stalk weighing five lbs. can be raised on each square foot in an acre of land, the product would be 108 tons. Some will prefer to sow broadcast, counting upon the shade to kill the weeds, whilst others will plant in drills; in which case, by making them twenty-eight inches apart, a horse can walk between the rows with plow or cultivator. In some soils the use of a subsoil or corn plow, without a mold board, will greatly increase the size of the stalks over that which can be obtained by a cultivator with several teeth.

Some say that by planting thickly in drills, the stalks are smaller and more tender, but it is the general impression that the larger and better developed stalk, when full of juice, makes the best food. The best method whereby to get the largest crop with least labor is to make two drills 4 inches apart with spaces of 28 inches, cultivating while small with smoothing harrow, and after, with plow or cultivator; the grains in the drills to be 4 to the foot. In this way the sun and air strike both sides. All rowed crops should be planted north and south. The seed which is grown in the tropics makes a larger growth and sweeter stalk, than that grown from seed matured in the North. *Millet* also makes a large growth, and when ensilaged is a very attractive food for cattle. *Clover*, which can be cut three times in wet seasons, cutting at its first bloom, is made by the seasoning effect of ensilage a more healthful and nutritive food than when fed fresh from field; it should

be cut before it has died at the bottom, after which it quickly rots on the ground. *Rye* and *oats* and *wheat* in many seasons are more valuable to a dairy farmer in the ensilaged state than in the grain. Six or seven acres of the heaviest can be put into a silo, 20x12x16 feet, containing about 100 tons. These crops as well as clover can be removed in time to plant maize. We find that 910 lbs of ensilaged maize is equal in nutriment to a barrel of corn meal.

Southern Cow Pea makes a very nutritious fodder, of which cattle and horses are very fond. Horses will work well upon it when ensilaged, without any grain. It grows luxuriantly, and by the system of ensilage it becomes for all parts of the country a valuable product, which it is not practicable to cure in any other way. Southern planters say "that with ensilage they can produce cotton at 4 cts. lb. less cost than ever before, because it has cost more to keep a mule than a negro in these sections where grass does not grow." If this is so, the saving by ensilage in making 6,000,000 bales of cotton would be more than one hundred millions of dollars. The necessity of buying the seed from the South will of course benefit that section to that extent also; like clover, it is a great land improver, and a very cheap and profitable crop for fattening hogs. This pea, which is really a bean or lentil, is of value for shading out weeds. It is an excellent crop to plow under, as well as to feed green and for ensilage. Planted between rows of potatoes, it prevents the growth of weeds, and will cover the whole field with a crop of vines, shading the potatoes from sun-burn. It can then be mowed off and ensilaged, or fed green, or it can be pulled up, and the cattle will eat it roots and all. The seed matured makes a highly nutritious soup. There are different varieties, black, clay, white and black-eyed. I mention it here, as it is entirely unknown to many farmers, and I would advise them to investigate it. I shall probably publish a circular on the subject of Crops for Ensilage.

Mr. Morris and Mr. Potter state that with ensilaged clover, and brewers' grains, their cattle are kept in much better condition than with hay and same quantity of grains—and by careful experiments, they find that the yield of milk and butter is greater, and the butter is improved in flavor and color, than when fed in the dry state. The great saving by this system, is in being able to allow the maize or other crop to reach its full maturity for this purpose; also in barn room and insurance. "Mr. Mills states that 500 tons of ensilaged-maize the past year cost him $500, that it has taken the place of 300 tons of hay that would have cost him or been worth $7,500, and that his 120 head of cattle are in better condition than they would have been with the hay." Perhaps the best and most disinterested testimony as to the value of this system is the report of Prof. Cook, of New Jersey Agricultural Experiment station; he says: "It is claimed for ensilage that it makes winter butter equal to June butter, a claim willingly admitted, it being to our knowledge of unusually fine flavor and color. Milch cows can be safely fed large quantities of this fodder, which is a perfect substitute for hay. If it is of first class quality, eighty pounds per day will furnish an animal with the full amount of carbohydrates."

The corn-plant is in perfect condition only a few days to each crop, and it is exceedingly important to cut it at precisely the right stage of growth.

I am satisfied that the carelessness of the farming community on this head has caused a great deal of loss to themselves and to the people whom they feed. The perennial grasses have but little sugar and can be fed at any time, but better milk, butter and cheese can be made when they are young and juicy than when they are dried; but with cereals, which are annual, there is another law, viz.: the starch which largely composes these is insipid until it has ripened into sugar, by means of or at the time of tasseling or flowering. This process requires air and sun. Much broadcast corn is fed while unpalatable and unhealthy, both to the animal that eats it and the human animal that eats and drinks the product of the unripe food.

To ensilage the green food before giving it to the cattle, and thus prepare it for digestion, (instead of fermenting it in their bellies,) is both humane and economical. Dry stalks steamed are not to be compared to this fodder, because the nutritious value has gone into the grain. The error that stood so many years in the path of Mons. Goffart was the idea that there must be a partial desiccation. On the contrary, all drying must be avoided. The corn-plant does not remain full of juice more than two weeks after tasselling, and wherever fading has taken place the air has already entered the cells and acetic fermentation has commenced. When cut in that condition the ensilage will be sour, smell like a tan-vat, and taste like pickles preserved in manufactured vinegar. The longer ensilage remains in the silo, the better it becomes, and possibly some farmers may come to keeping it as wine is kept, and label it as the product of such a year, and that a very small quantity of old ensilage will go a great way.

I have changed my mind also about transporting it, and I now believe that it will be baled and shipped; at any rate, in hogsheads it can be kept a long time.

THE SILO.

Earth Silos.—Where the soil is clay or not too sandy and where it can be drained the cut maize can be packed in trenches. A good proportion for a trench is five and a half feet deep, seven and a half feet wide at bottom, and eleven feet wide at top, and any convenient length. This with oxen or horses and a scraper can be very cheaply made. At this slope the sides remain firm, and at this width the earth cover does not arch. The bottom of the trench should be floored with plank, and when filling it standing rye straw should be put against the sides, which will allow the ensilage to pack more easily; it should be well rounded on top and covered with a thin layer of straw or tarred roofing felt, and on that about two feet of earth piled. In packing in the ensilage it is well to cover with boards temporarily, and roll with heavy roller frequently for several days during shrinkage, and also to roll the earth cover until it no longer settles; and it should be protected from rain. The drains outside of the trenches should be so deep that water will never penetrate. Mr. Morris has used such silos in addition to his brick silos to the amount of many hundred tons for the past five years with excellent profit. His land is clay for a foot or two, and a kind of rotten rock beneath.

WOOD SILOS.

There is no difficulty about making wood silos; they require however, more compression to prevent air from entering through the joints. The bays in the barn can be boarded up and down with matched flooring. The moist ensilage will keep the joints tight and it will keep well. The cover must be loose, and weighted so as to make a continuous pressure. But this silo requires an elevation of the cut fodder,and should the barn burn the winter supply is lost. Wherever it is possible. the cellar under the barn should be utilized if the barn be large enough to serve for a cover, and for the working place for cutting the fodder. In the Southern States last year wood silos were built in the fields with double thickness of boards and a coat of tar between. The weight used was cord wood. which becomes more valuable as it dries. The Southern ladies appreciate this dry wood, and approve of ensilage. These silos have doors through which the ensilage is excavated from below.

At Mt. Holly, N. J., there is a silo 19 feet long, 10½ feet wide, and 8 feet deep, made with 8 inch brick wall, the sides and bottom cemented, with batten roof, capacity 40 tons, cost $79.22.

CONCRETE AND MASONRY SILOS.

The best silos are built specially of *masonry or concrete.*

For a silo twelve feet by twenty feet (or longer) and fourteen feet deep, which would hold seventy-two tons, or sufficient for ten cows six months with full rations, the concrete walls should be fourteen inches thick at the bottom and ten inches thick at the top of the side walls, with the bevel on the outside of the wall, and the end walls twelve inches thick top and bottom, the inside being perpendicular and smooth, so that the plank covering may settle with the ensilage. The concrete wall is stronger than an ordinary stone wall, and for this short silo, fourteen inches at bottom is thick enough. It is not best to go any deeper in the earth than can be well drained, and a trench should be cut on the outside of the wall, six to ten inches deep, all around, to carry off all water that may reach this depth. If the land around the silos is nearly level, it is best to go only so deep that the bottom of the wall will be below frost.

Having excavated the earth as deep as the wall is to go, fifteen feet wide and twenty-three feet long, then set standards for the boxes in which to form the concrete walls. It will require twenty standards three by six inches, fifteen feet long (if the walls are to be fourteen feet high), of straight grained timber. Those standards intended for the inside of the wall should be straight on one edge, so that the wall may be made straight and plumb on the inside. There will be three standards upon each long side—one at each corner and one in the middle. The other edges of these inside standards will be eleven feet nine inches apart, and as the boxing plank are one and a half, inches thick, this will bring the walls just twelve feet apart. The outside standards will be opposite the inside ones, and just three inches farther apart

NOTE.—The direction as to concrete walls is from E. W. Stewart, of Erie Co., N. Y.

than the wall is thick, so that when the plank are placed inside it forms a box fourteen inches wide at the bottom, and the bevel or slant on the outside of the wall is made by bringing the outside standard four inches nearer the inside standard at the top. The end standards will be parallel with each other, and fifteen inches apart. These standards are held together by nailing a lath under the bottom ends and a bracket across the top ends, holding the side standards seventeen inches apart at the bottom and thirteen inches at top. When the standards are set up, and the inside standard plumbed very carefully, and both stay-lathed to hold them firmly in position, and the standards placed all around the proposed silo, it is all ready for fitting in the boxing plank. These boxing plank should be straight-grained hemlock or pine, fourteen inches wide, one and a half inches thick, and may be the whole length of each side and end, or, if more convenient, the sides may be two planks long, and the outside end plank will require to be fourteen and a half feet long; they may run past the ends of the side planks. The outside of the ends must be plumb, so that the outside plank of the long sides can be raised, but the end walls being shorter, twelve inches thick is enough of strength, and has the same material per foot of surface. When these boxing planks are placed, there will be a continuous box, fourteen inches wide on the sides and twelve inches on the ends around the silo.

Water lime concrete is the only concrete suitable for silos, as it requires strong, air-tight, smooth walls that will stand moisture to some extent. This kind of wall is easily made air-tight, and is built cheaper than an ordinary stone wall. It is only necessary to use water lime or cement enough to completely coat the particles of sand, so as to cement them together, and this becomes a cement to fill in spaces among large gravel or between stones. The cement is made by mixing one part of water lime with four of fine sand, while dry, so that the lime and sand can be evenly mixed. Then work it into mortar, and if you have coarse gravel and no stone you may put in five or six parts of gravel. The gravel is best mixed in the mortar bed, but it must be used at once, as such mortar sets in a few minutes after wetting. But if you have rough stones of any kind, either cobble or flat, they can be worked into the wall to good advantage, and save cement. When stones are to be worked in, put one or two inches of thin mortar in the wall box, then bed into this mortar a layer of stones, keeping them back a half inch from the boxing plank, so that the cement may be tamped all around the stone, leaving a smooth surface on both sides of the wall. This cement is a poorer conductor of heat, cold and moisture than stone. A properly built concrete wall never shows frost on the inside. In many parts of the country, thin, flat, irregular stones are found in abundance, and these are well adapted for concrete walls, requiring only a thin layer of mortar between them, and the walls becomes solid in a few days. But it is better not to bring these flat stones quite to the boxing plank, but let the concrete come over their edges so as to form a smooth surface.

When the concrete wall is laid with stone, sand and lime, as stated, so large a proportion of stone may be worked in that the water lime will be only

one-tenth of the wall, and also when the wall is made of sand and coarse gravel; so that, to find the amount of water lime required, count one barrel to forty cubic feet of wall to be built. If water lime is very expensive, and you have flat stones, no matter how irregular, you may use quicklime after you get one foot above where the earth will come against the wall. One of quicklime to five of sand will make an excellent mortar in which to lay these stones, doing the work in all respects as above stated. The concrete should be well tamped into the boxes, filling all crevices between the stones, and solid against the planks. Water lime will set hard enough so that these boxing planks can be raised twelve inches every day. That is, if you fill the box all around the silo in one day, the next morning you may raise the boxing planks where you began the day before; and as you fill, raise section after section of planks till you get around again. This may be repeated each day till the wall is completed provided the mortar sets in the usual time. But quicklime, if used, sets slower, and will take two or three days to become strong enough to raise the plank. It will be noted that the planks are to be fourteen inches wide, but are raised only twelve inches, which leaves a lap of two inches on the wall below, keeping the sides of the wall smooth and even. The proposed silo will have 952 cubic feet in it, and requires twenty-two barrels of water lime, of the Akron or Rosendale brand. This lime in many places will cost from one dollar to one dollar and a quarter per barrel, or twenty-two dollars to twenty-seven dollars total. The only other cost of the wall is the labor, which can be done by common laborers. The standards can be set by any one who can use a level and plumb. When the walls are completed, take a seasoned board as wide as the wall is thick, tar one side, and turn the tarred side down upon the wall. This will prevent the moisture from rotting the plate rim placed on top of the wall.

The roof placed over the silo must be elevated some three feet above the plates so as to give head-room for filling the silo full. This may be done by framing short posts into the timber on top of the wall, and placing light plates on these, upon which the roof is to rest. It will be seen that this silo can be built, by many farmers, with only a small expenditure for water lime, shingles and nails, all the rest of the materials being from their own farms. The bottom of the silo is usually cemented, to prevent ingress of moisture.

A wall of the thickness of two feet of stone, or sixteen inches of brick will make an excellent silo. The bottom should be of broken stone and cement, and the sides should be very carefully smoothed. Doors can be safely inserted if convenient. The silos of Mr. Mills are each forty feet long by thirteen feet wide, and twenty feet deep, substantial stone structures, and cost $700 for the two. In another case, where the work was very carefully planned and closely watched, the same space was obtained at a cost of less than $500.

The drainage so as to avoid inflow of water is very important, as the slightest inroad of water will cause the mass to mould as far as it penetrates. The contents of a silo will be about fifty pounds of compact ensilage to the cubic foot. In the prairies the natural ravines with stone bluffs will serve with little expense for silos, and the cattle can be carried over droughts

and winter seasons. In Texas the loss by the cattle each winter of the weight gained in summer, and the tremendous loss by starvation incident to such winters as that of 1880-1, can be entirely prevented by ensilage.

The cover of the silo should be laid directly upon the ensilage without any straw between, and care should be taken that the pressure should be uniform. Make the cover of two-inch plank, matched and battened in sections of three feet, the battens put on with screws and projecting, which will keep them level. The ensilage will settle about one quarter, and if the walls are smooth and free from any projections it will not require any trampling. The less trampling the better, for when the juice is out, the air enters. For this reason it is important to cut the maize when in full juice, while the pollen is falling from the tassel. The screws and levers suggested by some inexperienced people are entirely unnecessary. The pressure should be constant rather than powerful.

In some cases ensilage should be piled in curbs above the silo, about one-third the depth of the silo; these sides should be firm, but movable; the cut fodder should be levelled with care, and the cover adjusted; so that it will be sure to press with uniformity, continuously, and not leave any *garrets* under it for the air to lodge in. Upon this cover will be found a convenient place for piling sacks of grain meal, as there will not be steam enough to stain the sacks, or posts or beams will answer. It was formerly considered necessary to use great pressure in order to squeeze out all the air contained in the cut fodder, (about one hundred pounds pressure to square foot), but it has been found by experience that when cut three-eighths to three-fourths of an inch long and in full juice, the shrinkage of the fodder compacts it sufficiently close without any great weight beside weight of cover. If the crop has dried so as to show pith, the air has already entered its cells, and it would be well to increase the weight.

It is probable that the practice will become more general of covering with earth instead of any other cover. This has the advantage of avoiding all unevenness, but it requires some watching for cracks. The earth will cake so that it can be removed without trouble and thrown in the manure heap. The length of pieces is more profitable at three-eights of an inch especially with a cutter that does not require great power to drive it, as is unfortunately the case with all cutters made upon the small cylinder American principle, but when in haste it is perfectly safe to cut as long as three-fourths inch, and thereby cut twice as fast, and the ensilage will keep as well, but should have a little more pressure.

The earth taken from the excavated silo will often serve to raise the platform upon which the cutter is to stand, and at the same time be on level with the wagon load. The cut fodder can be easily carried by elevator or carrier to a movable shute, which is better than to drop it all in one place. (It is best to locate the cutter so that the cut fodder will fall into the silo without an elevator.)

In unloading, the stalks can be rolled direct from the wagon or cart to the cutter platform on two ropes with a windlass. Place the ropes lengthwise in bottom of the wagon with their forward ends joined in a ring, and the rear ends provided with a ring in each. Two hooks to be screwed into

the edge of platform across which stalks are to lie. The wagon being backed to the door, the front ring is attached to the pulley rope, and the rings connected with the hooks in platform, and by means of double pulley or windlass the whole load which has been piled crossways on the wagon can be rolled on the ropes to the platform, or the forward ring can be attached to a hook, and the wagon driven from under the load.

On land where there are loose stones great care should be taken that none are mixed with the stalks. To cut stalks in the field, the farmer must study the cheapest way whether by hand with corn knives, or with mowing machine, or with machine to gather and bundle, will be a matter of size and circumstances.

When we consider that the whole increased crop is to be cut into short pieces in a very brief period of time, and when it is at its greatest weight, it is absolutely necessary that the farmer should have the best cutter that can be procured, one that will cut $\frac{3}{8}$, also $\frac{3}{4}$ inch—one that does not mash the stalks, and will not shake to pieces.

When using ensilage from the silo, it is best to begin at one end and take a vertical slice either from top to bottom or from top to centre, in which case a floor is to be laid upon the lower level to keep out the air. A manure fork will generally be used. A little taken from the face of the compact fodder each day will keep it from heating. It can be raked down. Each day's supply should be taken out the previous day, and put in a heap. Fifteen to thirty-six hours of exposure makes it more palatable. I have seen maize ensilage that was perfectly sweet from Southern seed, but nearly if not quite all of it that has been put up thus far has been a little sour. I presume the former will be preferred, though some say it is just as good when sour, and some prefer it so.

Much objection has been made to the method of ensilage by those who know nothing about it practically on account of the handling of so much water, which they say is an unnecessary expense. There is a delicate analysis performed in the animal stomach, which finds something valuable in the juices that the chemist evaporates, and which value he cannot detect. It is different from the water in the form of dew and rain, which gives the farmer so much labor in making his hay. It is undoubtedly nutritive, and better when ensilaged.

No farmer who has acted upon Mr. Goffart's advice so fully and freely given in his Treatise, and for which he was awarded the Decoration of the Legion of Honor in 1876, has failed, and nearly all of these leading men have built larger silos after the first experiment. They find it exceedingly convenient to have hay to sell, if they make any hay at all.

It is a method needed in every State in the Union—in fact, every portion of the globe where cattle are fed.

The ancient plague of grasshoppers that sometimes afflicts the West, also of worms and bugs, can be mitigated by saving a portion of the crop by ensilage before they appear;—and wherever tornadoes are liable to attack the farmer, his underground provision for his cattle will be a great source of comfort to him, when the clouds gather, and the lightning threatens his barns.

Many farmers will have their ensilage sour in the silo through delay caused by the break down of their cutter when they have bought a light, complicated machine. It is well to have a reserve cutter.

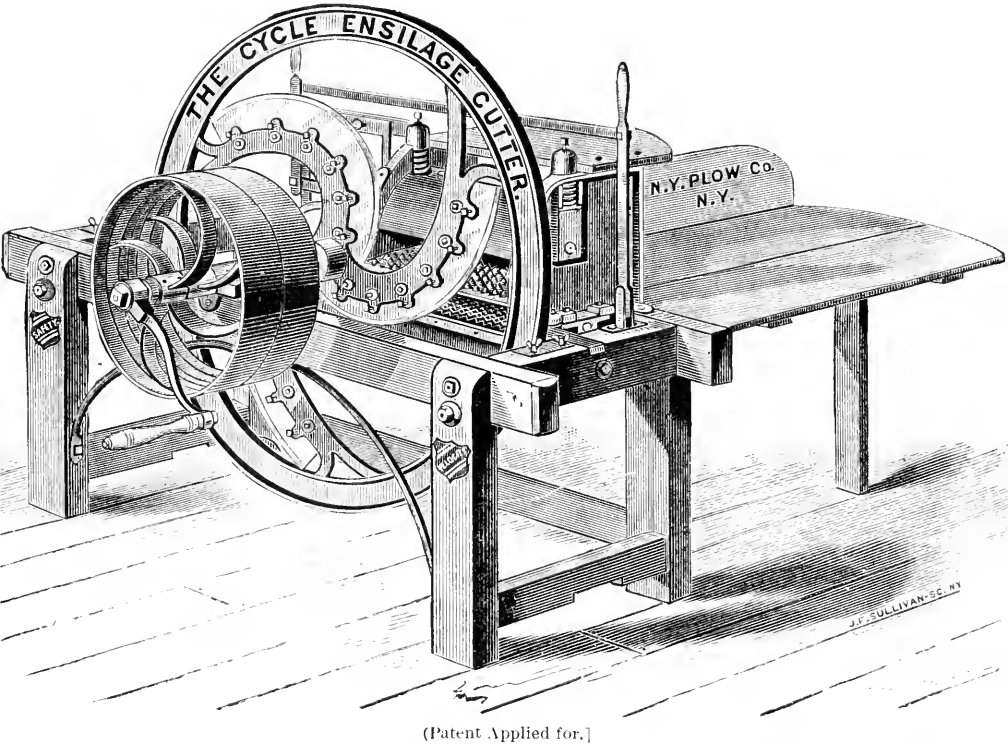
Some dairymen say that milch cows do as well on ensilage when mixed with about one quarter its bulk of fine cut dry hay or straw as with meal or shorts. Perhaps the straw serves to distend the stomach as cob meal does when ground with corn. For sheep with lambs, sows and mares, ensilage is especially profitable, and for fatting sheep. For summer use, when the pastures are dried, ensilaged June grass will keep up the supply of milk as nothing else can. American farmers should no longer hesitate to build silos.

J. B. BROWN, Pres't The New York Plow Co., 55 *Beekman St., N. Y.*

THE CYCLE ENSILAGE CUTTER.

—MANUFACTURED BY—

THE NEW YORK PLOW COMPANY.



(Patent Applied for.)

Having introduced the system of Ensilage to the farmers of the United States, we now offer them a Cutter made especially, and suitable in every way for the purpose.

After much experience in manufacturing large cutters, we have found that the principle of this cutter is the best FOR CUTTING GREEN CROPS FOR ENSILAGE; also for cutting Hay, Straw, and Stalks.

This Cutter will cut Green Maize, Clover even when wet, Cow Pea, Millet, &c., &c., without clogging or winding on the roller.

The System of Ensilage, which must become general among farmers, requires such a machine as this to make it profitable and safe, in order that the silo may be filled as fast as two feet per day at least, to prevent heating.

Since the whole increased crop is to be cut into short pieces in a very brief period of time, and when it is at its greatest weight, it is absolutely necessary that the farmer should have the best cutter that can be procured.

These machines combine great rapidity with strength, durability and simplicity of parts, and require much less power than any other form of machine. They have three knives, with long drawing cut, so leading each other that the cut is continuous and steady, and without jar. The length of cut is easily changed to be either $\frac{3}{8}$ or $\frac{3}{4}$ inch.

The knives are adjustable by the simplest set screws, and are covered (cover not shown in cut). With this machine a fine cut ($\frac{3}{8}$ in.) can be had as cheaply as 1 inch with cutters made on any other principle.

The knives are more than twice the length of the Throat-piece. There is great advantage in such long draw-cut knives, and especially when they are dull. The fodder slips along till it comes to a sharp place, or becomes so compact that it is cut, whereas ordinary feed cutter knives which chop off the fodder, being no longer than the throat, often drag down or pull through the fodder uncut till it clogs the machine. The knives are easily sharpened with a small flat file or whet-stone, without the aid of a mechanic.

There is an aperture for dropping stones before reaching the rollers, so that there is very little danger of any reaching the knives. The cutting plate of hardened steel is separate from face plate.

The rollers are light and combed, so that it is impossible for them to wind, and they do not mash the stalks.

For Ensilage the juicy stalks should not be bruised or mashed, either in cutting or trampling, more than is avoidable, because when the juice escapes air enters. The knives and rollers of the Cycle Cutter leave the cut fodder in better condition than the short, stubby knives and mashing rollers of cutters not made with this intention; most of the cutters previously invented having been designed to mash the stalks as much as possible.

Stop levers are on both sides of the cutter, by which the feed rolls can be instantly stopped. The WORM driving gear is peculiarly simple and durable, and it is apparently impossible that any break down can occur while a silo is being filled. They have tight and loose pulleys and crank. The spiral springs ensure uniform pressure better than weights or other form of spring, and the feed rollers are not confined to parallel opening.

SIZES.

(We shall make smaller and larger sizes if demand requires).

Diam of Wheel.	Size of Mouth.	Will cut, per hour, Green Stalks.	Price.	Extra Knives.	Diam. of Fullies.	Face of Pulleys.	Weight.
24 Inches.	*8 x 3 Inches.*	*2 Tons.*	$50	*$2.50* Each.	*10 in.*	*4 in.*	*400 lbs.*
36 "	*12 x 5½ "*	*4 "*	90	*3.00 "*	*15 "*	*" *	*650 "*
42 "	*14 x 5½ "*	*6 "*	125	*3.50 "*	*15 "*	*" *	*950 "*
48 "	*16 x 6 "*	*10 "*	175	*4.00 "*	*21 "*	*" *	*1100 "*
Knife Wheels, complete			*36 in. $20.00*		*42 in. $25.00*	*48 in.*	*$30.00*
Throat Piece, with steel			"	*4.50* "	*5.00*	"	*5.00*
Worm and Worm Gear			"	*4.50* "	*5.00*		*5.00*
Double Gear Wheels		*Large*	"	*2 75* "	*2 75*		*4.50*
" " "		*Small*	"	*2.00* "	*2.00*		*3 00*

With these extras, purchasers would have practically a reserve machine.

POWER REQUIRED.

With two-horse power the 36 inch and 42 inch sizes can be speeded to 250 to 300, at which speed they will feed and cut with great rapidity. It is better to run these sizes fast than to run the 48 inch slow. A two-horse power in good order will run the 48 inch very well, but it requires a four-horse engine to run it at a speed of 300 to 350. At this speed it will keep two or three men very busy to supply it. This size will be wanted most of all when farmers learn, as they will, that they must prepare to feed principally green crops. The greater speed reduces the cost very materially. Lazy workmen do not approve of these cutters.

With 350 revolutions, the largest size Cycle Cutter will cut from fifty thousand to one hundred thousand cubic inches of ensilage per minute, according to the length cut, $\frac{3}{8}$ or $\frac{1}{4}$ inch.

But the important thing about any cutter is the freedom from danger of breakdown. In this respect there is no comparison between this principle and others where gears are used, and small cylinder heads with two or three bolts to each knife without provision for shedding

stones. In such cutters a stone is a great disaster, as it not only breaks the knife, but often destroys the whole cylinder of knives and the mouth-piece. Slipping fly wheels, which are relied upon in some machines, are humbugs, because the damage is done to cutting parts before the effect of the blow reaches the wheel, as all who have seen experiments in natural philosophy have learned. The duplicates and repairs that are necessary to have on hand can be arranged in the Cycle Cutter by any farmer, which is not the case in complicated machines. The knives are very easily adjusted and kept in order, and every part is simple and accessible.

Many farmers will have their ensilage sour in the silo through delay caused by the break down of their cutter when, through inexperience, they have bought a light, complicated machine for the purpose.

The two small sizes can be run by one horse. The 24 inch has one pulley, and a crank convenient to side of feeding box for cutting by hand. The other sizes have tight and loose pulley, the latter being convenient in case engine is used.

The box is built like a table, with one side raised. An annex box, with stone trap, can be easily attached.

When cutting for ensilage it is more expeditious to place the cutter on a platform above the top of silo, including side boards or curb, and to *shute* the cut fodder into it. The power can be easily transmitted by belt, and the whole stalks can be raised by the team from the wagon or cart direct to the cutter platform without handling.

Elevators or Carriers can be attached at any time to these cutters. We build them indestructable and positive, so that they will not wear nor give any trouble. They rise at any angle, from front or from right side of machine (standing behind). With this apparatus the cut-feed can be deposited without labor in any part of the silo or silos.

Price of Elevator, $2.00 per foot.

From J. Y. Smith, Doylestown, Pa.

"I received the (48 in.) Cycle Cutter, and put it to work, and found it to work splendidly. I ran the cutter with one-horse tread power; it cuts stalks very fast. The horse, after running three hours, was not as warm as when running a small-cylinder cutter to cut twenty bundles of stalks. A two-horse tread power will run it finely. When running about 350 revolutions per minute, and cutting all the horse could drive, I could not feel the slightest jar on the barn floor; so you may know how steady it runs." I had the cutter tried on clover, which was very wet; it cut it as fast as it could be fed, and the rollers do not clog; I do not think you can feed any kind of feed that will clog it.

References to Francis Morris, Oakland, Md.—J. Gregory Smith, St. Albans, Vt.—R. M. Hoe, N.Y.—C. W. Mills, Pompton, N. J.—Samuel Remington, Ilion, N.Y.—Edward H. Knight, Mechanical Engineer, and many others.

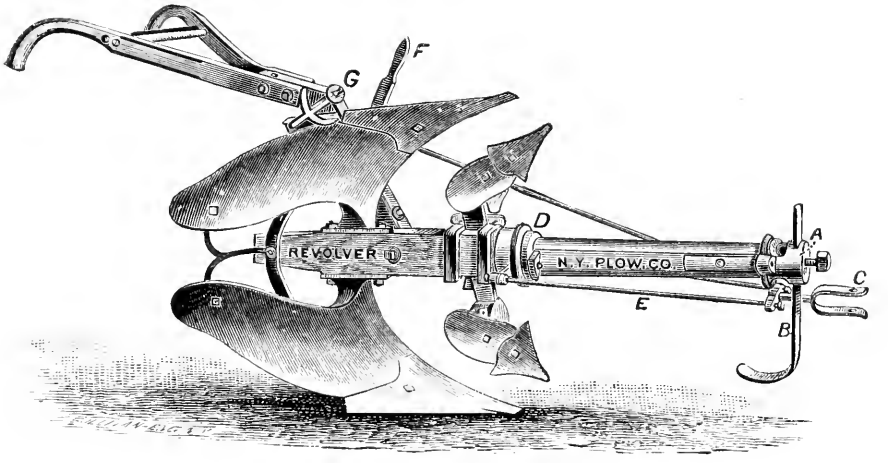
Treatise on ensilage free.

Goffart's work translated by J. B. Brown, 30 cts.

MACHINE BELTING.

	Rubber.	Oak Leather.
2 Inches.	*10 cts. per ft.*	*17 cts per ft.*
2½	*11 " "*	*22 " "*
3	*16 " "*	*27 " "*
3½	*18 " "*	*32 " "*
4	*22 " "*	*36 " "*

We also supply STEAM ENGINES and BOILERS, both new and second-hand.



THE REVOLVER DOUBLE PLOW.

This plow is meeting with great success, not only on account of its convenience in plowing on side hills, but because it enables the farmer on level land to commence at one side of a field and work furrow after furrow clear across it, avoiding dead furrows, and keeping the sides and corners of field clear.

With this plow a farmer can finish and plant a portion of his field without waiting to plow it all. In turning about the team, step only on the unplowed ground, and though the plow is a little heavier than a single plow, it revolves so easily that the labor is not as great in turning as with a single plow. The beam to which these plows are attached revolves in the Swivel-Box or collar, and is fastened securely by a lever, the plows being latched. The shoe regulates the depth. Jointers or Skim plows which are so desirable in plowing sod, are attached as shown in cut, or, if prefered, steel coulters will be substituted, as they fit in the same holder. The draft is very little if any heavier than the single plows, as increased weight makes it more steady and the lines of the plow mould are the best and the easiest for general purpose, that our long experience (55 years) in plow making teaches us.

We have known for years that the ordinary Swivel plow, using both sides of a single mold, could not do satisfactory work on level land, but here is a plow that will do best kind of work, without regard to shape of field and requiring no calculation.

We make them with both cast and steel molds. On all we use a cast share with tool steel point, which can be drawn and tempered by any blacksmith, and which makes a strong, and durable adjustable point, and which is the safest and most economical for farmers to use on any plow.

Price of Plow, with Cast Iron Molds, ... *$20.00*

" " " *Steel* " *$25.00*

Extra Shares ..... *Each .80*

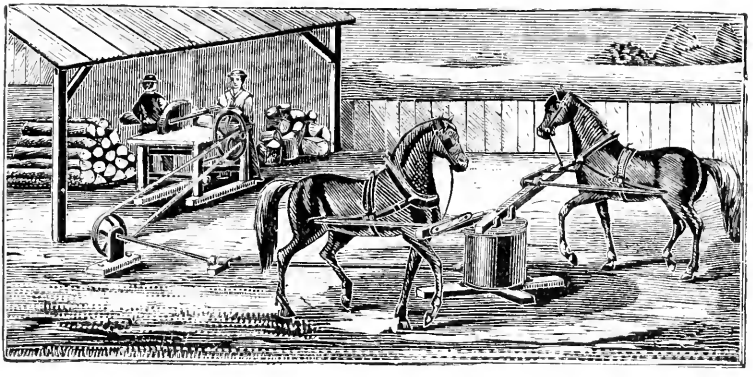
Extra Land. .75 *Extra Cast Molds. $1.50* *Extra Steel Mold. $2.50*

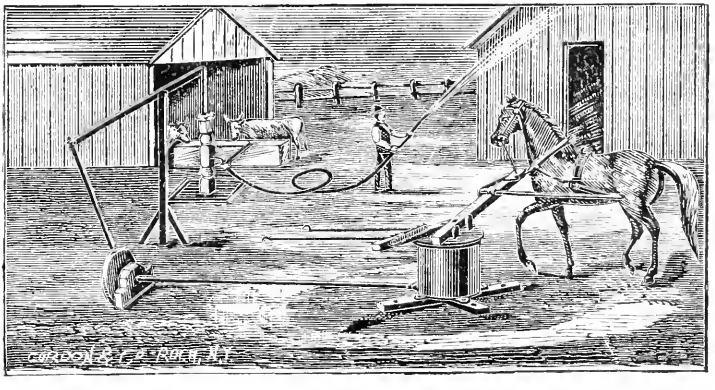
MANUFACTURED UNDER HARTMAN'S PATENTS,

By THE NEW YORK PLOW CO.,

55 BEEKMAN ST., N.Y.

POWERS.





WARREN LEVER HORSE POWER.

The simplest and safest method of working one or two horses—Cheap and not likely to get out of order. Can be placed in any position and moved about as desired. It is covered from dust and dirt. The manner of attaching the horse to the Sweep saves one-quarter to one-third of the strength of the horse, which is lost in other lever powers, by the line of draft not being in the right direction. All who have used it for cutting ensilage, also for shelling corn, grinding tools, grinding apples, sawing wood or pumping water, are pleased with it.

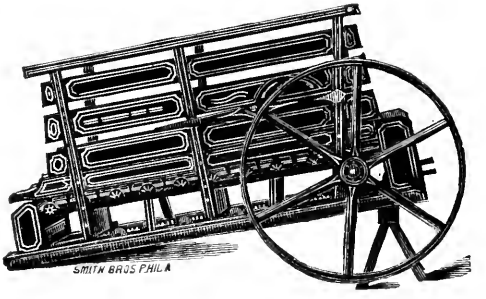
We will take back and refund the money to all purchasers that for any reason regret their purchase after trial.

Weight about 300 lbs. Height, 20 inches. Diam 18 inches. Length of Sweep, adjustable. 6, 7 or 8 feet. One revolution of horse makes 28 revolutions of band wheel. Horse makes 5 to 7 revolutions per minute. Diameter of Band wheel 24 inches by 3½ face. The speed can be doubled with the Jack.

Price One Horse Power, Complete, ... $50.00
" *Extra Sweep to make complete 2 Horse Power* 6.00
" *Jack to double speed* 8.00

Manufactured by THE NEW YORK PLOW CO.

55 BEEKMAN ST., N. Y.



CHAMPION HORSE POWERS.

1 Horse, $115 00. ***2 Horse, $160 00.*** ***3 Horse, $200 00.***

Steel Rods. Lags, strong and durable. Price includes 30 feet 3 inch belt for 1 horse; 40 feet 3½ inch belt for 2 horse; also governor, extra wheels, segments, blocks, etc.; for 2 horse, extra band wheel. Band wheel is 54 inches in diameter, and makes 90 Revolutions per minute at ordinary walk.

POTATO DIGGER.

We have at last found the right machine for this purpose, and secured the right to manufacture. It turns all the potatoes out without any injury, and so leaves them, that they can be picked up without loss.

Price ... ***$12.00***

Cut in next Circular.

SMOOTHING HARROW.

We manufacture the best slanting tooth harrow for this purpose. Adjustable teeth. Slides on back to facilitate transportation.

Price 10 ft. ***2 Horse*** ... ***$24.00***
" ***5*** " ***1*** " ... ***13.00***

PULVERIZING HARROW.

For breaking up all clods and sods. Price, $25.00

ADAMANT PLOWS,

Repairs for all plows.

Plows for all purposes.

CULTIVATORS, CIDER-MILLS, Presses and Screws, Corn and Cob Mills, Corn Planters, Corn Shelters.

Send for Special Catalogue of any implement wanted.

SEED.

FAR SOUTH SEED CORN suitable for Ensilage, (sweeter than Northern,) large growth, will not ripen seed in Northern States.

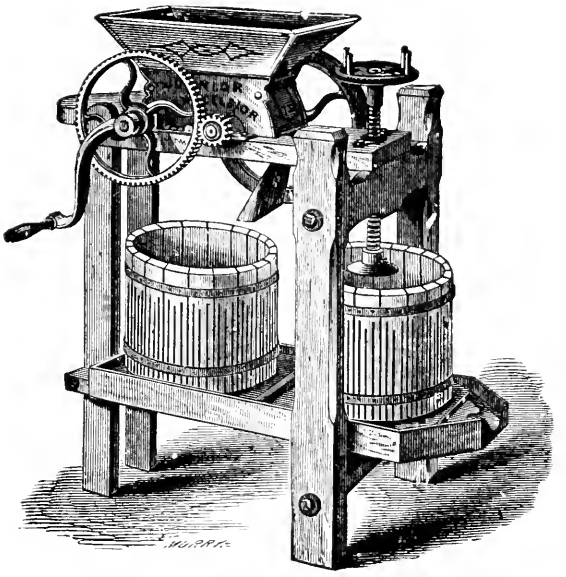
Price single bushel ... ***$2.50***
Larger Quantities ... ***2.00***

NO CHARGE FOR BAGS OR SHIPPING.

Southern Cow Peas, best qualities for Ensilage.

THE NEW YORK PLOW CO.,

55 Beekman Street, New York.



Excelsior Junior Cider Mill, $22.50.

Same Grinder as Union Mill, with smaller Press.
These Mills are also excellent Wine Mills.

Wrought Iron Screws.

No. 1.

Diameter, 1¾ in. Length, 24 in.

$3.00.

No. 2.

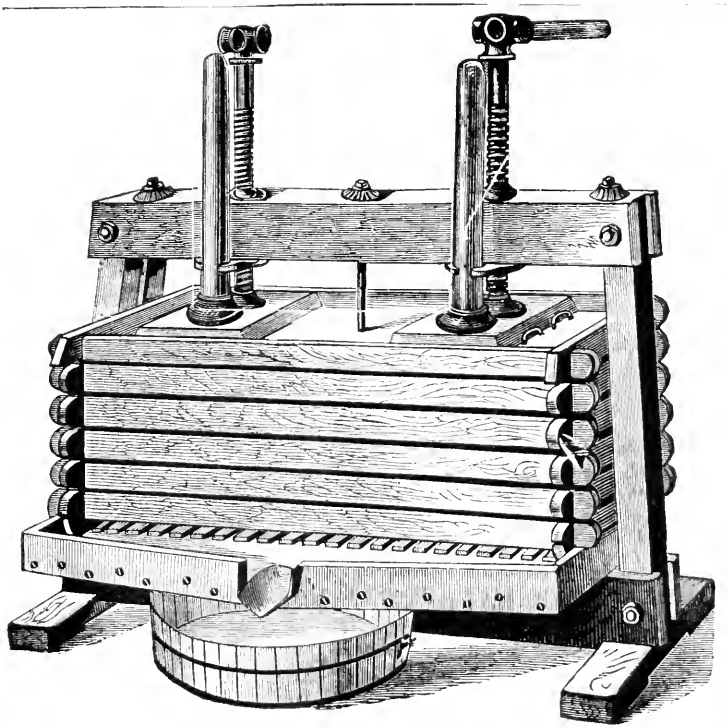
Diameter, 1¾ in. Length, 30 in.

$6.00.

Judges' Report at Centennial Exhibition on Union Cider and Wine Mill.

"Recommended for Award for the following reasons, viz:

"For ingenious construction and efficiency of operation; the mill comprises a revolving cylinder, "with projecting ribs, with a reciprocating jaw or crusher, furnished with teeth, which is worked from "an eccentric on the main shaft; a balance wheel steadies the motion, and reduces the labor of grind- "ing, which is *remarkably easy;* the press is worked by a strong screw, and the juice is extracted "rapidly and efficiently."



No. 4 Double Press. $35.

The curb is eighteen inches by three feet inside, and will hold about pomace sufficient for a **barrel of Cider at once.** It is so made that it can easily be taken apart to empty the pomace after it is pressed. It is strong and durable, and large producers of Cider and Wine will find it a Press they have long desired, and which we think will fully meet their wants and expectations.

Those who have used this Press assure us that they can average **fifteen barrels of Cider per day** with it, but of course this depends on the quality of the apples and pomace.

Weight 400 pounds.

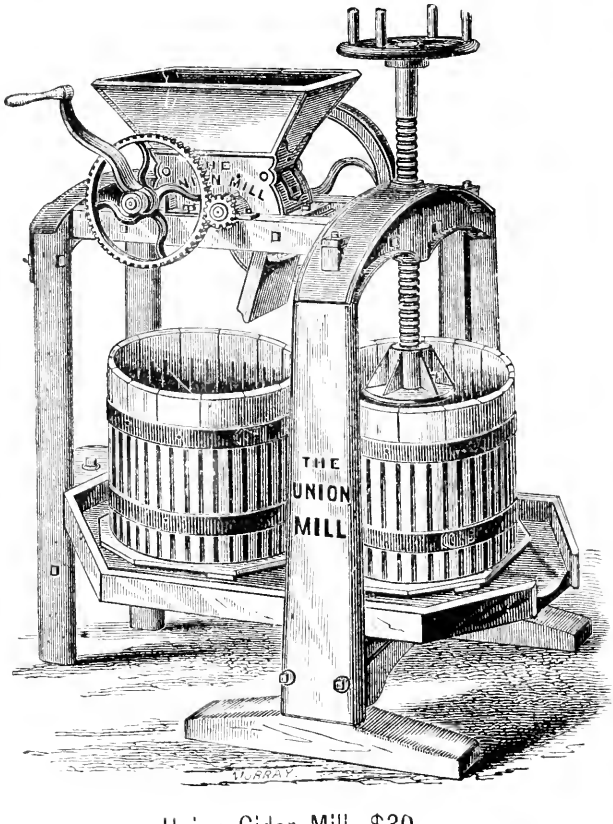
CIDER MILLS, PRESSES, SCREWS, ETC.

MANUFACTURED BY

THE NEW YORK PLOW CO.

55 BEEKMAN STREET, NEW YORK.

☞ *All unpleasantness from Iron Mills can be prevented by thoroughly rinsing them with water after using, thus diluting the acid. Never use old cider barrels or grating mills if you want sweet cider.*



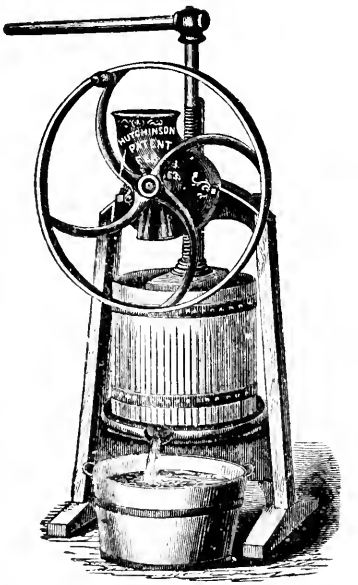
Union Cider Mill, $30.

This Mill combines an easy running Grinder with a Large Press which holds the pomace of three bushels of apples. It is constructed with a Ribbed Cylinder and a Crusher, which both crushes and grinds the fruit, making a soft pomace similar to a *wet sponge*, and depriving it of all receptacles that can contain any of the juice. The Vibrating Crusher falls back and enables momentum of balance wheel to increase half the time, which reduces the labor, instead of, as in other mills, being a continual "squeezing grind," which has made apple grinding such hard work.

This Mill was adjudged to be the best at the Centennial Exhibition, and was awarded diploma and medal. (See Judges' Report, next page.)

The average product of this Mill is five barrels a day. The screw is stout and does not tilt in pressing. The apples being crushed and not grated, the pomace is soft and adhesive, hence, strains out readily, leaving the juice clear. Cider so made keeps sweet longer than when made by grating mills.

Union Grinder, without Press..... .....$16.00
" " " (as below) 20.00

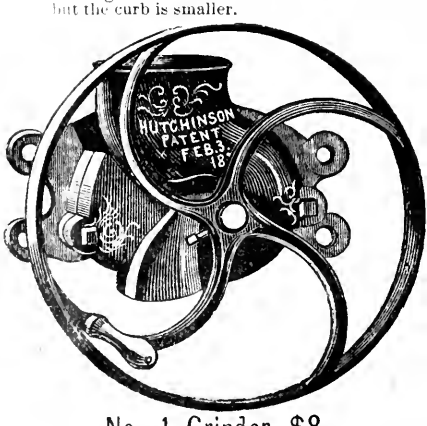


Hutchinson's Family Mill.

No. 0. $15.00. No. 1. $18.00.

The No. 1 Mill can easily grind from *eight to ten bushels of Apples, and from ten to twelve bushels of Grapes, Currants, etc.*, per hour, The iron work is beeswaxed to prevent rust, which can be replaced when worn. The Curb (or Press) will contain the pomace of one and a half bushels of Apples. One man can make with it from *two to three barrels of Cider*, or from *one hundred to one hundred and fifty gallons of Wine per day*, while it is always ready to make a pitcher or bucket of Cider in a few minutes. Weight 150 lbs.

The grinder of No. 0 is same size as No. 1, but the curb is smaller.



No. 1 Grinder, $8

Same as used on **Family Mill** o & 1.