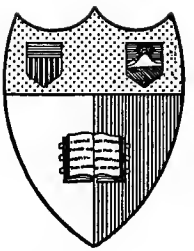
TEXTBOOK OF
PRINTING OCCUPATIONS

C. W. HAGUE



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PRINTING OCCUPATIONS

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PREFACE

With the growing demand, in the vocational and public schools throughout the country, for the instruction in shop subjects based upon the analysis of the trade, there is the necessity for textbooks presenting classified material. It is with this end in view that the author has compiled this text on printing.

Printing, which may well be termed a "specialized trade," offers unusual opportunity for blocking the operations into classified groups for the learner. This treatise, based upon extended trade experience, teaching experience, and the results of trade analysis, includes only the branches which are practical for school instruction, and standard equipment. The book contains little that is new in content, but rather the new organization of old material to cooperate with, and meet the qualifications for federal and state aid in schools. It is primarily a student's textbook, and should be the most important tool in the hands of all part-time and full-time students learning the printing trade, or those taking this subject in pre-vocational classes. It may also be used as a reference book for instructors of printing as a guide for the proper sequence of presenting material to classes.

The three major divisions, Composition, Imposition, and Platen Press Work, are so arranged as to treat each as a complete occupation independently of the others in part-time classes. Further, the separate groups within these divisions may be taken up, if necessary, disregarding sequence, after gaining a thorough knowledge of the general information preceding the groups. It is advisable, however, when the student is to learn the complete printing trade, to follow the given order of divisions and groups, so that his progress may be based upon the increasing difficulties with each succeeding group of operations.

The exercises included with each group are typical of the trade operations, and are arranged according to their progressive difficulties. They may be followed directly

from the text according to the given instructions, or, whenever practicable, similar exercises may be substituted for productive reasons, or to suit equipment. Care should be taken, however, not to depart from the general course of instruction while fitting the selection of the work to the needs of the class.

The author wishes to express his appreciation to the American Type Founders Co., the Chandler and Price Co., the J. H. Day Ink Co., Mr. R. T. Porte, and the many others who so kindly helped to make this treatise possible.

C. W. Hague

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I—STRAIGHT COMPOSITION

STRAIGHT COMPOSITION

PRINTER'S SYSTEM OF MEASURE

A system of measurement, known as the Point System, has been almost universally adopted for use in printing. Type and practically all other composing materials are now made according to this system of measure, which enables the compositor to accurately and easily assemble type forms to any definite measurement. Previous to the adoption of this standard, in 1867, type and various other materials were of irregular sizes, known as Bastard, and it was difficult to make different kinds of type align, and to use materials interchangeably. There is still some of this type in existence, but little in use.

The point system is based upon the "point" as a unit, which is approximately one seventy-second of an inch, or to be more exact, .01384 of an inch. This being too small a unit for convenience in larger measure, a table of larger units has been constructed, with the point as a basis. In order that one may compare type measurements with inches, this table also gives the equivalents in our standard linear system.

Type Measurement Units

6 points	=1	nonpareil (non-par-eil)
2 nonpareils	=1	pica (pi-ca)
6 picas	=1	inch
72 points	=1	inch
12 nonpareils	=1	inch

In this table the relation of sizes of the point system to the linear system is not absolutely accurate, but is near enough for every practical use.

Fig. 1. Line Gauge.

The printer's measuring stick is known as a Line Gauge, and is usually graduated into nonpareils and picas on one side, and in inches on the other, so that the comparative measurements may be seen at a glance.

TYPE

The work of the compositor deals mostly with the handling and setting of movable characters, and groups of characters known as Type. The term "type" used to mean unit cast characters only, but with the development of the modern composing machines it is necessary to classify type into: a. Foundry Cast Type, b. Linotype, c. Monotype, and d. Wood Type. Linotype and monotype composition are specialized occupations in themselves, and require extended training and special machinery, so will not be discussed in this book. Foundry cast type, and perhaps a little wood type, are the only kinds involved in hand composition as treated here.

Foundry type, which is usually spoken of as "lead" type, is made of an alloy of lead, tin, antimony, and sometimes copper. About 80 per cent of the alloy is lead, and the rest the other constituents, which are to add hardness and toughness to the metal. Lead alone would not be durable enough for the large number of impressions expected from type.

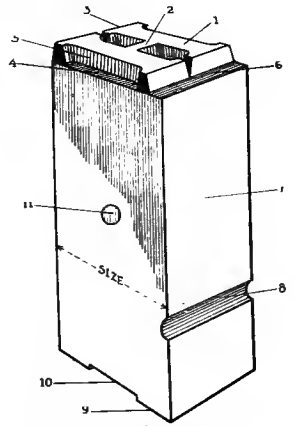


Fig. 2.
Nomenclature of Type.
1. Heavy Element.
2. Light Element.
3. Serif.
4. Counter.
5. Neck.
6. Shoulder.
7. Body.
8. Nick.
9. Foot.
10. Groove.
11. Pin Mark.

In the illustration it will be noted that names are given to the different parts of a single type character. The whole very much resembles the makeup of the human body, and the similarity simplifies the understanding of their functions. The printing surface at the top is called the Face, and there are many different faces, or designs of type. The bevelled part which supports the face is the Neck, and projecting from the neck is the Shoulder. The main part of the type below the

shoulder is the Body, and at the bottom, the part on which the type stands, is called the Foot.

The grooves across the front of the letter are known as the Nicks, and vary with almost every kind and size of type on each piece of type. There are usually anywhere from one to six of these nicks, which serve for several functions. First, they always indicate the bottom of the character, which enables the setter to set the type correctly without examining the face; second, they aid in replacing to the proper cases where the faces may be confusing. They also serve as a series number for the type founders, but this does not concern the compositor.

The elements, listed at the top of the type, are characteristic to certain designs of type where there is a contrast in the width of the printing parts. The counter, or routed-out parts, are common to all. In some designs of letters some parts of the face project beyond the body, so that when set this part overlaps the adjoining letter and decreases the excessive white space between them. Such letters are called "kerned letters," and are more commonly found in Italic and Script types.

The size of any type is always determined by the number of points from the nick side to the back, and is indicated by the number of points, such as, 6 point type, 10 point type, or 48 point type, etc.

The width of the letters are also cast according to the point system so that the lines will justify properly, known as "point set," but this does not concern the type setter. The height of the type, as well as other printing materials intended for impressions, is called "type-high," and is approximately eleven-twelfths of an inch, or exactly .918 of an inch. This is standard so that all types may be used interchangeably.

Body type. Type which is used for straight paragraph composition is known as Body type. It is usually of a plain, light face, and of the smaller sizes, ranging from 6 points to 18 points. The difference in sizes is usually in multiples of two points, excepting where such sizes as 7 point, 9 point, and 11 point type have been adopted by some of the newspapers and magazines.

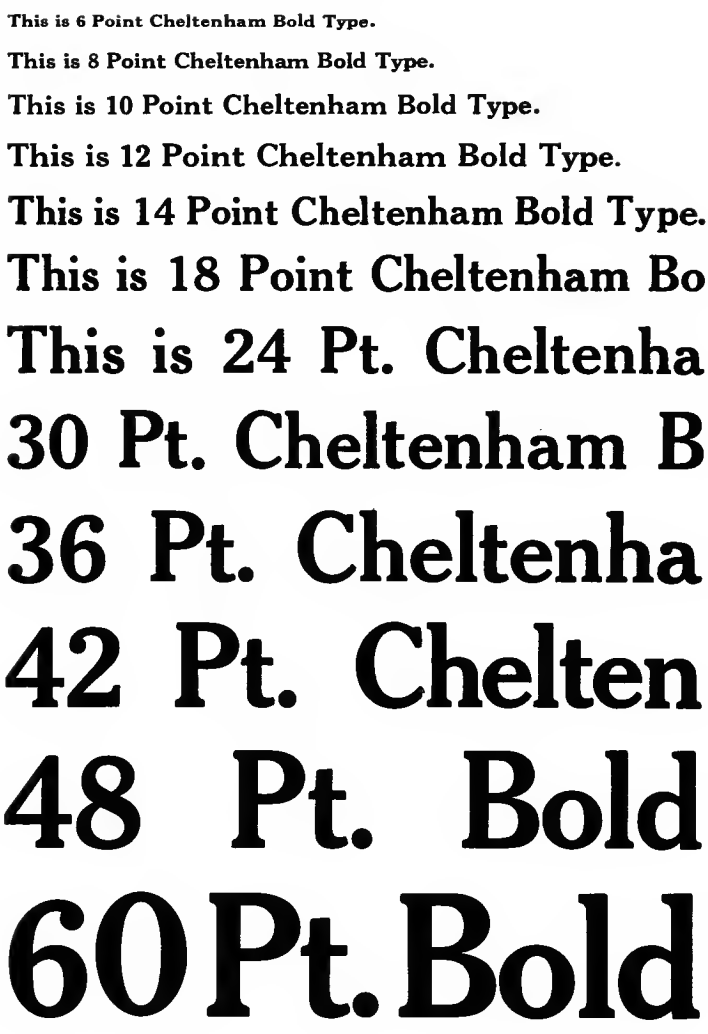


Fig. 3.—Type Sizes.

This face is 12 point Cheltenham Old Style

This face is 12 point Cheltenham Old Style Italic

This face is 12 point Cheltenham Bold

This face is 12 point Cheltenham Bold Italic

This face is 12 point Cheltenham Bold Condensed

This face is 12 point Cheltenham Bold Extra Condensed

This is 12 pt. Chelt. Bold Extended

Fig. 3-a. A Family of Type Faces (Cheltenham).

Job Type. Job type, which is used for display purposes, and where contrast and emphasis are required, involves many designs, sizes and classifications. The design of the type is usually indicated by a name, derived either from the designer, period of design, or style of design, such as Century, DeVinne, Gothic, etc. The design may next be classified according to style of face, such as Light Face, Bold, Italic, etc., and still further classified according to the width of the letter, such as, Extra Condensed, Condensed, Medium, Expanded, Extended, etc. When speaking of any particular kind of type, the name is mentioned first, the style second, and the width of the letter last, as for instance, Caslon Bold Condensed.

Family. All of the type of any one design, including all the styles, widths, and sizes of that design, compose a Family of type, for instance, the Cheltenham Family.

Series. All of the sizes of one style and width of type of any design constitute a Series of type, as for instance, all the sizes of the Century Bold Condensed.

The sizes of display type usually range from 6 point to 72 point, as follows: 6 pt., 8 pt., 10 pt., 12 pt., 14 pt., 18 pt., 24 pt., 30 pt., 36 pt., 42 pt., 48 pt., 60 pt., and 72 pt. Some between sizes are to be found in some shops but are not common.

Above 72 points, type is usually made of end-grain hard wood, to eliminate weight, and is measured in lines instead of points. A line is equal to one pica. This type is usually of plain design and used for large poster work and strong headlines.

Font. A complete collection or outfit of one size and style of type, containing the proper apportionment of each character according to its frequency in use, is known as a Font of type. A case of type is often referred to as a "font" of type, especially in job series.

When type is purchased it is ordered in either Weight fonts or Job fonts. Body type usually comes in weight fonts, such as 20 lb., 50 lb., etc., in which the characters are properly apportioned. Job type is usually in job fonts, in which the characters are apportioned according

to their frequency in use, disregarding weight, and are usually indicated by the number of A's in both the cap and lower case letters.

An extended study of type faces can be made to good advantage after an understanding of typographical design has been attained, so that the student may know the appropriate use of types for any job. One of the best places to observe and study types is in the type catalogs, for there may be found numerous designs in all their sizes and styles.

SPACES AND QUADS

The space between words and at the beginning or ending of a paragraph is formed by Spaces and Quads. They are type bodies of the same size as the type with which they are used, but are less than type high so that they will not give an impression. They are common for all kinds of type and may be used with any type of the same size.

The unit of spacing material is an "em quad," which is a square of the size of type with which it is used. Thus, an em quad used with 8 point type is always 8 points square, and an em quad 12 points square is always used with 12 point type. For filling out a larger space 2 and 3 em equads are used, which are two and three times the length of an em quad, but of the same width.

The "en quad" is just one-half the size of the em quad, or one-half a square. In 8 point type the en quad would be 8x4 points.

The "three-em space" is next smaller in size, and is the space most commonly used between words of a sentence. It

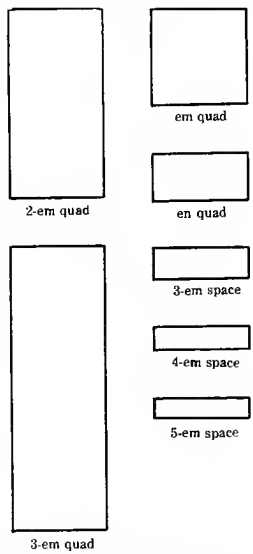


Fig. 4.
Relative Sizes of Quads and Spaces.

is one-third of an em quad, and really means three-to-the em space.

The four and five em spaces are one-fourth and one-fifth of an em quad, respectively, and are used in case less space is necessary between words, or when a combination is necessary for filling out space.

In some jobs it will be found that thinner spaces are necessary to make proper adjustments, in which case one point and one-half point brass and copper spaces are used. These spaces are not supplied with regular type fonts, but may be purchased for any size of type.

Spaces and quads are located in the type cases in compartments which will accommodate their sizes, and for convenience in their use.

LEADS AND SLUGS

Leads and Slugs are strips of type metal, less than type high, from one to twelve points in thickness. Those from one to four points in thickness, inclusive, are called Leads, and those from five upward are called Slugs. They are cut into all desired lengths in multiples of nonpareils and picas, and are usually kept in a lead and slug case designed to hold quantities of each length.

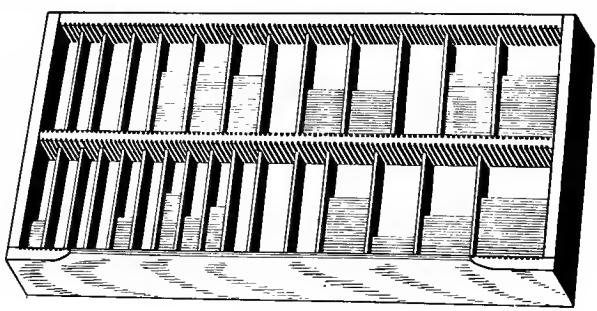


Fig. 5. Lead and Slug Case.

Leads are used chiefly for spacing between lines of type as they are set, while slugs are used for filling out wide blank spaces, and around borders, panels, etc. Two point leads are the thickness most commonly used, while in slugs the nonpareil and pica thicknesses are most

practical. By using combinations of these any even thickness may be obtained.

It is best whenever possible to use leads or slugs of the full length required, but in case this is not possible they may be spliced for the desired length. For instance, if there are no leads 24 ems in length the required length may be obtained by splicing two twelves, or by using one eleven and thirteen together. In case it is necessary to use spliced leads or slugs consecutively in a job, it is best not to have the splicings follow directly below each other, because it is difficult to handle without upsetting.

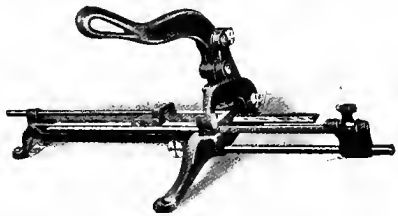


Fig. 6. Lead Cutter.

Care should be taken not to force leads into tight measures or cases, nor to jam corners, because the soft metal is easily bent and hard to straighten accurately.

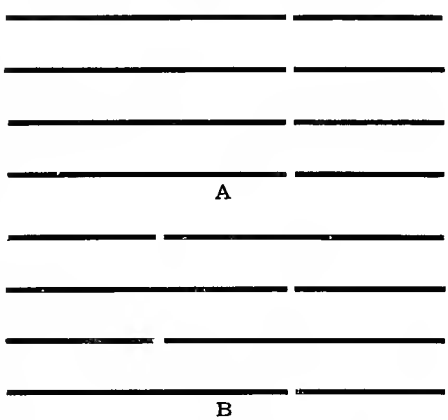


Fig. 7.—Splicing of Leads.
(a) Improper Method.
(b) Proper Method.

Type Cases

There are many kinds of type cases designed to meet the needs of compositors, but those most generally in use are: the News Cases, Cap and Lower Case; California Job Cases; and Yankee Job Case. These cases are

most practical in arrangement of type, and for compactness of space. The general scheme in the arrangement of the characters is the same for all, so that if one is learned any may be used.

Owing to the extensive use of the type setting machines in up-to-date shops there is very little straight composition done by hand, and the California job cases are rapidly replacing the news cases. There are, however, many still in use in small newspaper offices, and most schools are equipped with these cases for beginners. The time spent in learning the news cases is not time lost, for after learning them the other cases will be found to be merely contractions of the two cases in one.

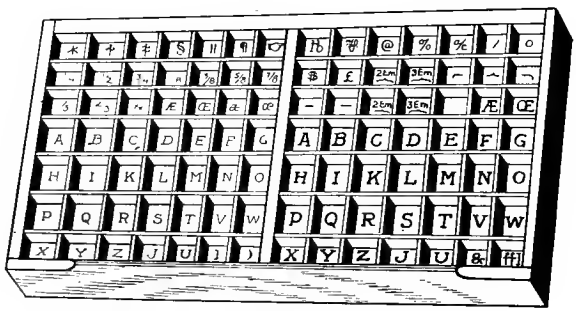


Fig. 8. Cap News Case.

News Cases. A pair of News Cases consists of one case called the Cap Case, the other the Lower Case. The cap case is divided into ninety-eight compartments, forty-nine on each side of the center partition. On the right side are located the capital letters as indicated in the diagram, starting with the "A" and following alphabetically, with the exception of the "J" and "U", which are placed after the "Z." The reason for this is that the "J" and "U" were added to the alphabet last, and after the cases had been in use for some time, so they were placed at the end to save the rearrangement of the other letters. The other characters on this side should be learned, though some of them are seldom used.

Left of the center partition are the small caps following the same arrangement as the caps. They are the same size of type as the rest of the case, but the printing face is smaller. They are used mostly in editorials where the first word is set in caps and small caps instead of lower case letters. This side also contains asterisks, or reference marks, and the common fractions, which should be learned for occasional use.

The lower case is designed to hold all of the lower case letters, punctuation marks, figures, and spaces and

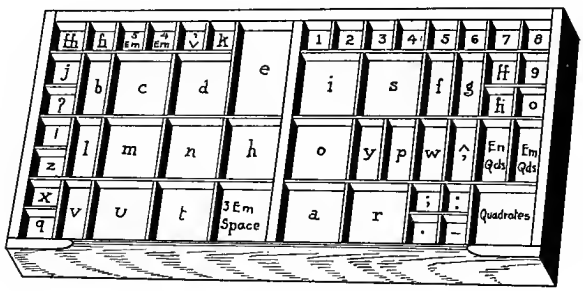


Fig. 9. Lower News Case.

quads. Very few of the lower case letters are in alphabetical order, but are arranged according to their allotted quantity and convenience in setting of those most used. For instance the letter "e" is used more than any other letter, and therefore occupies the largest compartment, and is in a central position. The letters "j" and "k" are used the least and are therefore in the smaller and less convenient boxes. The three-em spaces are used most and occupy the large compartment directly in front of the compositor.

The double letters cast upon one body are known as ligatures, as, fi, fl, ff, ffi, ffl, and are located at various places as indicated in the diagram. They are conjoined to conserve space in setting and should be used whenever necessary.

California Job Cases. The California Job Case is the most extensively used because of its complete and compact arrangement. It is merely a contraction of the lower news case on the left side, and the cap case on the right.

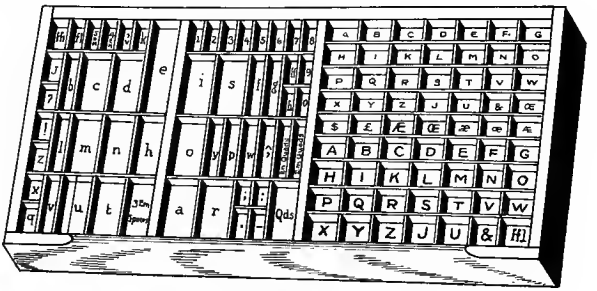


Fig. 10. California Job Case.

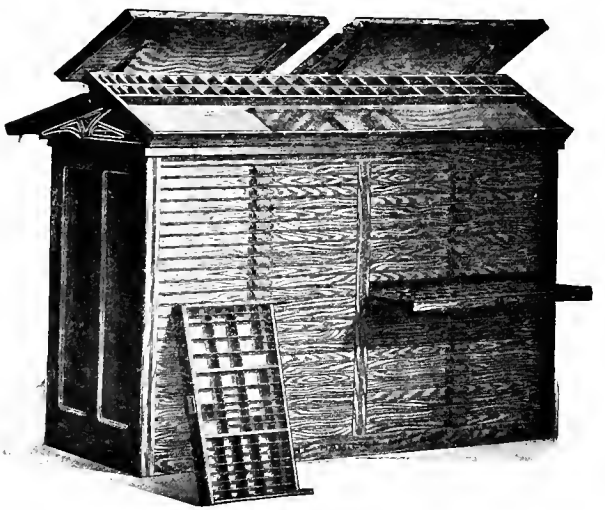


Fig. 11. Type Cabinet.

The compartments are decreased in size to permit the combination in the same size case, and will not hold as large fonts of type as the news cases. They are more suitable for fonts of job type, and are usually kept in dust tight cabinets. They are also made in three-quarter and two-third sizes, in which the same arrangement is more compact for narrower cabinets.

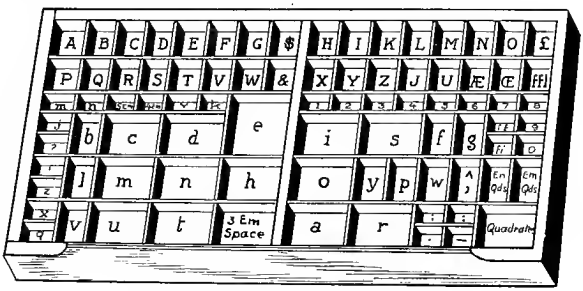


Fig. 12. Yankee Job Case.

Yankee Job Cases. The Yankee Job Case is another form of a contraction of the news cases into one case, with the lower case in front of the caps. This enables the placing of much narrower cases and cabinets in crowded floor space. In this case the capitals extend from left to right across to the back of the case, as indicated in the diagram.

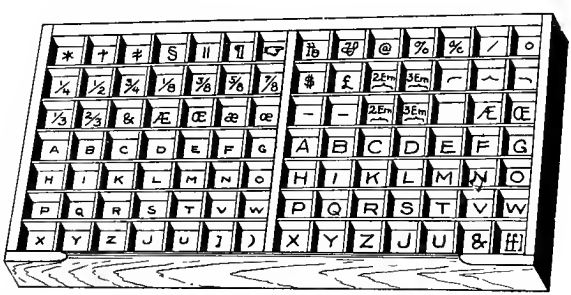


Fig. 13. Double Cap Case.

Double and Triple Cap Cases. Some fonts of type are composed of capital letters only, with various sizes of face cast on the same size body, and they are most suitably arranged in Double and Triple Cap Cases. The heavy copperplate Gothics are an illustration of such type. In these cases the letters are arranged similar to the caps of the news cases, but also include the figures and punctuation marks as indicated. The quads and spaces are usually kept in the lower right-hand corner.

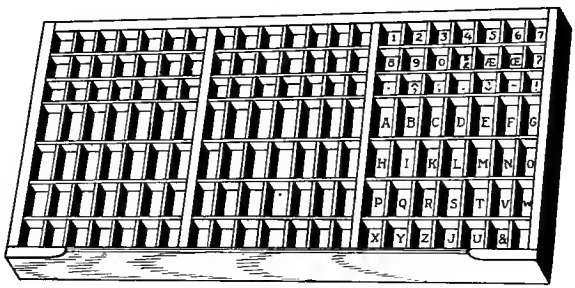


Fig. 14. Triple Cap Case.

Learning the Cases. Every student should have a fair knowledge of the arrangement of the case and its characters before starting to set type. This avoids the mixing of the similar characters. The best way is to draw a diagram of the cases and fill in the characters completely, until memorized. If this method is difficult, the insertion of a larger letter in the corner of each compartment of a case is a valuable help to beginners in setting.

In lettering diagrams, students should know the difference between caps and lower case letters, which may be indicated as shown on the opposite page.

TOOLS AND MATERIALS

The following list of tools and materials of composition are chosen from standard equipment and should be known by their technical names. They may not all be identical with those in use in every shop, but their application will be the same.

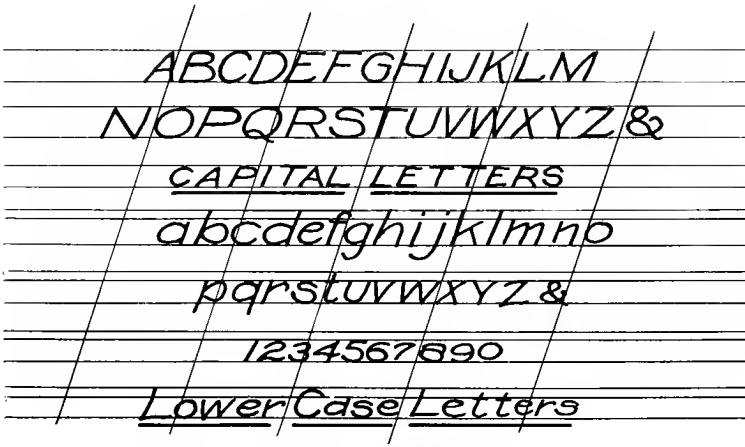


Fig. 15. Lettering Chart.

Composing Stick. The Composing Stick is the tool with which the compositor sets his type. It is a three sided tray with one movable side to permit adjusting for different measurements.

The front edge of the stick is usually graduated into nonpareils and picas, so that it may be set conveniently without measuring the space. If there is no graduated scale on the stick, the best way of setting is by inserting leads or slugs of the desired length and clamping snugly against them.

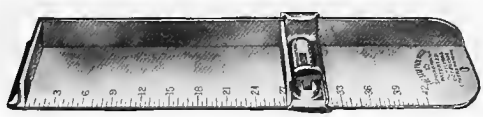


Fig. 16. Composing Stick.

Galleys. Galleys are brass or galvanized iron receptacles with three sides, on which to place type when removed from the stick, to make up forms, and to hold type for distribution.

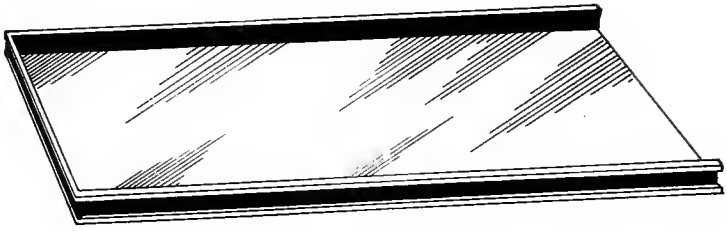


Fig. 17. Brass Galley.

Metal Furniture. Metal Furniture is framework of type metal, less than type high and cast in multiples of picas in length and width. Whenever a large amount of space occurs in a type form, which would require a large number of leads or slugs, this space may be filled in with this furniture.

It is usually kept in a regular case with compartments designed to accommodate the various sizes.

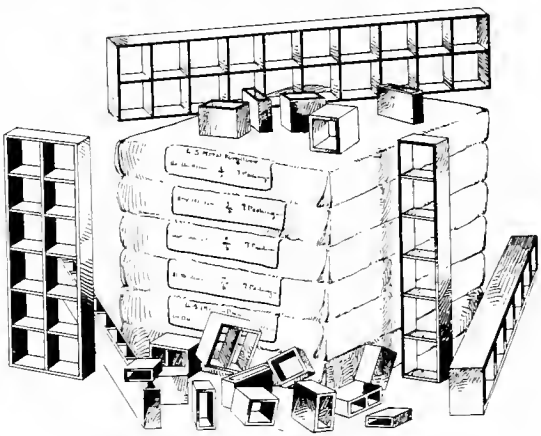


Fig. 18. Metal Furniture.

Brass Rule. Brass Rules are strips of brass, type high, used for printing straight lines and borders. They are usually cut into labor saving fonts of pica and nonpareil lengths, and cast in point thickness.

12 Point

12 Point

12 Point

6 Point

6 Point

6 Point

6 Point

6 Point

6 Point

6 Point

6 Point

12 Point

6 Point

6 Point

Fig. 19. Brass Rule Faces.

There are many styles of faces on rules for different purposes, and the face of the rule may be narrower than the body. A two point rule may have a hair line face bevelled either to the center or to one side or it may have a one point face. Border rules are often made up of ornamental designs, and the fonts may include special corners that insure better junction with the sides at the corners.

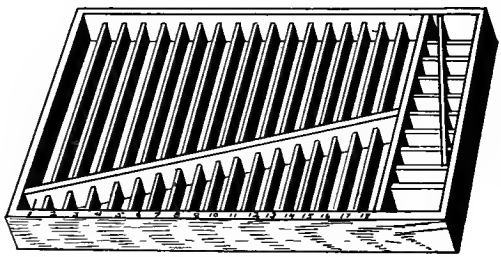
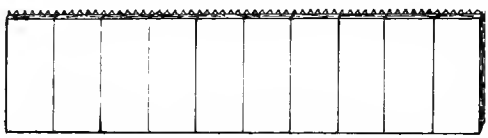


Fig. 20.—Rule Case.

Leaders. Leaders are type bodies cast in em lengths, very much resembling quads and spaces, for the purpose of printing dotted or intermittent lines.

Dot Line Leaders



Hyphen Line Leaders

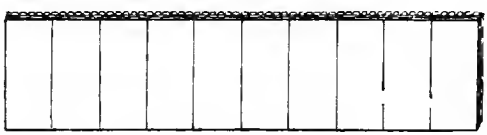


Fig. 21.—Leaders.

They are cast in type sizes so that they may be used in forms with type of the same size. They are used

for inserting blank lines in type forms, and also in tabular forms.

There are two main kinds of leaders; those which print dotted lines, or dot leaders, and those which print intermittent lines, or hyphen leaders. The latter are coming more into use because they are more durable, and print a more pleasing line.

TYPE SETTING

Fig. 22.—Proper Method of Holding Composing Stick.

Type setting is the process of arranging type characters into desired combinations, or forms, for the purpose of giving a printed impression.

The first things necessary for setting type are to set the composing stick the desired length for the width of the composition, and to obtain a supply of leads of proper length for spacing between lines. The leads are usually placed at the rear center of the lower case for convenience in using.

The compositor then takes his position at the case, which is, standing erect, with both feet firmly on the floor, and directly in front of the case. Care must be taken not to form the habit of lounging against the case, for this retards the speed of the compositor, and gives a slouchy

appearance. The composing stick is held in the palm of the left hand with the fingers grasping lightly beneath it,

Fig. 23.—Proper Position at Case for Setting Type.

and the thumb extended in the tray of the stick to guide the type as set. The stick is held nearly parallel to the body for ease of inserting type, and so that the lines may be read while setting.

The letters are picked from the case with the thumb and first finger of the right hand, and inserted in the stick, from left to right, with the face out, and nicks up. The hand should be trained to pick up the type with the nicks up, if possible, so that it may be placed into the stick with the least possible loss of motion. Type is always set from left to right, the same as the printed page, only the letters are upside down, and each succeeding line is set above those already set. It should always be read in this manner because it is the easiest way in which to read things in the negative.

Spacing and Justification. At the beginning of each paragraph in ordinary composition, the first word is indented with an em quad, and between each word, while setting, a three em space is inserted. An em quad is also placed between sentences within a paragraph, and at the end of a paragraph the remainder of the line is filled with spaces and quads. When filling in space with spaces and quads, the largest ones should always be placed at the outside, because they are less likely to fall over when removed from the stick.

Each line of type should be set firmly in the stick, and in ordinary paragraphs the first and last word of each line must be flush to the sides of the stick. This means that if the words do not completely fill the line when spaced with three-em-spaces, the line must be justified by increasing the spaces between the words. This may be done by replacing the three-em spaces with en quads, or perhaps a combination of thinner spaces will be necessary. The space between the words should always be as uniform as possible within the same line, and there should not be a noticeable contrast of spacing in any two consecutive lines. Otherwise the job will look unbalanced and uneven. In the smaller sizes of type the en quad is usually the maximum space that looks well between words. In case it is impossible to have the space between all the words of a line exactly uniform, the larger spaces should be placed where they will be least observable, that is, between words beginning or ending with a tall letter. The opposite is true of thin spaces; they should be placed between words beginning or end-

ing with short letters, or those that are circular or slant away from the space. It is also well to put the thicker spaces between the larger words. The lines should always be justified so that when they are raised in the stick they will not fall back. On the other hand, if the spaces are forced in, and they are too tight, it will be difficult to remove from the stick and will be likely to pi.

Where punctuation occurs in a line it is always set right after the last letter of the word which it follows, and the same amount of space following it as between the rest of the words, excepting in case of a period, where an em quad is used between sentences. When quotation marks are necessary, two commas are used inverted before the quotation and two apostrophies at the end. The rules for punctuating in type setting are identically those used in writing and may be found in any handbook of composition.

It is permissible to divide words, putting part on one line and part on the next, to avoid excessive spacing. Whenever this is done, however, the word must be properly separated between syllables, and a hyphen placed at the end of that part of the word on the first line. It is not permissible to divide a word so that a one letter syllable will be alone on a line. For instance, do not separate the word "around" because the "a" would be alone on the first line. A good compositor should be careful not to have a large number of hyphens following consecutively down the page. Usually not more than two are used. This may be avoided, when setting in narrow measure, by letter-spacing one of the words within the line, which is done by inserting a very thin space between each of the letters.

The space between the lines of type is determined by the size of type being set, and by the allotted space for the composition. The usual space between lines of a paragraph while setting is the two point lead, while between paragraphs the space is usually two leads, or a six point slug.

Beginners in type setting should go slowly and strive for accuracy, with special attention to details, and speed will come with practice and experience. Remember, all

the mistakes will show in the proof, and will represent the skill of the workman.

HANDLING TYPE

Removing Type From Stick. Removing the type from the composing stick is one of the most difficult operations for a beginner, because of the possibility of upsetting it.

Fig. 24.—Removing Type from Stick.

It is usually advisable for the student to remove the type a few lines at a time at first, rather than setting a full stick, until he has become accustomed to handling type.

To remove the type, always be sure that there is a lead at the beginning and end of the composition. Place the stick on a flat surface with the open side away from the student. Grasp the type with both hands by placing the first fingers at the extreme outer corners, and the thumbs at the extreme inner corners with the middle fingers acting as braces at the sides of the stick. Without releasing the clamp, shove the type a little forward in the stick and raise it as shown in the illustration, pressing

slightly with the fingers and thumbs. As the type leaves the stick, press in from the sides with the fingers used as braces. When the type is free from the stick raise it to an upright position, and continue to hold the type firmly until it is placed upon the galley.

Placing on Galley. The best position for a galley is on a galley rack, or type case, with the closed side to the right, and at a slant that will prevent the type from falling over. The type is always placed on the galley with the heading toward the closed end, because this brings the type in an inverted position for reading, and for correcting with the right hand. When placing type upon a galley always bring the left side of the form against the left or lower side of the galley, and then slide it carefully against the head of the galley, or against the type already there. Do not release the grip on the type until it is safely on the galley in proper position.

Tying Type Forms. When the job is completed it is necessary to tie up the form so that it may be easily handled without upsetting. To do this be sure that there

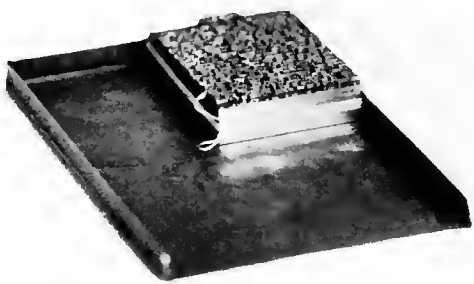


Fig. 25.—Type Form Properly Tied and Placed on Galley.

is room all the way around the form for winding a string, and that there is a rule or thin lead handy for finishing it off. Take a string which is long enough to extend around the type four or five times, and tie a knot in one end.

Starting at the upper right-hand corner of the form, place the end of the string as far down the edge of the type as possible, with the knot extending over the right end about a quarter of an inch. Hold the knot in place with the right hand and wind the string around the form in a counter-clockwise direction with the left hand. When passing the corner started at, slightly raise the knot and overlap with the string. This will hold the string in position and the right hand may now be used to steady the form. The string must be kept taut while winding, and after passing each corner it is well to tighten it up a little, but not enough to break the string. This will help bind the form into a secure position. To finish off, have the string end with about three inches over the upper left hand corner of the form. Hold the string with the left hand, and with the rule in the right hand, thread the string through underneath the turns in the form of a loop. Draw the loop carefully tight to the corner and leave the free end sticking out for handiness in untying. The form may now be removed from the galley to the stone, and is ready for proofing.

PROOFING AND CORRECTING

There are two usual ways of taking proofs of type forms; first by the Planer method; and second, by the use of a Proof Press. Both are in practical use in print shops and should be practiced by students.

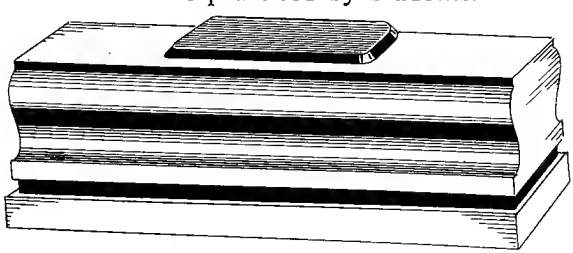


Fig. 26.—Proof Planer.

To take a planer proof the type must first be inked by hand. This is done with a roller or "brayer," which has been supplied with ink by rolling it on a glass or metal

plate on which ink is distributed. Soft ink is better for proofing, and it should be well distributed to insure even inking. After inking the form, a thin piece of paper called "dry proof" paper is placed with the glossy side upon the type. If heavier paper is used, it is well to dampen the side placed away from the type. Never place the damp side on type because ink and water are enemies and will not adhere. Next the proof planer, which is a solid block of hard wood with a felt covered surface, is placed carefully face down upon the paper and is tapped with a mallet. Do not tap too hard or the paper will slip over the type causing a blur, and the type may also be damaged. Remove the paper carefully without touching the inked surface and the proof will be ready for corrections.

The Proof Press is a much quicker method and much better proofs may be obtained. It is more commonly in use where there are many proofs to be taken.

The type is left on a galley and is placed on the bed of the press where it is inked, and the paper is placed on the type the same as for the planer method. The large metal roller, which is covered with a felt blanket, is then rolled over the type, giving the proof. Several proofs may be taken at once if the size of the press permits.

Fig. 27.—Hand Proof Press.

There are several designs of automatic proof presses on the market, which of course simplify the operation, and are rapid proof producers, but the process of taking proofs is similar for all.

Cleaning Type Forms. After a suitable proof has been obtained, the type form should be cleaned to prevent the ink from hardening, and to prepare for correcting. This is done by pouring a little gasoline or benzine on a cloth,

and wiping the type thoroughly, after which the form is cleaned with a brush and gasoline to remove the ink and dirt below the surface. The cloth should be used first so that the ink from the surface of the type will not be

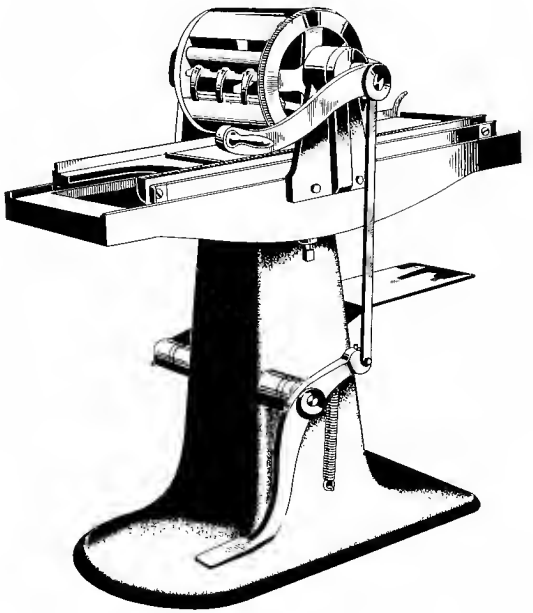


Fig. 28.—Automatic Proof Press.

brushed into the crevices. If the ink has been allowed to harden, it may be necessary to use a more stringent cleaning solution, such as a weak lye solution, to remove it. Type should always be well cleaned to prevent a gradual accumulation of dirt, which, in time, will fill letters and cause a dirty print.

PROOF READING

The main purpose of pulling a proof is to discover any errors made in composition and for making correc-

tions. Although the proofs are usually read by a proof reader or a member of the editorial staff, it is necessary

Fig. 29.—Position for Correcting Type Form.

for every compositor to know the list of proof marks, their meanings, and applications, so that he may make the corrections indicated in the type form. The usual way

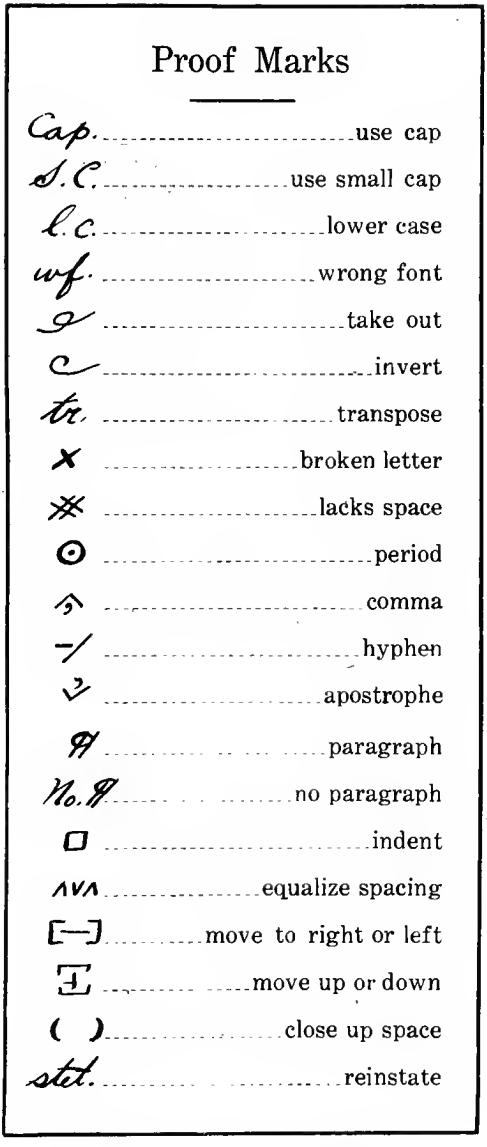


Fig. 30.—List of Proof Marks.

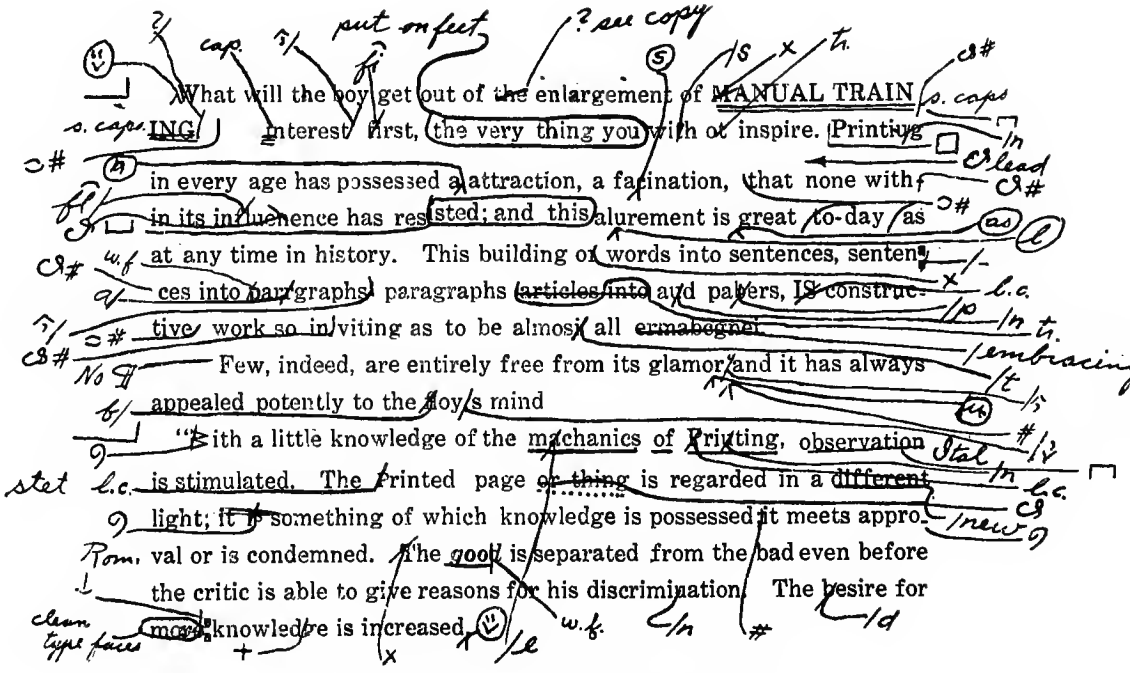


Fig. 31.—Method of Correcting Proofs.

is for one person to read the copy aloud, while another reads the proof and marks the corrections necessary.

Proof marks are merely a list of symbols representing the meanings of the corrections to be made. They may be thought of as a code of shorthand corrections between the proofreader and the compositor.

The proof marks are always written on the margin nearest the error, and are connected to the error by a line known as a "path" line. This is for the convenience of locating where the correction is to be made. The illustration shows the proper method of correcting a proof.

Correcting Type Form. To make corrections in a type form from a proof, place the form on a galley on the type case from which the job has been set, with the head of the galley to the right, and the beginning of the job against the head. This enables the compositor to stand facing the form, with his right hand in position for working as in the illustration.

Fig. 32.—Type Tweezers.

So long as they are properly used, tweezers should be used in removing the wrong type from the form. In taking hold of a piece of type with tweezers always be sure to grasp each side of the shoulder and never the face. If this is impossible because of lack of space, do not pry with the tweezers, but rather raise the entire line slightly by working it up with the fingers at the ends of the line.

Care must be taken not to let the tweezers slip when pulling on a type character, because it will scratch the face of the type. Sharp pointed tweezers should never be allowed.

After the correction has been made, the line must be justified with proper spaces so that it will be exactly the same length as before. Sometimes it will be found necessary to shift words from one line to another to make room for words omitted, in which case it is better to place lines in a stick for justification.

When all the corrections have been made, another proof should be taken of the job for verification with the first proof. This second proof is commonly known as a Revise. If this bears corrections still another proof should be taken until a perfect copy is obtained.

TYPE DISTRIBUTION

Type distribution is the process of disassembling a type form by replacing the characters and materials to their proper compartments in the cases.

Before distributing type it should be thoroughly cleaned at all times, the same as after taking proofs.

When the job is ready for distribution place it on a galley and moisten the type by running a wet sponge across it. This helps the characters to cling together, and lessens the possibility of pi. Place it on or near the case to be used and remove the string with which it is tied. The last line set is always the first line to be distributed, so type will be in the usual position on the galley.

For beginners, it is best to start with one line at a time, and increase as skill in handling is developed. Be sure that there is always a full length lead before and after the lines before picking up. The lines are lifted by grasping the type the same as when removing it from the stick, and are raised to a horizontal position as quickly as possible. They are then placed above the palm of the left hand between the thumb and middle fingers, where they are held for distribution. By holding in this manner, if any type falls, it will fall into the palm of the hand, rather than into the case. The lines are then distributed from right to left, by picking one or more words at a time between the thumb and middle finger of the right hand. The words are read, and by using the third finger for a trip, are placed letter for letter as they are spelled into their proper boxes. Usually, after knowing the words, it is unnecessary to look at the characters individually, but great care must be taken to make no mistakes. At first it is necessary to watch the sizes of the spaces and quads, but with experience the thickness may be sensed by the feeling of them.

At first the worker will find some difficulty in the manipulation of the fingers to make the type separate and trip properly, but with practice the motion becomes almost automatic and great speed may be acquired. The

Fig. 33.—Distribution of Type.

distribution of type and putting away of materials is not a necessary hardship, nor the job of a flunky, but is a job that should be done accurately and can be done well only when the work is taken up with the proper spirit.

RULES OF GRAMMAR

For the most part the style of composition is governed by the common rules of grammar and good judgment, but inasmuch as they vary somewhat the most applicable ones are reviewed in this section.

PUNCTUATION

Use of the Period (.)

1. At the end of all sentences that are not interrogatory or exclamatory.
2. After abbreviations.
   Examples.—Prof., Mr., ult., Inc., Dr.
3. After all Roman numerals, and Arabic figures when used to number lessons, paragraphs, and problems.
4. After Initials.
   Examples.—R. L. Webb, W. B. Bradford.
5. Between dollars and cents expressed in figures.
   Examples.—$1.50, $12.25.

Use of the Comma (,)

1. To set off a substantive used in direct address.
   Example.—You see, John, I am right.
2. To set off appositives.
   Example.—Next he went to Paris, the capital of France.
3. To set off absolute phrases.
   Example. — Everything being ready, the gun was fired.
4. To set off any word or phrase which has a parenthetic function but for which parentheses or double dashes are not suitable.
   Example.—He was there, however, with eager intentions.
5. To set off a geographical name explaining a preceding name.
   Example.—Berlin, Germany, is a large city.
6. To separate coordinate clauses connected by one of the simple conjunctions.
   Example. — The train moved swiftly, but he jumped from the platform.

7. To set off a dependent clause preceding its principal clause.
   Example.—If I can, I will be there.
8. To indicate every distinct pause within a sentence, except the pauses for which other punctuation marks are used.

Use of the Interrogation Mark (?)

1. After a direct question.
   Example.—How did you do it?
2. After a question, or questions, within a sentence which is a statement or command.
   Example.—"What have you to say?" he demanded.
3. Enclosed in parentheses in a sentence to indicate that a statement is used in a questionable manner.
   Example.—The Pilgrims landed in Plymouth (?) in 1620.

Use of the Exclamation Mark (!)

1. After a word, clause, or sentence indicating surprise, emotion, etc.
   Example.—Get thee behind me, Satan!

Use of the Colon (:)

1. After the salutation of a letter.
   Examples.—Gentlemen: Dear Sir:
2. Between hours and minutes when expressed in figures.
   Examples.—8:30, 6:00 A. M.
3. After a formal introduction to an enumeration of items or particulars.
   Example.—The colors are as follows: red, blue, and yellow.
4. After a formal introduction to a quotation.
   Example.—We quote the following from Gray's "Elegy:" "The curfew tolls the knell of parting day," etc.

Use of the Semicolon (;)

1. After expressions in a series, dependent on an introductory or final clause.
   Examples.—The officers of Higgins college are: Charles Mann, President; Oscar Davis, Vice-

President; Elmer Cleasly, Secy.-Treas.

2. Between the clauses of a compound sentence in one or both members of which commas are used to show omission or enclose explanatory expressions.
   Example.—The car of potatoes goes tomorrow; the car of corn, Wednesday.
3. Between parts of a short compound sentence when those parts have very slight connection.
   Example.—I'll take the best; money is no object to me.

Use of the Dash (—)

1. To indicate an unexpected break in the thought or grammatical connection.
   Example.—Yes, he was there—but why speak of him?
2. To indicate the omission of figures.
   Example.—Sectional tournament will be held March 10—12. (Meaning March 10, 11, 12.)
3. Before the name of an author or speaker following something quoted from his writings or speeches.
   Example.—"War is hell."—Emerson.

Use of the Parenthesis ( )

1. To enclose explanatory expressions that in being spoken would be said in an undertone, or as an aside.
   Example.—Johnson (the old grouch) sat in the first row.
2. When an amount expressed in words is followed by figures of the same thing, the figures should be enclosed in parentheses.
   Example.—One thousand dollars ($1,000).

Use of Brackets [ ]

1. Brackets are used to enclose an explanation made by some one other than the speaker or author of the quotation.
   Example.—"Friends, Fellow Citizens, Countrymen, lend me your ears." [Applause]
2. To enclose folios and lines designating pages where articles are continued on or from.
   Example.—[Continued on page 6]

Use of Quotation Marks (" ")

1. To enclose the exact words of an author, speaker, or writer.
   Example.—"Let me see," she said.
2. To enclose names of books, articles, or plays.
   Example.—Have you read "Treasure Island?"
3. To enclose a technical word used outside of its usual connection.
   Example.—The word "hammered" at his brain.
4. To enclose an expression that is intended to imply something different from its ordinary meaning.
   Example.—As he passed he "threw a kick" at me.
5. If a quotation consists of more than one paragraph, use quotation marks at the beginning of each paragraph and at the end of the last, not at the end of each.

Use of the Hyphen (-)

1. To indicate that a word at the end of a line has been divided and part placed on the line following.
2. To separate words into syllables.
   Example.—in-tri-cate.
3. To join two or more words together, known as compound words.
   Example.—time-table.

Use of the Apostrophe (')

1. To denote the possessive case.
   Example.—Harry's hat.
   Ladies' furnishings.
2. To indicate abstractions, or the omission of letters or figures.
   Example.—Don't, Sec'y, '21.
3. To indicate the plural of letters or figures.
   Example.—B's, 8's.

DIVISION OF WORDS

The dictionary is the best guide for the division of words, the rule being to separate between syllables only, but the following rules will be found helpful.

1. Words should be divided between syllables only,

or the parts of words which contain only one vowel sound.

Example.—ro-man-tic; guar-an-tee.

2. In ordinary cases do not divide a short word of only two syllables.

   Examples.—nev-er; in-to.

3. Never divide a word on the first or last syllable, if the syllable is a single letter.

   Examples.—a-round; eas-y.

4. Words ending in "ing" should be divided so that the "ing" is carried over to the second line. If the consonant is doubled by adding the suffix, the second consonant will be carried over with the "ing."

   Examples.—sweep-ing, print-ing, run-ning, plan-ning.

5. Compound words, those made up of two separate words, should be divided between the words if possible.

   Example.—offset, off-set; work-and-turn.

6. Words ending in able, or ible, should be divided so that the vowels a, and i, remain with the ble.

   Example.—prob-able, poss-ible.

7. Proper names should not be divided excepting in case of absolute necessity, and then following the foregoing rules.

CAPITALIZATION

1. Every sentence should start with a capital letter.
2. All proper nouns and names should start with a capital letter.

   Examples.—Harry, United States.

3. Capitalize the days of the week, names of the months, and holidays, but not the seasons.

   Examples.—Tuesday, May, Christmas, spring.

4. Capitalize all geographical names, and epochs of history.

   Examples.—Atlantic Ocean, Rocky Mountains, Civil War, World War, Middle Ages.

5. Capitalize the titles of books, magazines, newspapers, and stories.

Examples.—Treasure Island, The Printing Art, The Milwaukee Journal, The Value of Printing.

6. Always capitalize letters constituting initials or titles.

   Examples.—J. E. Dorfmeister, Ph. D., M. D.

7. Capitalize the abbreviations A. M. and P. M. when used with capitals, and lower case when used with lower case letters.

   Examples.—TUESDAY A. M., Tuesday p. m.

8. Capitalize each line of poetry unless otherwise designated by the author.

SHOP WORK

STRAIGHT COMPOSITION

GROUP 1—PLAIN SETTING

JOB 1. PARAGRAPH COMPOSITION.

Specifications

1. Use eight or ten-point body type.
2. Width of composition to be eighteen picas.
3. Heading to be in caps and centered.
4. Space between heading and body, one six-point slug.
5. Space between lines, one two-point lead.
6. Indent paragraphs one em quad.
7. Use three-em spaces between work while setting, with necessary change for justification.

Instructions. This job is typical of news composition and should be set slowly and accurately to inculcate the proper habits of typesetting. The diagram of the case should be referred to as little as possible, and special attention should be given to details. Read the specifications carefully and follow the copy accurately. It is never permissible to change copy excepting by authority of the author or editor.

The student's name and job number should be set at the beginning of each job for identification on the galley, the name to be flush to the left, and the job number to the right.

The heading is to be set in all capitals of the body type being used, and centered by placing an equal amount of spaces and quads on each side. The space between words set in capitals may be slightly greater than between words of the paragraphs.

When the job is completed it should be properly tied, a planer proof taken, corrected, and thoroughly cleaned before distribution.

TYPE SETTING

Every compositor should carefully follow all the rules of type setting in his first job, because he is then forming habits that will remain with him in his future work. Special attention should be paid to the details while setting, in order that the whole job may have a good appearance.

The spaces between the words of a line should be as nearly alike as possible, never varying more than the difference between a three-em space and an en quad. Whenever a variation is necessary place the larger spaces between the longer words and taller letters. The opposite is true for thin spaces.

Do not divide words at the end of the lines unless it is quite necessary. It is much easier for the reader to carry the thought from line to line if few divisions occur. Never divide the words at the ends of more than two consecutive lines.

Be sure that all words in each line are spelled correctly before justifying, and then justify each line so that it fits snugly in the stick. This may save much trouble later when removing type from the stick.

JOB 2. POETRY

Specifications

1. Use eight or ten-point body type.
2. Width of composition to be determined by longest line.
3. Heading to be in caps, and centered on average length line.
4. Space between heading and body, one six-point slug.
5. Space between verses, one six-point slug.
6. Space between lines, one two-point lead.
7. Alternate lines to be indented an em quad.
8. Use three-em spaces between words.

Instructions. In setting poetry the lines are usually of irregular lengths, according to the rhyme, and are not justified to the width of the stick. The space between words should be kept uniform, and each line filled out with spaces and quads.

The indention of different lines of poetry is usually determined by the author, to indicate the rhyme, but in most cases every other line, starting with the second in each verse, is indented an em. In case a line runs over, the rule generally used is to increase the indention for the second line.

It is necessary to give special attention to the punctuation in poetry, so that the meaning and expression will not be lost.

JUST THIS MINUTE

If we're thoughtful, just a minute
In whate'er we say and do;
If we put a purpose in it
That is honest thro' and thro'
We shall gladden life and give it
Grace to make it all sublime;
For, though life is long, we live it
Just a minute at a time.

Just this minute we are going
Toward right or toward wrong;
Just this minute we are sowing
Seeds of sorrow or of song.
Just this minute we are thinking
On the ways that lead to God,
Or in idle dreams are sinking
To the level of the clod.

Yesterday is gone; to-morrow
Never comes within our grasp;
Just this minute's joy or sorrow,
That is all our hands may clasp;
Just this minute! Let us take it
As a pearl of precious price,
And with high endeavor make it
Fit to shine in paradise.

JOB 3. NUMBERED ITEMS

Specifications

1. Use eight or ten-point body type.
2. Width of composition seventeen picas.
3. Heading to be in caps one size larger than body type.
4. Space between heading and body, eight points.
5. Lines in first paragraph to be leaded with two-point leads.
6. Rules to be set solid, (without leads).
7. Space between rules, one two-point lead.
8. Indent figures from 1 to 9 two and one-half ems. Indent figure 10 two ems.
9. Use an em-quad for space between figures and first words of rule.
10. Indent run-over lines to come directly below first line.

Instructions. Whenever a list of items is numbered, it is best to have the figures set with regular indention, and plainly apart from the reading matter. A period is always placed after the figure to show that it is complete in itself.

When the numbers exceed nine so that double figures are necessary, there should be a space equivalent to a figure placed before the single figures so that the figures will align without changing indention of the reading matter. The figures in most type are one-half of an em in width, so that an en-quad may be used before single figures.

RULES FOR COMPOSITION

The following list of rules should be kept uppermost in the mind of the compositor while setting straight matter to insure artistic and well appearing results:

1. Keep spaces between words as nearly uniform as possible.
2. Between sentences within a paragraph the space should be from two to three times as great as between words.
3. Never divide a word at the end of a line unless it is absolutely necessary for even spacing.
4. Do not divide a word so that a one letter syllable remains alone on a line.
5. It is never permissible to have hyphens at the ends of more than two consecutive lines.
6. Read each line over carefully for mistakes before justifying.
7. Have each line tight enough when justified to prevent falling over.
8. Never force thin spaces between words for fear of bending or breaking. Remove a larger space until thin one is inserted.
9. When filling in with quads and spaces, always put the larger ones at the end of the line.
10. Take time to set each job carefully and accurately; speed will come with practice.

GROUP 2—INITIAL LETTERS

JOB 1. CONDENSED LETTER

Specifications

1. Use ten or twelve-point type for straight matter.
2. Use a thirty-point condensed capital "I" for initial letter.
3. Width of composition, twenty picas.
4. Heading in fourteen and eighteen-point caps, aligned with one-point leads.
5. Space between heading and body, two six-point slugs.
6. No indention for initial letter.
7. Space between lines, two two-point leads.
8. Set first word of body in capitals.
9. Indent second line three-em space from initial letter.
10. Use three-em spaces between words while setting, with necessary change for justification of lines.

Instructions. Initial lettering is frequently used for beginnings of chapters in books and for short magazine articles to add attractiveness, and to take the monotony from plain body composition.

This job illustrates the use of condensed composition, and therefore a condensed letter should be used, and preferably a condensed body type.

The initial letter is placed in the composing stick without indention, and the remainder of the word is set in capitals. Where the first word is a one or two-letter word the second word is also set in capitals. If the first two words are a proper name, they are both set in capitals. The remainder of the paragraph is set in caps and lower case as in any straight composition.

After the first line the margin at the right side and below the initial must be equal, which will be determined by the shoulder on the large letter. In the case of some letters, such as the "T," "V," and "Y," allowance may be made for the wide space at the bottom of the letter.

The initial must be selected to harmonize with the text type and general character of the job.

THE PRINTER'S TYPE

I AM cold and senseless. I come from the depths of the earth. When new and bright I am pleasing. When I grow old I am beaten, cast aside and reborn to use again. For centuries I have preserved the work of art, knowledge and history. I have heralded broadcast the works of man, created wars, overturned kingdoms and elected crowns. Mightier than the sword am I. Had I never been born the world would still be clothed in darkness and ignorance, seas remain unknown, wealths unused and learning undreamed. Wonderful institutions of learning have been created through my efforts, lives broadened and homes made happy. My greatest ambition is realized when I can teach the young, comfort the old and spread learning throughout the world. I assist you to learn the happenings of your neighbors, the doings of the city and the wars of yesterday. My use extends from the smallest hamlet to the farthest corner of the earth. Yet, I am little known, seldom seen, and quite small and insignificant. But, you will seek my lasting impression on the morrow—for I am but th printer's humble type.

M. B. Loomis

JOB 2. EXTENDED LETTER

Specifications

1. Use twelve or fourteen-point expanded type for body.
2. Initial letter to be thirty or thirty-six-point expanded of some kind of type.
3. Heading to be in caps, letter spaced, two sizes larger of same type.
4. Width of composition, twenty-five picas.
5. Space between heading and body, twelve points.
6. No indention for initial letter.
7. Indent second line in accordance with shoulder on type.
8. Space between lines, four points.
9. Space between words, one en-quad while setting, with necessary change for justification.
10. Use italic type for word "Selected."

Instructions. This exercise illustrates composition set in wide measure with the initial letter to harmonize. When the text is set in wide measure, the type should be larger to make the reading easier, and wide spacing should be used between words.

When a quotation, such as this exercise, is started with an initial letter, the quotation marks are omitted at the beginning, but are placed as usual at the end.

The two first words are set in capitals because the first word is a two-letter word. The rest of the letters of the first word are set flush against the initial letter while the second line is indented to form the necessary margin at the right of the letter.

SUCCESS

HE HAS achieved success who has lived well, laughed often, and loved much; who has gained the respect of intelligent men and the love of little children; who has filled his niche and accomplished his task; who has left the world better than he found it, whether by an improved poppy, a perfect poem, or a rescued soul; who has never lacked appreciation of earth's beauty or failed to express it; who has always looked for the best in others and given the best he had; whose life was an inspiration; whose memory a benediction."

— *Selected*

JOB 3. MORTISED DESIGN

Specifications

1. Use twelve-point body type.
2. Mortised letter design to be appropriate in size and shape for text.
3. Heading to be in bold caps of same kind of type as text.
4. In mortise use initial letter of larger size of same type as text.
5. Width of composition, twenty-one picas.
6. Space between heading and body, fourteen points.
7. Indention after first line in accordance with shoulder on design.
8. Space between lines, two points.
9. Space between words, one three-em space with necessary change for justification.
10. Use italic type for name at foot.

Instructions. The mortised design is used for the same purpose as ordinary initial letters, but serves to attract and beautify more than the plain letter. With the mortise any letter may be used, and two colors may be obtained by two impressions on the press.

The design should be selected to harmonize with the nature of the content as well as the style and kind of type in the text, and shape of the job.

The letter within the mortise should be centered and wedged firmly into place with thin spaces so that it cannot fall out while printing.

THE BOOK BEAUTIFUL

HOUGHT, skill, and refined taste are needed to produce a beautiful book. Art may enter largely into the making of a book; in the harmony of cover and contents; in the cover decorations; in the adaption of type to subject-matter, to size of page, to length of line, and other elements; in the arrangement of title-page, chapter headings, and other features; in the selection and use of illustrations; and in the harmony between what the book says and its bodily presence. To look at a book with critical interest is to practice one's aesthetic sense on one of the most important of all products of human skill, and the product best fitted to serve as an object of art study. Buyers and readers of books may learn to criticise them wisely, and may then ask that good taste and high skill be put into their production; thus will the noblest and most important of all the arts thrive among us.

—*John Cotton Dana.*

GROUP 3—USE OF BORDERS

JOB 1. SINGLE LINE BORDER

Specifications

1. Use eighteen-point caps and lower case for heading.
2. Use ten-point caps for name of author.
3. Use twenty-four point initial letter.
4. Use ten-point body type for body.
5. Width of composition, twenty-one picas.
6. Margin between type and border at top and bottom, one and one-half picas.
7. Margin between type and side rules, one pica and four points.
8. Use two-point brass rules, with one-point face for border.
9. Have end border rules overlap side rules.

Instructions. Set the type matter first, according to specifications, and place it on the galley. Fill out at the ends, with leads and slugs of the same length as the width of the body, until the marginal space is correct. The form must also be an even pica length to avoid cutting rules for the borders. Next, build the marginal space along sides by using leads and slugs the full length of the form. To this add the border rule of the same length rules, which are added last, for the top and the bottom.

The Gettysburg Address

—ABRAHAM LINCOLN—

FOURSCORE and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation or any nation so conceived and so dedicated, can long endure. We are met on a great battle-field of that war. We have come to dedicate a portion of that field as a final resting place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this: but in a larger sense, we cannot dedicate—we cannot consecrate—we cannot hallow—this ground. The brave men, living and dead, who struggled here have consecrated it far above our poor power to add or detract. The world will little note nor long remember what we say here, but it can never forget what they did here. It is for us, the living, rather to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion; that we here highly resolve that these dead shall not have died in vain; that this nation, under God, shall have a new birth of freedom; and that government of the people, by the people, for the people, shall not perish from the earth.

JOB 2. DOUBLE LINE BORDER

Specifications

1. Use ten or twelve-point type for body of poem.
2. Use eighteen-point type for heading.
3. Use italic type for name of author.
4. Width of composition, twenty-one picas.
5. Indent alternate lines commencing with second line, one em.
6. Space between lines, two points.
7. Space between verses, eight points.
8. Space between heading and name of author, ten points.
9. Space between name and body, twelve points.
10. Use two-point rule with hair line face for borders.
11. Width to outside of borders, twenty-four picas.
12. Length to outside of borders, thirty-six picas.
13. Margins between type and borders at side, one pica.
14. Margins between type and borders at top and bottom, one and one-half picas.
15. Space between rules of border, one two-point lead.

Instructions. Set the poem complete first, according to specified sizes, and place it on the galley. Second, build the space around the form to the exact size ready for the border with nonpareil slugs. Third, add the inside line of the border with perfect joints at the corners. If the rule is side-beveled, turn it so that the bevel comes on the outside. Fourth, place two-point leads around the outside of the border rule. Fifth, add the outside line of the border.

It is necessary that the leads between the border rules fit accurately (within a point) to prevent the rules from sliding out of place, and it may be necessary to splice leads to half pica lengths for the purpose. The border rules may also be spliced to obtain the desired lengths. Be sure that the rule joints and corners come well together, but do not overlap.

IF

Rudyard Kipling

If you can keep your head when all about you
  Are losing theirs and blaming it on you
If you can trust yourself when all men doubt you!
  But make allowance for their doubting too;
If you can wait and not be tired by waiting;
  Or being lied about don't deal in lies,
Or being hated don't give way to hating
  And yet don't look too good; nor talk too wise,

If you can dream—and not make dreams your master;
  If you can think—and not make thought your aim;
If you can meet with Triumph and Disaster
  And beat those two imposters just the same;
If you can bear to hear the truth you've spoken
  Twisted by knaves to make a trap for fools;
Or watch the things you've given your life to, broken
  And stoop and build them up with worn-out tools,

If you can talk with crowds and keep your virtue
  Or walk with Kings—nor lose the common touch;
If neither foe nor loving friend can hurt you,
  If all men count with you, but none too much;
If you can fill the unforgiving minute
  With sixty seconds' worth of distance run,
Yours is the Earth and everything in it
  And—which is more—you'll be a man my son!

JOB 3. CAST FONT BORDER

Specifications

1. . Use twelve-point type for body.
2. Use mortised design appropriate for the tone and shape of job.
3. Use eighteen-point initial letter of same type as text.
4. Width of composition, eighteen picas.
5. Space between lines, one nonpareil.
6. Name at end in caps and small caps.
7. Width of margins between type and border, two picas.
8. Use twelve-point cast font border.

Instructions. Set the body first and surround it with nonpareil slugs to the specified size without the border. With the job at the lower and right end of the galley, add the border piece by piece at the galley sides first. Complete the left and top sides with accurate fitting of border bodies, and surround the entire job with nonpareil slugs to hold them in place. Tie the job firmly before removing from the galley.

IF THESE HOURS BE DARK, as, indeed, in many ways they are, at least do not let us sit deedless, like fools and fine gentlemen, thinking the common toil not good enough for us, and beaten by the muddle; but let us work like good fellows trying by some dim candle light to set our workshop ready against to-morrow's daylight — that to-morrow, when the civilized world, no longer greedy, strifeful, and destructive shall have a new art, a glorious art, made by the people and for the people, as a happiness to the maker and the user.

WILLIAM MORRIS

II—DISPLAY COMPOSITION

DISPLAY COMPOSITION

TYPOGRAPHIC DESIGN

When we realize that printing ranks as sixth among the industries in the United States, and exceeds all other industries in the number of establishments, it is not hard to understand why many of the more mechanical operations have been given over to machinery in this large scale production. Type setting which was once done entirely by hand, is now in a large degree the work of type-setting machines. This, however, applies more to composition of straight matter, and there still remains the opportunity for individual ingenuity and constructive ability in display setting.

Probably in no occupation is there the opportunity to reveal more originality and artistic taste than there is in display composition, and no greater satisfaction than in viewing the finished product in the form of a proof. Each job is usually distinctly different from every other one achieved and offers a new field for thought and design.

Composition is oftentimes spoken of as an Art rather than a part of a trade, and in no sense is the term inappropriate when the work complies with the laws of art and architecture. In display composition we have the task of creating designs made up of type characters and materials which will convey (1) thought, and (2) feeling, to the reader in the most pleasing and effective manner. While we may say that originality plays the largest part in producing effective work, unless that originality be fundamentally based upon certain underlying rules and laws of design and harmony, the job will most likely be a failure from the standpoint of art. Other elements which enter into the producing of effective and successful jobs are (1) good judgment in the selection of type, and (2) the arrangement necessary to produce the desired attractiveness.

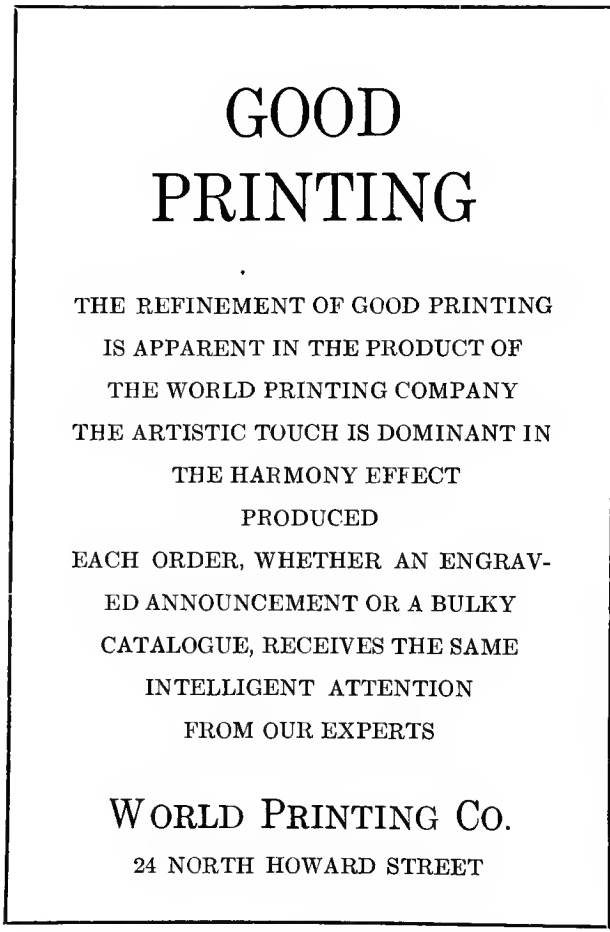


Fig. 34.—Effect of Grouping Type.

(a) Type Distributed in Even, Monotonous Order Over Page.

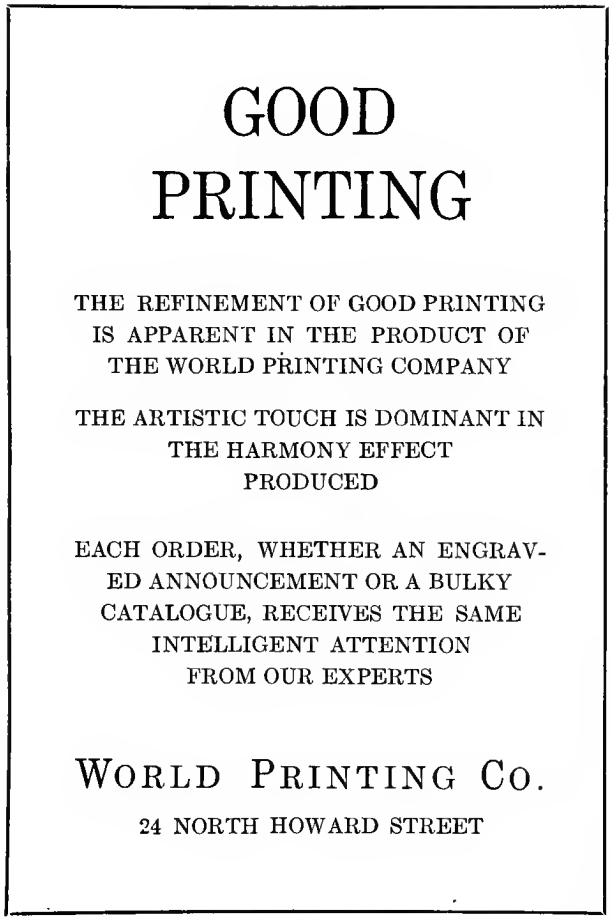


Fig. 34.

(b) Same Page Grouped Giving a Clearer and More Pleasing Effect.

These elements of typographic design may be formulated for separate discussion in the following outline:

ELEMENTS OF DESIGN

1. **Arrangement**
   - Architecture
   - Proportion
   - Balance
   - Prominence
2. **Selection of Type**
   - Appropriateness
   - Use of families
   - Degree of contrast
3. **Feeling**
   - Style
   - Decoration
   - Color

Architecture. In discussing the various elements of design in typography, the first to be considered is the architecture, because this involves the general arrangement of the job as a whole. Before starting to set any job, the compositor should have in mind the project as he wants it to appear when finished, or better still, a sketch. This outline, or scheme of arrangement, should have some special significance, and should conform to laws of common architecture. That is, the purpose of the job should to some extent govern the style of design. If, for instance, the job be a program, a menu, or a dance order, the general nature of the job should be as significant for the particular occasion as possible, in shape, size, design, kind of type, color, etc., and these various details should, as a whole, portray harmony in relation to each other.

It is said that "the best ornament the world has ever seen has been constructed and is based upon the laws that govern architecture," and this may also be appropriately applied to typography. The best jobs are those which reveal a knowledge of architecture on the part of the compositor.

Proportion. Another very important element in the design of printed matter is that of proportion. It applies to the shape of the page; margins between type forms and borders, and borders and the edge of the paper; and to the general placement of groups of type matter upon the page.

The common proportion used for book pages and various other commercial jobs is that of two to three, or where the length equals one and one-half times the width. For instance, pages are frequently 4x6, 6x9, 8x12, in which the first number is the horizontal width. They are often reversed in which case the first number becomes the vertical width.

This ratio of proportion gives the most pleasing effect and dates back to an early period in the history of

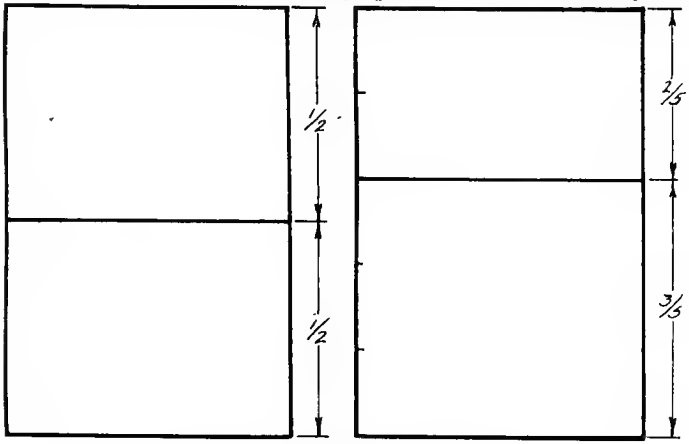


Fig. 37.—Finding Page Centers.
(a) True Center, equidistant from top and bottom.
(b) Optical Center, three-fifths from bottom.

printing and bookbinding. Most diversions from this proportion are to prevent excessive waste of paper which will not cut efficiently to the proper size, and where other dimensions are needed to meet special requirements.

There have been several proposed schemes for the standardization of sizes for paper stock, in which practically all papers would be based upon the ratio of two to three. This would prevent the carrying of odd size stock, and conserve on cutting, but would also necessitate the revising of many established magazine and book sizes, and the schemes have not been adopted.

NEWSPAPERS OF THE WORLD

THE REVUE HEBDOMADAIRE says that among European countries Germany has the greatest number of newspapers, heading the list with 5,500 of which 800 are dailies. England occupies second place with 3,000, the number of dailies being 809. France has 2,819, only about one-quarter of them appearing daily, or two or three times a week. Italy publishes 1,400 newspapers, and in the following order come Austria Hungary, Spain, Russia, Greece, and Switzerland.

The total number of newspapers published in Europe is about 20,000. In Asia not less than 3,000 papers appear periodically, the largest number being in Japan and the British Indies. Africa has the smallest number of papers, only 200 dailies being published in the whole continent, and 30 of those in Egypt. The rest are in the European colonies. In the United States there are more than 17,000 papers, of which 2,217 are dailies. The total number of American newspapers and periodicals exceeds 21,000.

Fig. 35. A page in which the margin from the border to the edge of the paper is equal to that between type and border.

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Fig. 36. The same as Fig. 35, excepting the proportion of three-to-two exists between margins.

Another application of this same ratio is in case of margins between type and borders, and borders and edge of paper. Whenever borders are used on a page, the margin of white space from the border to the edge of the sheet should be about one and one-half times the white space between the type and the border. Where double borders are used they are usually treated as one, and the space between them, unless too wide, is not considered.

When the type page is not centered upon the sheet, the additional margin is usually at the bottom and right, excepting in case of book pages where it is at the bottom and outside margin. The same proportion may be used effectively in this case by having the wider margins one and one-half times the narrower.

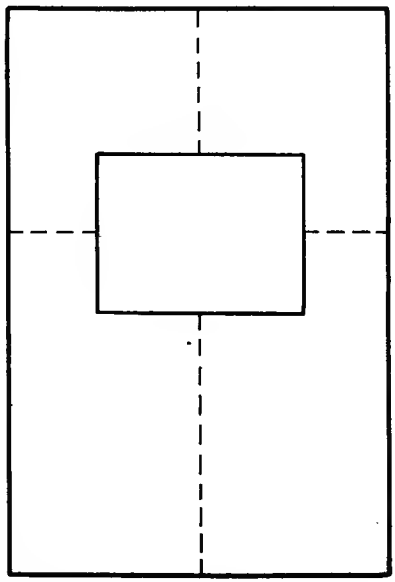


Fig. 38.—Showing the Position of a Centered Group Upon Page by Using Optical Center.

In placing groups of type matter upon a page, the first thing which must be considered is the "optical" center of the page. In this illustration it will be noticed that the optical center is slightly above the true or geometric center, and that the true center appears low. We will also discover that a perfect square appears slightly flattened to the eye. Because of this optical illusion it is necessary to raise the center of the page so that it will appear correct.

This is done by the established ratio of three to five, in which the page is divided into five equal parts

and the center line is formed three-fifths from the bottom of the page. It may also be noted that this ratio is recognized by type designers as in the capital letters "B," "E," "H," etc., so that the lower part will not appear flattened. When placing groups of type matter upon a page this optical center serves as a guide in their placement. If one group is used it should be placed so that its center comes on the center line and with equal margin on either side. If two or more groups are used they will be arranged so that the optical center serves as a balance pivot.

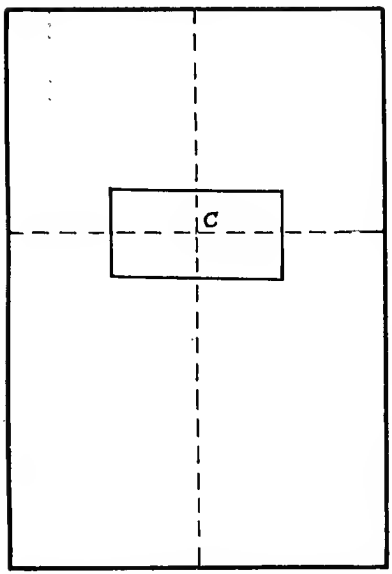


Fig. 39.—Diagram Showing How the Center of Attraction of a Page Is Determined.

This ratio may also be used when an out-of-center balance is desired, by placing the group three-fifths to either side as well as above the center.

Balance. The principle of balance is one of the basic elements of design which aids in the planning and arranging of type matter and groups of type upon the page.

The old tendency to place material upon a page in a regular, monotonous order, with even spacing throughout is no longer in practice. A page of display matter almost invariably contains several distinct ideas, which, although they be related to each other, have a varied value in their purpose, and may be more attractively arranged into groups divided by white space. Each group is usually a selection of more closely related ideas, which may be set together so that they may be displayed

with about equal importance. When several unrelated ideas are to be placed on the same page there will be no trouble in determining the content of the groups, and they may be arranged according to their respective values.

The position of the groups depends upon first, their own value of importance; and second, upon their relative size and weight, in giving the page as a whole a balanced appearance.

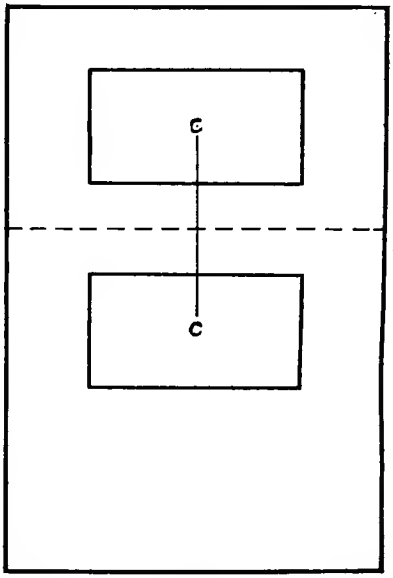


Fig. 40.—The Balancing of Two Equal Groups of Type Upon a Page, Using the Center of Attraction as a Pivot.

Where there is but one group, the usual position for it is in the center of the page, and there is no problem of balance. The center of the page is again determined by the line drawn three-fifths from the bottom, or the optical center, and one drawn equidistant from the sides. The intersection of these lines forms the center of attraction for the page, and is used as a pivot for balancing the respective groups of material. The same principle is used as in balancing of weights over a pivot. In fact, the groups are considered as weights, determined by their size and color, which must be balanced from the center of attraction.

When two groups of equal size are to be used on the same page, they will be placed equidistant above and below the center of attraction. A straight line,

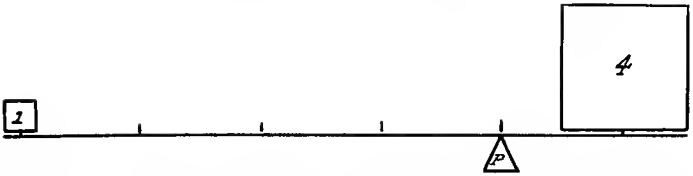


Fig. 41.—The Relation Between Weights and Levers in Balancing.

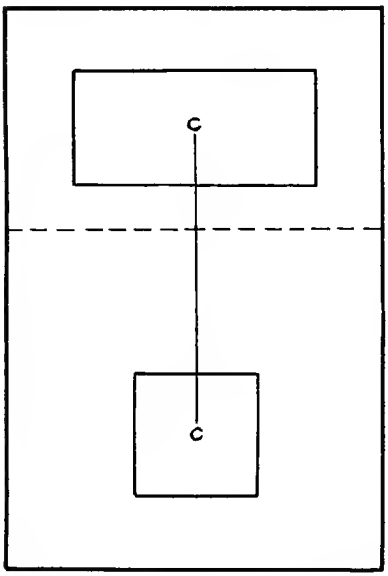


Fig. 42.—Balancing of Two Groups of Unequal Weight Upon the Center of Attraction.

which may be thought of as a lever drawn to connect the centers of the group, should be bisected by the pivot, and will prove that the groups are balanced.

If the groups are of unequal size and weight, the inverse ratio will be applied in placing them correctly. In physics the law of balance states that the product of the length of the lever and the weight on one side of a pivot must equal the product of those of the other side. Thus, if the weights are unequal, the levers must be inversely proportional, or the shorter lever must be used on the side with the greatest weight. In placing unequal groups of type matter their distance from the center line will, therefore, be inversely proportional to the weight. If, for instance, one group is just twice as heavy as the other, the center of the heavier group will be just one-half the distance from the pivot that the lighter one is.

In case three or more groups are to be used, it will first be necessary to balance the smaller groups upon each other until two common centers of weight are obtained, and then these centers are used to balance upon the center of attraction on the page.

When it is desired to balance groups away from the center of the page, such as is often necessary in arranging cuts, two balancing processes are required. First, balance the groups from the horizontal centerline and mark their location by a point; then, balance the group from the vertical center line and draw a mark indicating the center of the group. Next extend lines from these points at right angles to the lines from the first group, until they cross, and that point where the lines intersect will give the center for the second group.

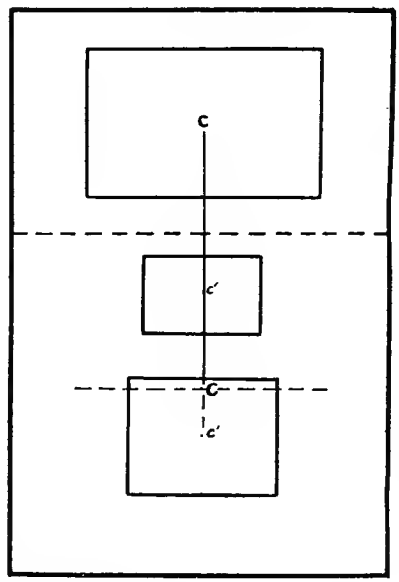


Fig. 43.—Balancing of Three Unequal Groups Upon a Page.

When groups of different tones or intensity are used together, their weights will be determined by the denser or lighter tones as well as their relative sizes.

Prominence. The next thing to consider in the arrangement of a job is the prominence, or the placement of the subject matter according to its estimated value of importance. In all display jobs there are certain features which should be brought out to invite attention, create interest, produce emphasis, and present information which will prove effective in obtaining the desired

result. These feature elements may be summed up into what is commonly known as the What, Where, When, Why, Who, and perhaps How, as a guide for determining the important display lines of a job. In designing a job the compositor should decide which of these elements are the most essential in each particular case and emphasize them accordingly. In case the job is of advertising nature the purpose usually is first, to attract attention; second, to create interest; and third, to produce results. It rests largely with the typographic construction to make it effective.

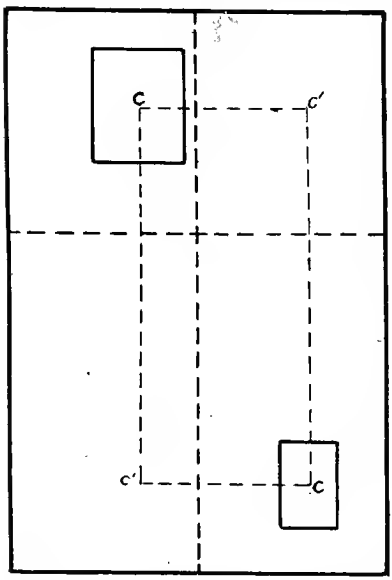


Fig. 44.—Showing How Two Groups of Unequal Weight May Be Balanced Out of Center on a Page.

The most successful means of display is in the grouping of material, because with ample white space between groups the best contrast can be obtained. The opinion that blank space is a waste of money and material no longer exists, but rather that it furnishes a background in which to display artistic and attractive designs.

The separate groups of printed material claim the attention of the reader according to the relative size, weight, and color, and should be placed on the page so that their prominence will be most pleasing and effective.

Appropriateness. In the selection of type for any given job the first thing for consideration is the appropriateness. In many shops where there are but a few designs of type the matter of selection will be but a matter of using the best available, but when there is a

Fig. 45.—Method of Determining Prominence of Display in a Job.

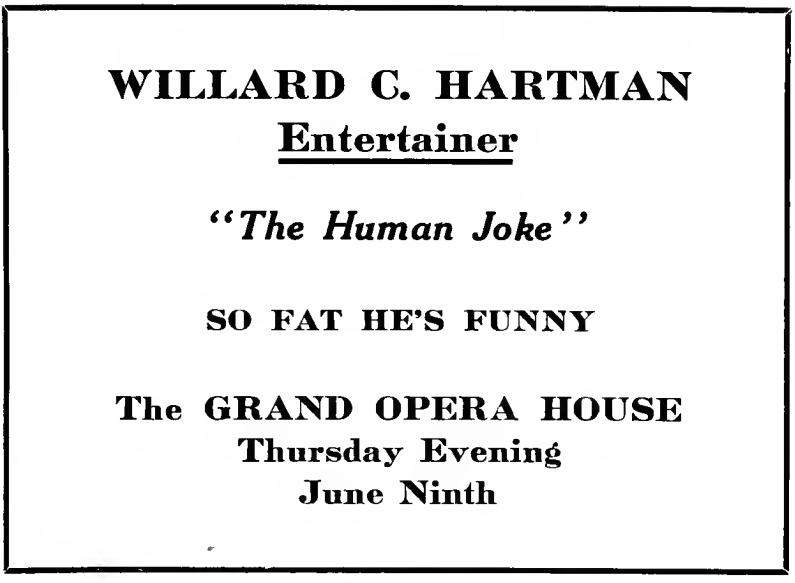


Fig. 46.—A Type Page in Which the Type Is in Harmony With a Wide Page.

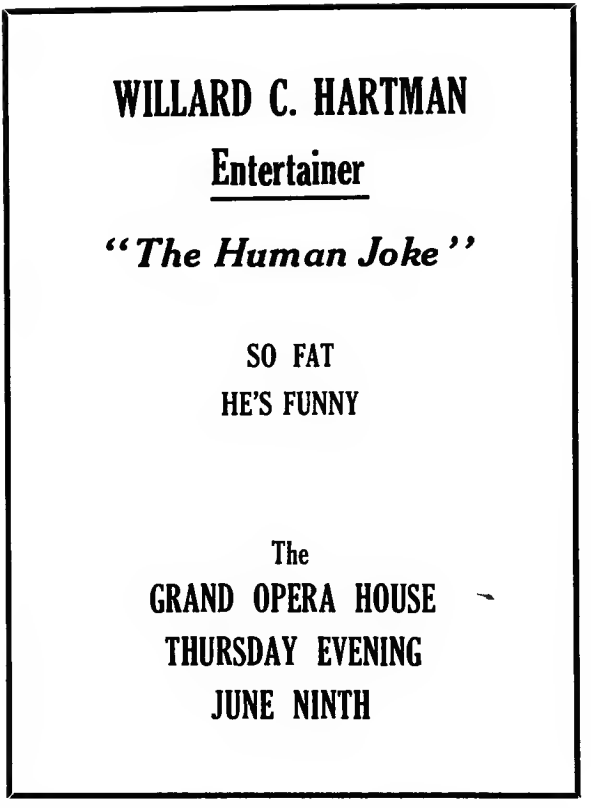


Fig. 47.—A Type Page in Which the Type Is Harmonious with the General Shape of a Long Page.

wider range of variety much discretion should be used in selecting the kind of type for each job.

The appropriateness of type for any job is determined first by the nature of the content of the job; second, by the general size and shape of the job; and third, by the character of the stock on which it is to be printed.

Appropriateness for the nature of the content is to make the type portray to some degree the feeling of the manuscript that it represents. For instance, it would be inappropriate to use black heavy type for a ladies' apparel shop stationery, or playful ornamentation in setting forth the uses of a heavy piece of machinery. On the other hand, hardware and merchandise of the heavier nature are more appropriately displayed with bolder type.

The design of the type also enters into consideration, and while plain faced types are usually best for most jobs, a touch of fanciness often helps to reveal the feeling desired for unique and formal occasions. For example, the Old Cloister is significant of religious and other revered printed matter.

Type used in any job should as nearly as possible conform to the general shape and size of the job. That is, harmony should be obtained between the shape of the job and the style of type used. In architecture tall and narrow buildings usually have a preponderance of vertical lines which harmonize with the general structure. This rule also holds true in typographic design by using type which harmonizes with the general shape of the job. Narrow and condensed types are not appropriate for wide jobs, and conversely wide types do not harmonize with narrow pages. This also applies to the use of borders and ornaments.

The size of type used should be appropriate for the particular design involved, the tendency being usually to overdisplay with huge letters. This is merely a matter of good judgment in keeping the reading matter in harmony with the rest of the design.

It is well to know what kind of paper the job is to be printed on when selecting the type, because with numerous finishes of stock there may result trouble and

Fig. 48.—Showing Discord in Type Faces, Ornamentation and Style.

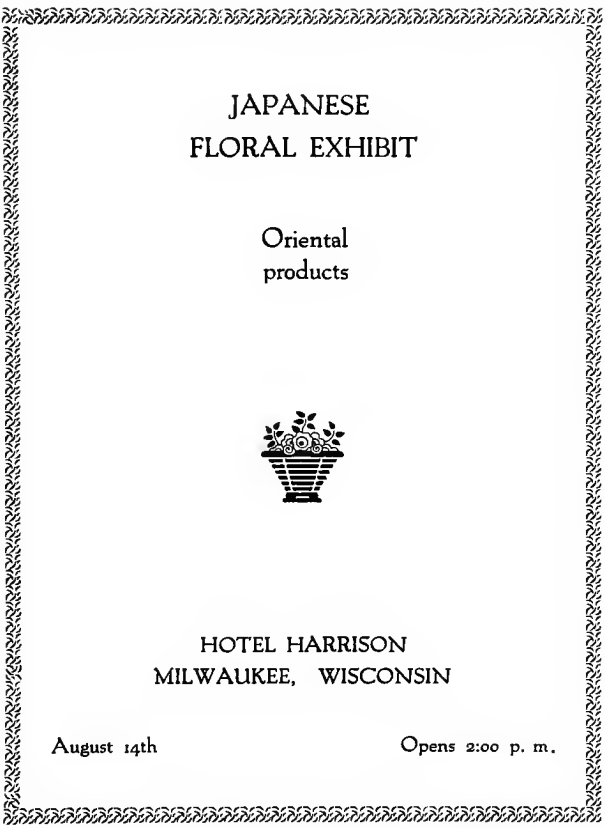


Fig. 49.—Showing the Appropriate Selection of Type, Ornaments and Border for a Job.

discord. If the paper be rough cover stock it may be difficult to print with very small type, and many type faces are not suitable for fancy finished papers.

Use of Families. Some of the best typography has been accomplished by the use of only one kind of type, and very few jobs look well with a mixture of various type designs. Many compositors advocate the use of series only in designing jobs, but it is often necessary to use more than one style of type to effectively set a job, and so long as the same family, or design of type is adhered to, the effect should be harmonious.

A simple rule in art which prohibits the mixing of straight lines and curves, excepting on rare occasions, also very aptly applies in the mixing of different type designs. For instance, it may be plainly seen in the illustration that plain Gothic type does not harmonize with fancy types such as Wedding Text or Old English.

When a second kind of type is used it should be used very sparingly, perhaps in small sizes, for emphasis, originality, etc.

Almost any effect may be produced by the use of one design of type, especially if the family contains light face, bold face and italic in the desired sizes, and it is the safest assurance of a well appearing product.

Degree of Contrast. The degree of contrast is an important factor in giving the proper prominence to the relative parts of a job. It is best obtained by first, the arrangement, which has already been discussed; and second, by the proper selection of type sizes and styles.

Contrast is commonly the result of using different sizes of type together, in which the smaller and less conspicuous sizes supplement the larger and more important. Suitable contrast can also be obtained by the using of different styles of the same type design. For instance, bold face and italic types are often used to attract attention in contrast to light face type.

The tendency now is for less emphasis in display and the more liberal use of white space and margin.

Feeling. Feeling, which is the reactionary element in design, serves to create a response on the part of the reader. Generally speaking, it may be the result of any or all parts of the design, but it is more often a response to those qualities such as style, decoration, and color, which effect the finer senses of most men.

Style. New types, or the novel way in which type faces are handled may lend freshness and attractiveness which will appeal to the feeling. Harmony in all parts of a design, together with the color and paper, may also produce an effect which will demand a responsive feeling.

Decoration. Decoration or ornamentation may be used attractively if used sparsely and harmoniously, but many of the worst specimens of typography are due to the abundance of decorative material and ornaments which do not harmonize with the accompanying type. The style of decoration, if used at all, should harmonize with the character of type and style of design. The use or misuse of ornamentation at once reveals the taste and discrimination of the compositor.

Color. Of the several kinds of beauty, it is said that the eye takes the most delight in color, and nothing reveals the culture of an individual more than color. A large proportion of commercial forms are now displayed in two or more colors, and many catalogs and magazines are coming to make use of colored illustrations to add to their attractiveness. While process printing, which reproduces pictures in their original colors, is yet impractical for school use, many two or three color jobs can be done which will contribute valuable problems for beginners.

The use of color in printing is one in which utmost care must be given in order that the colors will be appropriate, harmonious, and present a pleasant rather than an offensive feeling. The danger is usually too much rather than too little color, and strong contrasts must be avoided.

Volumes are written on the theory and practice of color, but much is not essential for the practice of a compositor, and only those parts which are practical will be discussed here.

Colors may be divided into two main classes, namely: warm and cold colors. Warm colors are those which contain elements of red and yellow, or those that produce the effect of light and heat. The cold colors are those such as green, blue, and gray, that are in contrast to warm colors. Nature is the guide in the use of these colors, and her example is a reliable one to follow. It is known that the sky and grass are pleasant to gaze upon indefinitely, while the sun or fire, though attractive,

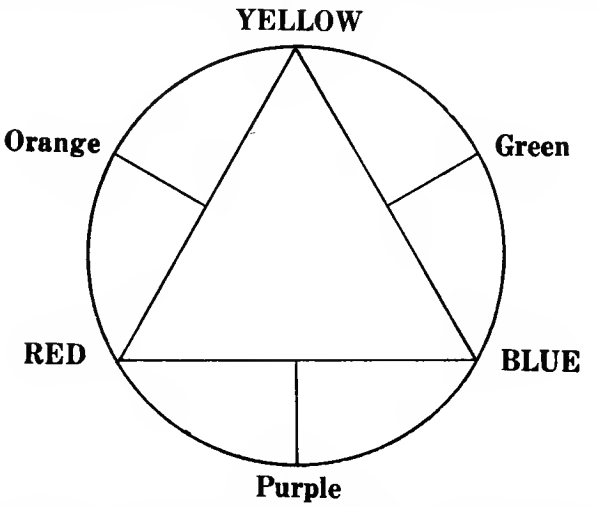


Fig. 50.—Color Spectrum. Primary and Secondary Colors.

soon become offensive to the eyes. From this we may gather that cold colors, such as the sky and grass, may be used in large quantities and they never become tiresome to the eyes, while the warm colors, as those of the sun and fire, should be used in small quantities merely to lend brightness and warmth to the background.

All colors are component parts of a ray of light, or conversely, a ray of light is a mixture of all colors. Rays of light, such as the sun's rays are conceded to be white, and if broken up by a prism will produce what is known as a spectrum of colors. All the colors of the

rainbow in their consecutive order will be seen. The three predominating colors from which all the rest are formed are red, yellow, and blue, and these are known as "primary" colors. By mixing equal amounts of any two of these colors we have formed a secondary color, such as green from blue and yellow, purple from red and blue, and orange from red and yellow.

When two colors have for their added value a white, these colors are said to be complementary colors. For instance, we know that the three primary colors when used in proper proportions have as their added value a white, and if we wish to find the complement of any separate color we must choose the one which is made up of the other two. Thus, green, which is made up of blue and yellow, will be the complement of red, etc. By referring to the color spectrum the opposite colors will always be complementary to each other.

Complementary colors when used together enhance each other and make pleasant combinations to use in printing. Unless the compositor is confident that the colors are harmonious, a safe rule is to use complementary colors, because they are almost sure of resulting in a pleasing effect.

Black can always be used with any color of the spectrum, but when used with a large amount of cold color it should have an added touch of some bright color to give it attractiveness and life.

USE OF LAYOUT.

Before undertaking the setting of any job, the copy should be analyzed and a sketch made so that some idea may be formed of the finished product, and to guide the compositor in his work. This sketch is known as a "layout" of the job and serves the compositor the same as a blue print serves a machinist or a carpenter. This is necessary in order that the shape, size and arrangement be obtained, and that all parts will bear the proper relation to each other. It also serves as a time saver in that any unsatisfactory features or mistakes may be corrected before setting the job.

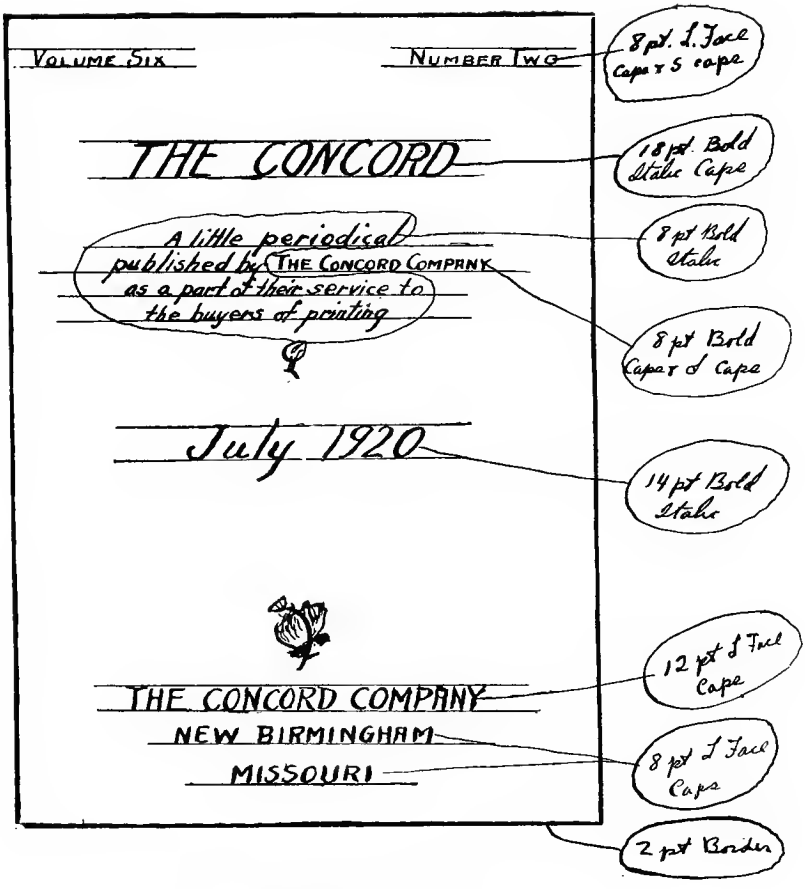


Fig. 51.—Layout of Job.

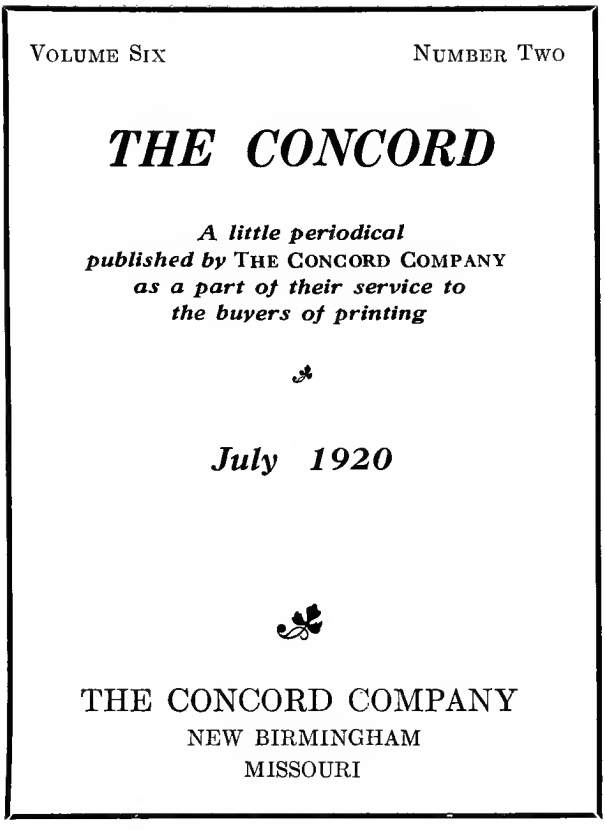


Fig. 52.—Job as Set From Layout in Fig. 51.

In many of the larger plants it is the work of a specialist to lay out the jobs to be printed, but in the smaller shops the work rests upon the head compositor. It is essential, however, that all type setters at least know how to intelligently read and understand layouts so that they may proceed with the work. It is also important that any person learning the printing trade know how to make layouts because it is essential for rapid promotion.

The first step in making layouts is to analyze the copy by picking out the most essential features, and classifying them according to their importance and prominence in display. The second step is to decide upon a general arrangement for the job as a whole. After these things have been done, the sketch is made upon a piece of plain or layout paper.

In making the sketch it is best to first draw the border, if there is to be one, because this will give the general shape and bounds for the job. If time permits, a ruler should be used for all straight lines, because it will give a neater appearance and furnish a clearer conception of the plan in general. Next, block out very lightly with a pencil the position of the groups within the border. This should be done so that the proper arrangement may be secured conforming to the rules of balance and proportion. It also gives an idea as to the size of the type necessary, and the appropriateness of ornamentation or decoration.

To sketch in the lettering it is best to draw light parallel lines to guide their uniformity. Plain Gothic lettering, indicating the caps and lower case letters, is ordinarily used, either vertical or forehand as is easier for the student. The approximate size of the type to be used may be simulated in lettering, and the exact size and kind of type specified in the margin. Any specifications which are not to appear in print should be so designated by encircling them with a pencil line, and connected with a line to the lettering. This is the common method of indicating specifications and is apprehended by all compositors. The layout can be made

more elaborate by imitating the particular kind of type to be used and this often furnishes a more satisfactory picture of the proposed job. Any space to be set with straight matter and smaller sizes of type may be blocked out and indicated by straight lines. This saves much time and tedious labor in lettering that is not necessary.

For the purpose of making layouts, a special paper may be obtained which simplifies the process immensely. This layout paper is ruled with cross lines which are one pica apart, thus forming a network of little pica squares, which are numbered along the margins on two sides. Some paper has every sixth line a trifle heavier, or of a different color, which also divides the paper into inch squares. This simplifies the sketching of a layout because measurements can be made directly according to the point system.

A "dummy" is a preliminary layout of a book, magazine or pamphlet, for the purpose of general arrangement and appearance before printing. It serves for several functions not included in a simple layout but the main purpose is to present a plan from which to work.

When a book is to be printed, the dummy of blank pages is simply bound to conform to the amount of manuscript. The general outline of the manuscript is then sketched in the dummy to guide the making up of the pages, cuts, etc., showing their desired location and arrangement. This is a big aid to the author because he can indicate how he desires the material to be printed, and to the compositor because he has definite plans from which to work. Dummies are usually made up of sections, each section constituting the number of pages that are to be printed at once on the press. This enables the stock cutter to cut the sheets the proper size, and also aids in the imposition of the forms for the press.

SHOP WORK

DISPLAY COMPOSITION

GROUP 1—ELEMENTARY DISPLAY

JOB 1. TICKETS

Specifications

1. Select one of the first two tickets shown in the illustration for copy.
2. Use bold type of appropriate sizes according to prominence.
3. Width of composition, fifteen picas.
4. Use either plain rule or cast font border.
5. Width over-all including border, one and one-half inches.
6. Length over-all including border, two and three-fourths inches.

Instructions. Tickets vary greatly according to their nature and use, so for this reason four typical examples are shown. The type should be selected according to the nature of the entertainment, and used consistently throughout. Straight line rules often add greatly in giving a finished effect, and also to dividé the several items of subject matter. Only the absolute essentials should be put on a ticket in order that it will be clear and concise.

BOY SCOUT

Father and Son Banquet

Friday, February 11, 1923

MEMORIAL HALL

6:30 P. M. **Plate $1.50**

BASKETBALL GAME

LAWRENCE vs. CARROLL

CO. H. ARMORY

SATURDAY EVENING, FEBRUARY 12

Admission - - 50 cents

SIXTH ANNUAL

Wisconsin State Championship

Sectional Tournament

Under Management of

River Falls Normal

Normal Gym

March 22, 23, and 24, 1922

SESSION 1
March 22, 1922

SEC. ROW SEAT

PARQUET

PLEASE RETAIN THIS CHECK

THE THREE HATS

ANNUAL BENEFIT PLAY

STOUT AUDITORIUM

April 15, 1922

Admit One **Admission 50 cents**

JOB 2. PROGRAM

Specifications

1. Use light face type of plain design.
2. Use all caps of appropriate size for heading.
3. Use ten-point caps and lower case for body, excepting for parts to be emphasized, such as "orchestra."
4. Width of composition, twenty-four picas.
5. Allow enough space between numbers of program to insure good proportion.
6. Use plain line rule for border.
7. Width over-all, including border, twenty-seven picas.
8. Length over-all, including border, forty picas.

Instructions. This job is one style of program setting which is plain and simple. Many styles and ideas may be used for the general arrangement and makeup, but the arrangement of the program proper is typical of most jobs. Plain type which can be easily read is most suitable for jobs of this nature.

PROGRAM

COMMENCEMENT EXERCISES

HAMLINE UNIVERSITY

JUNE 15, 1919

Invocation		Rev. Walter A. Smith
The Diadem		Alph Herman
	Orchestra	
Address	"The New Era"	Dr. M. A. Scott
The Hungarian Lustial		Keler Bela, Op. 108
	Orchestra	
Solo	"Spring"	Miss Mae Roberts

Presentation of Diplomas and Address to Graduating Class
PRES. L. D. HARVEY

Stars and Stripes Forever	John Phillip Sousa
Orchestra	

JOB 3. MENU

Specifications

1. Use eighteen-point caps of distinguished design type for heading.
2. Use eight-point bold italic caps for sub-heads.
3. Use eight-point light face type for items of menu.
4. Width of composition, fourteen picas.
5. Use rule with one-point face for border.
6. Width over-all to outside of border, twenty-picas.
7. Length over-all to outside of border, thirty-four picas.

Instructions. In setting a menu, or a job of similar character, it must be well arranged, neat, and easy to read. The usual manner of arranging the separate groups of items is so that the group will be well balanced by appropriately arranging the given number of items. If only two are given, they should be set flush at the ends of the stick; if a third is given it may be centered below, etc. The courses should be arranged in the order of serving so that the items may be selected by reading continuously from top to bottom.

Menu

SOUPS

Consomme — Mock Turtle

Tomato with Rice

FISH

Broiled Halibut Steak

Sea Bass — Blue Fish

ROASTS

Spring Duckling — Spring Lamb

Young Turkey

SALADS

Watercress — Romaine

Chicken — Lobster

VEGETABLES

Mashed Potatoes — Stuffed Onions

Green Corn — Lettuce

DESSERT

Fancy Cakes — Ice Cream

Wine Jelly — Eclairs

JOB 4. POSTERS

Specifications

1. Use eight-line wood type for heading.
2. Use bold type of plain design and appropriate sizes for remainder.
3. Use six-point break rules for between groups.
4. Allow proper spacing for proportionate size and tone of lines.
5. Width of composition, thirty picas.

Instructions. In setting posters the general arrangement and style of type must be such as to attract attention and fully inform the reader of its representation. For this reason a large bold headline is usually used at the top, followed by the abstract information necessary to answer all questions pertaining to the event. The type material should be grouped and divided so that the proper emphasis will be given to the various units of information. The wording should be clear, precise, and to the point. Balance and proportion must be thoroughly considered in each group and in the job as a whole.

BOWLING

WEST SIDE ELKS

VS.

BUICK SPECIALS

MONDAY MARCH 30

AT THE

ARCADE ALLEYS

Neither team has met defeat so far this season, so a good game is promised all who attend.

TICKETS 50c **OPENS 7:30 P. M.**

GROUP 2—ADVERTISEMENTS

JOB 1. SINGLE COLUMN ADVERTISEMENT

Specifications

1. Width including border, thirteen picas.
2. Length including border, two inches.
3. Set display matter twelve picas wide.
4. Set body matter eleven picas and add a nonpareil along each side.
5. Use bold face type for display.
6. Use light face for body.
7. Sizes of type to be selected appropriate for prominence and space.
8. Use two-point rules with one-point face for break rules.
9. Use two-point face rules for border.

Instructions. Skeletonize the ad by arranging the top border and right side border and the marginal space in a galley before starting composition. This will guide in the apportioning of space and selecting of type sizes for the separate units while setting. It also enables the compositor to insert the composed units directly in place within the border when removed from the stick. When the composition is complete and the form is spaced to the proper length, add the two remaining sides of the borders and tie for the proof. Great care must be used in the selection of type to insure proper emphasis and suitable arrangement.

JOB 2. DOUBLE COLUMN ADVERTISEMENT

Specifications

1. Set body matter sixteen picas wide.
2. Set names of cities six picas wide.
3. Set name and address twenty-four picas wide.
4. Place one pica between cities and address.
5. Allow less margin above than below body group.
6. Allow three picas at left of body and seven picas margin at right.
7. Inside measurement of width to border, twenty-six picas.
8. Width over all, twenty-seven picas.
9. Length of ad, twenty-five picas, including border.
10. Use two-point brass rule for double line border.

Instructions. Set each of the three units separately and then assemble and fill in the marginal space with metal furniture, slugs and leads. The border should be skeletonized with two sides and the units assembled therein. Be sure that the groups balance for position and weight.

JOB 3. ADVERTISEMENT WITH CUT

Specifications

1. Select cut suitable for position of two-column ad.
2. Set full width unit twenty-six picas wide.
3. Set units at side of cut twenty-six picas less the width of the cut and marginal space between cut and type.
4. Place two two-point leads between side border rules and type form for margins.
5. Use two-point brass rules for borders.
6. Width over-all including border, twenty-seven picas.
7. Length over-all, including border, three and three-fourths inches.

Instructions. Skeletonize the ad with the proper length border rules and two two-point leads before starting to set the type. Set the full width unit first and insert it in the skeleton. Measure the cut for length and width, and subtract the width, plus the necessary margin, from 26 picas width and side lines.

If the cut is a picture showing a person, the proper position of the cut is such that the person faces toward the adjoining type material, or toward the inside of the advertisement.

If the cut is irregular in shape, it will be necessary to fill in the irregular measurements by changing the length of lines, or with leads or spaces.

GROUP 3—COMMERCIAL FORMS

JOB 1. LETTER-HEAD

Specifications

1. Set for standard size sheet, eight and one-half by eleven inches.
2. Width of composition, forty-five picas.
3. Use your own name in connection with some business enterprise for copy.
4. Select one of the given illustrations for form of design.

Instructions. In the style of typographic design for letter-heads the printer must always consider the tastes of his customers, and especially the business or profession for which the stationery is to be used. It should be kept in mind that simple, neat, and refined typography is appropriate for almost any order of stationery, while elaborate typography is in many cases inappropriate.

Where envelopes and other forms are to be printed for the same customer, it is well to keep the kind of type and general style of composition the same throughout.

THE SMITH & ROGERS COMPANY

PRINTERS, ENGRAVERS, DESIGNERS

J. R. SMITH
G.[W.[ROGERS

CLEVELAND, OHIO

THE PUBLIC SERVICE COMPANY

OF NORTHERN ILLINOIS

INCORPORATED

OFFICERS
J. S. BLUM
S. P. SCHAEFER
R. C. MILLER
H. E. PETERSON

OFFICES AT
HIGHLAND PARI
GLENCOE
OAK PARK
EVANSTON

GLENCOE, ILL.

GEORGE E. DOESELING
ARCHITECT
809 WISCONSIN STREET
DELAVAN, WIS.

JOB 2. ENVELOPE CORNER

Specifications

1. Set for common size envelope three and five-eighths by six and one-half inches.
2. Width of composition, fifteen picas.
3. Use your own name in connection with some business enterprise for copy.
4. Select one of the given illustrations for form of design.

Instructions. The envelope corner serves for three distinct purposes: first, a protection against tampering with the letter; second, a means of advertising; and third, it assures the sender of a prompt return in case it is not delivered.

The treatment should be neat, plain, and brief, and it is better to keep to small type. It is not only in poor taste to cover the envelope with printing, but it is against the post-office regulations. It should also be in accordance with the style of the letter-head, and appropriate.

GEORGE E. DOESELING
ARCHITECT
809 WISCONSIN STREET
DELAVAN, WIS.

GEORGE E. DOESELING
ARCHITECT
DELAVAN, WIS.

THE PUBLIC SERVICE COMPANY
OF NORTHERN ILLINOIS
INCORPORATED
2324 EAST ELM PLACE
GLENCOE, ILL.

115

THE PUBLIC SERVICE COMPANY
OF NORTHERN ILLINOIS
INCORPORATED

W. R. GEYOT GLENCOE, ILL.

THE SMITH & ROGERS COMPANY

PRINTERS, ENGRAVERS, DESIGNERS

CLEVELAND, - - - - - OHIO

THE SMITH & ROGERS COMPANY

PRINTERS, ENGRAVERS, DESIGNERS

CLEVELAND, OHIO

J. R. SMITH G. W. ROGERS

JOB 3. BUSINESS CARD

Specifications

1. Set for cut cards two by three and one-half inches.
2. Width of composition, eighteen picas.
3. Use your own name as representative of some commercial enterprise.
4. Select one of the given illustrations for copy.

Instructions. The sizes of business cards are far from being standardized, ranging in sizes from three by one and one-half to four by two and one-half inches. The size of type and amount of composition must, therefore, be appropriate for the size of the card. The business card is a formal method of introduction for name and business, and should therefore be clear and significant of its representation. Plain white cards and plain type predominate for most occasions.

JOB 4. STATEMENT

Specifications

1. Set for ruled statement sheets, size five and one-half by eight and one-half inches.
2. Width of composition, thirty picas.
3. Use your own name in connection with some business enterprise.
4. Select one of the given illustrations for copy.

Instructions. A regular form is used for the heading of statements as given in the illustrations. The word "statement" is usually placed at the top in small type which conveys the thought of a general form of business routine, rather than a personal "dun" bill. Blank lines are used for the name and address of the purchaser and for the date line. The name of the company is given most prominence, followed by mention of the commodity or product. The city, street, and number should be displayed so that the merchant's location can be referred to quickly in correspondence.

STATEMENT

_____ 192 ____

Mr. _____

_____

IN ACCOUNT WITH

THE KENDALL PRINTING HOUSE

HIGH GRADE PRINTING ENGRAVING STATIONERY

142 North Ontairo Street,
PHILADELPHIA

Zinc Etching Reduced from the Original, Which Measures 5⅜" x 8½".

GROUP 4—TABULAR COMPOSITION

JOB 1. SINGLE FORM (LEADERS)

Specifications

1. Use ten-point bold caps for heading.
2. Use light face caps of appropriate size for type matter.
3. Use one-point face rules for heavy line, and hair-line face for light lines.
4. Use eight-point dot line leaders for blank lines of body.
5. Set in five separate units and assemble for complete form on galley.
6. Width of first unit, including double line, thirty-three picas.
7. Width of second unit, for Author and Title of Work, twenty picas.
8. Width of third unit, Vol. and Page, eight picas.
9. Width of fourth unit, No. of Pages, four and one-half picas.
10. Width of fifth unit, at bottom and including bottom rule, thirty-three picas.
11. Place one two-point rule, hair-line face, between tabular units, and add one two-point lead at left end for even measurement.

Instructions. Set this form in five separate units treating each as a form in itself and assemble component parts to form the complete form. Set the heading unit first, the full width of the job, and place it on a galley. Next, figure the required widths of the tabular units, starting at the left, and allow two points for each vertical rule between units. The sum of the unit widths plus the vertical rules must equal the width of the first unit. It is permissible to add one two-point lead at each end to complete the width if necessary.

The number of leader lines must be determined and the same number set for each unit. Space between the lines with slugs and leads so that the space is equally divided. The rules between units and leader lines are included in short units.

DEPARTMENT OF PRINTING—REQUIRED READING

NAME_____

COURSE_____ WEEK ENDING_____ 192__

AUTHOR AND TITLE OF WORK	VOL AND PAGE	NO. OF PAGES

TOTAL NUMBER OF PAGES FOR THE WEEK_____

JOB 2. SINGLE FORM (RULES)

Specifications

1. Use bold face type for first unit.
2. Use light face type for tabular headings and last unit excepting last line.
3. Width of first unit, twenty-four picas.
4. Width of left tabular unit, three and one-half picas.
5. Width of center tabular unit, fifteen picas.
6. Width of right tabular unit, five picas.
7. Width of bottom unit, twenty-four picas.
8. Use one-point face rule for heavy lines, and hair-line or dotted line rule for light lines.
9. Set each unit separately and assemble on galley.
10. Add one two-point lead at left to complete width of tabular units.

Instructions. This form is set entirely of rules for the tabular lines, the length of the rules being equal to the length of each unit. It will be necessary to select rules whose faces are about equally worn in order to have an even impression. When it is necessary to splice rules be sure that the ends of the face are not bent, and do not have splices directly below each other. Use leads and slugs for spacing between rules, and keep the exact space in points between each line. If it is necessary to vary the space at all, add or decrease in the last space.

Insert vertical rules after each unit as they are assembled; do not wait until all are together on the galley and then try to separate them.

If the units are too narrow for convenient setting in stick, they may be set in place on the galley. Be sure, however, to have none of the material either under or over length, or it will cause a bowing of vertical rules when locked in the chase.

REQUISITION BLANK

Order No. ..... **No.** .....

..... **192** .....

The ..... **Department**

is in need of the following supplies:

Quantity	Description	Estimated Cost

Order from _____

Address _____

_____

_____ Teacher

OK'D. by _____ Director

ORIGINAL — For Business Office

JOB 3. DOUBLE FORM.

Specifications

1. Set in two separate forms for register in two impressions on press.
2. Form No. 1 will include all type matter, and horizontal rules, excepting those directly at top and bottom of vertical rules for protection of rollers.
3. Form No. 2 will contain all of the vertical rules, and those horizontal rules not included in the first form.
4. Width of composition for first form, forty-five picas.
5. Second form will be set in units, the sum of which will be forty-five picas.
6. Space between vertical rules will be in accordance with width necessary for nature of items to be listed.
7. Second form must register with the first form for length of rules, and so that each tabular heading will be centered in column.
8. Compute all measurements to exact point by aid of line gauge.
9. After each form is composed, take proofs on thin paper and check results by placing sheets together and tracing relative positions of parts.

Instructions. Most tabular forms which involve a complicated crossing of rule lines can be set to advantage in two forms. The composition of each is easier and usually a saving of time. It also avoids the cutting of short length rules and ascertains a perfect junction of rules where they cross. The contents of each form must be so decided upon as to simplify the composition, assure register, and to protect the rollers while crossing the forms.

PRINTING RECORD SHEET

GRAND RAPIDS VOCATIONAL SCHOOL

FOR WEEK ENDING _____ 192___

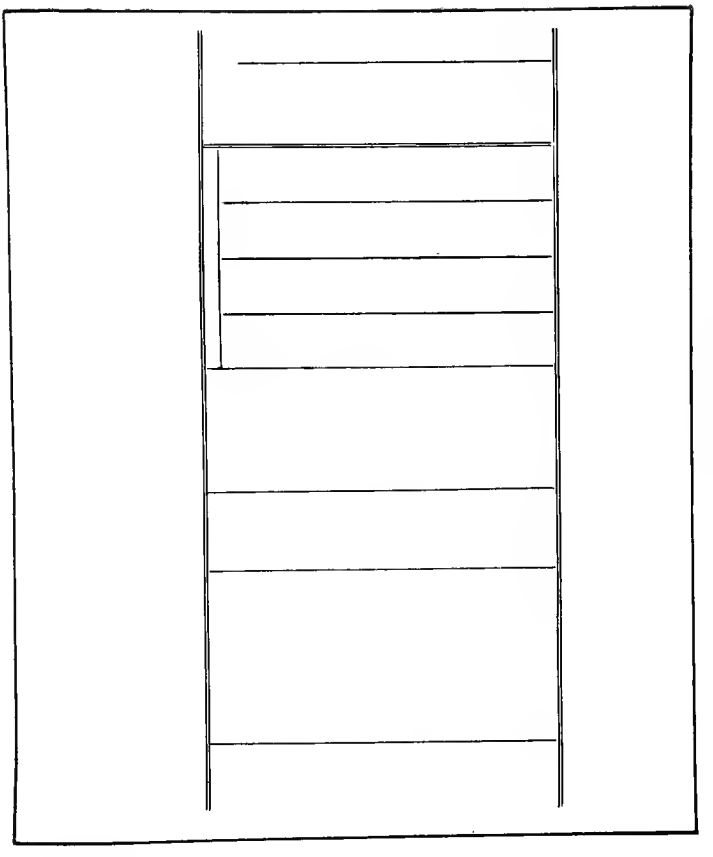
GRAND RAPIDS, MINNESOTA

DATE	ORDERED BY	AMOUNT	DESCRIPTION	TIME FOR COMPLETE JOB				TOTAL COST
				COMPOSITION	STONE WORK	PRESSWORK	BINDING	

O.K'D. BY _____ INSTRUCTOR

TOTAL FOR WEEK---$_____

Horizontal Form.



Vertical Form.

PRINTING RECORD SHEET

GRAND RAPIDS VOCATIONAL SCHOOL

FOR WEEK ENDING _____ 192___

GRAND RAPIDS, MINNESOTA

DATE	ORDERED BY	AMOUNT	DESCRIPTION	TIME FOR COMPLETE JOB				TOTAL COST	
				COMPOSITION	STONE WORK	PRESSWORK	BINDING		

O.K'D. BY _____ INSTRUCTOR

TOTAL FOR WEEK---$_____

Horizontal and Vertical Together.

GROUP 5—TWO COLOR WORK

JOB 1. SHIPPING LABEL

Specifications

Black Form

1. Use twenty-four point bold type for name.
2. Use twelve-point type for address.
3. Width of type line, fourteen picas.
4. Use hair-line rules for address lines.
5. Use two-point rule for borders.
6. Allow margin of about eight picas at left of type for red insertion.
7. Allow two picas between address and hair lines.
8. Allow one and one-half picas between lines.
9. Width over-all, including border, twenty-four picas.
10. Height over-all, including border, fifteen picas.
11. Border rules to be mitred.

Red Form

1. Use eighteen-point bold italic for words "From" and "For."
2. Use one-point face rules for cross line and border.
3. Set the word "From" so that it aligns with the bottom of name on black form.
4. Align the word "For" with the first hair-line rule on black form.
5. Width over-all, including border, twenty-two picas and ten points.
6. Height over-all, including border, thirteen and one-half picas.
7. Border rules to be mitred.

Instructions. Set each form separately according to the exact specifications and justify so that component parts will register. In setting the type lines it is well to insert a few thin spaces so that slight adjustments can be easily made for register.

The two forms may be checked for exact register by proofing each on thin proof-paper and holding one over the other against the line. All corrections should be made before locking in the chase.

Bob White Co.

Jackson Boulevard

St. Louis

Black Form.

From

For

Red Form.

From **Bob White Co.**

Jackson Boulevard

St. Louis

For _____

_____

_____

Black and Red Combined.

JOB 2. MOTTO CARD

Specifications

Green Form

1. Use eighteen-point type.
2. Width of composition, fifteen picas.
3. Indent first two lines equal to width of initial letter in purple form.
4. Space between lines to be determined by proper proportion.

Purple Form

1. Use cast font border.
2. Use forty-eight-point initial letter.
3. Width over-all to outside of border, twenty-four picas.
4. Length over-all to outside of border, thirty-six picas.
5. Use metal furniture for filling in blank space of purple form.

Instructions. Set each form separately with accurate measurements. Use a line gauge for relative positions of component parts of each form. Check the register of the two forms on thin proof-paper.

I AM not bound to win, but I am bound to be true; I am not bound to succeed, but I am bound to live up to what light I have. I will stand with anyone who stands right, keep with him while he is right, and part with him when he is wrong.

—*Abraham Lincoln.*

JOB 3. COVER DESIGN

Specifications

Brown Form

1. Use eighteen and fourteen-point caps together for title. Align with one-point brass leads.
2. Use twelve-point type for signature and date at bottom.
3. Use twelve-point border with open design.
4. Width over-all to outside of border, eighteen picas.
5. Length over-all to outside of border, thirty picas.
6. Fill in blank space with metal furniture.

Yellow Form

1. Use ornamental design which is appropriate for tone and shape.
2. Use twelve-point solid face border.
3. Use metal furniture to fill in blank space.

Instructions. Set each form separately and for exact register. The borders particularly must be exactly the same dimensions or colors will overlap.

Check results with double proof on thin paper.

JUST A RAY OF SUNSHINE

GIRL'S CLUB

1922-23

III—LOCKUP AND IMPOSITION

IMPOSITION AND LOCK UP

General

Imposition is the process of arranging type forms in the desired position for printing so that they may be locked-up in readiness for the press. It is commonly known as stone-work to the practical printer, because the forms are placed and handled on an imposing stone, and the workmen are known as Impositors.

Tools and Materials. The locking-up of forms employs a number of tools and materials which are especially designed for this work, and with which every stu-

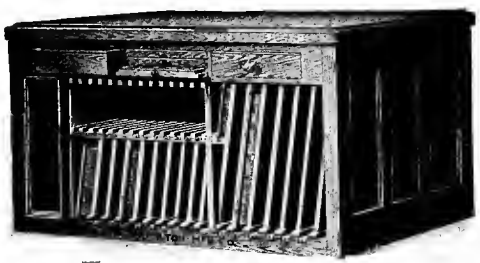


Fig. 53.—Imposing Stone.

dent should become familiar. The style and construction may vary somewhat in the different makes from various manufacturers, but the general application and use is about the same. Modern needs in this specialized occupation are continually being met with new and improved devices, but those included here are sufficient for forms used on platen presses.

Imposing Stones. The first and main piece of equipment necessary for imposition is the imposing stone. It consists of a large, flat slab of hard stone, with a polished surface, which is supported upon a wooden or steel frame. Some stones are now made entirely of steel, including the

imposing surface, which prevents the possibility of cracking or chipping which often happens to stone. The main disadvantage is that the steel surface will rust from the water used on type forms, unless given proper attention.

The frames which support the imposing stones are built in many designs to accommodate imposing materials, such as, furniture cabinets, chase racks, drawers,

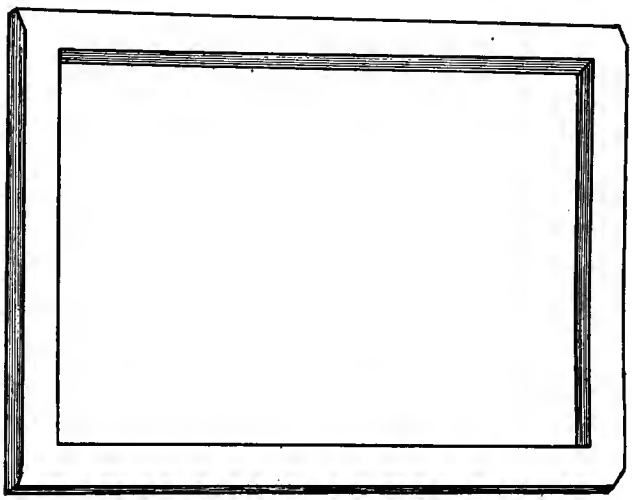


Fig. 54.—Chase.

etc., which are very convenient for the workman. They also vary in surface dimensions, depending upon the nature of the forms employed.
or an equivalent of the same dimensions. The size of

Chases. The metal frames within which the type forms are locked are known as chases. They are rectangular in shape and are usually made of welded steel. They are made to fit on the bed of the press and all chases for the same press are of the same dimensions,

any chase is determined by the inside measurement, such as ten by fifteen or twelve by eighteen inches, which indicates the amount of space that may be employed by the forms and lock-up.

Chases may be obtained which have attachable bars which may be used to subdivide the chase into smaller sections. These are convenient for locking several forms together, such as book pages.

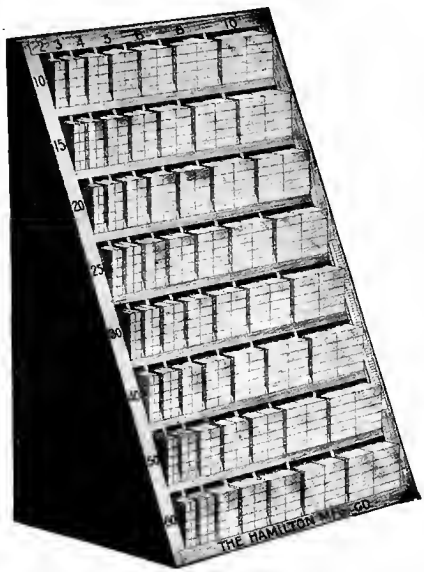


Fig. 55.—Furniture Cabinet.

Wood Furniture. The blocks of wood which are built around the forms to hold them securely in place in a chase are known as furniture. They are usually made of a hard wood that is capable of withstanding wear, and not very susceptible to warping.

The blocks are graduated according to the pica system in both length and width, and are about three-fourths of an inch in thickness. They are usually purchased in labor-saving fonts, in which they are cut to size and fitted into cabinets divided into compartments designed to hold each size. Usually the lengths are indicated on the end of each piece of furniture and also along the sides of the cabinet, while the widths are printed only at the end of the cabinet.

In the ordinary font of furniture the widths are as follows: two picas, three picas, four picas, five picas, six picas, eight picas, and ten picas. The lengths start

with ten picas and increase in multiples of five up to thirty, and then upward in multiples of ten to sixty picas. Larger sizes may be obtained if necessary, but these are usually sufficient for platen press sizes.

Quoins and Keys. Quoins are locking devices used to lock the forms in place in the chase, and the key with which they are tightened is known as a quoin key.

The two most common kinds in general use are the Hempel quoins and keys and the Wickersham.

The Hempel quoins are pairs of metal wedges which are grooved so that they will slide upon each other, and have slotted sides in which the key fits for locking. The locking property is due to the expansion of the wedges when they are tightened by the key. They are most commonly used in shops, their only disadvantage being in the tendency for the quoin to twist the form while tightening.

Fig. 56.—Wickersham Quoin and Key.

The Wickersham quoins are more recent and are rapidly being introduced into many shops. They are constructed in one piece, having the two slides held together by springs, and are separated by the turning of a small cam between them. The key, which is square, fits into the key slot in the center of the cam. They are better than the Hempel quoins in the respect that they expand straight instead of by sliding, thus preventing the twisting, but are not so convenient for inserting between the furniture. There is also the possibility of bringing the cam to such a point that it will spring back to the closed position in case it receives a jar, and this may cause the form to pi.

Reglet. Reglet is the name given to strips of wood in pica and nonpareil thicknesses, less than type high, which are used in locking of forms in chases. They may

be obtained in long strips and cut to any desired lengths, or they may be purchased in labor saving fonts cut to pica lengths, and fitted into a case. They are also convenient to use as emergency slugs in composition.

Type Planer. The type planer is a solid block of hard wood with a smooth surface at the bottom for planing the type before the lock-up. It may be identical to the proof planer with the exception of the felt covered bottom, which is not necessary on the type planer.

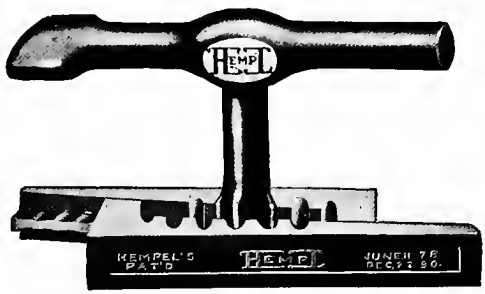


Fig. 57.—Hempel Quoin and Key.

Bearers. Bearers are strips of steel plate, bent at right angles, which may be inserted in the ends of the chase to protect the rollers on the press from being cut by ruled forms. The bearers are supposed to raise the rollers slightly, thus relieving the pressure against the type, but the effect is slight due to the fact that the rollers sink into the bearers to some extent. They do cause the rollers to turn evenly while crossing the form, and in this way insure an even distribution of the ink.

IMPOSITION OF SINGLE FORMS.

The position in which a form is to be locked in the chase depends upon the general shape of the form, and the position of the heading.

A form should always be placed near the center of the chase, because in this position it will receive the most even impression on the press. In case two or more forms are to be locked together they should be as nearly centered as possible. The shape of the form will deter-

mine which way it will be placed in the chase. This is governed by the easiest way for feeding the stock to receive the impression. The easiest way to feed sheets into a press is to keep the long way of the paper parallel

Fig. 58.—Locking of Form in Chase.

to the body, and for this reason forms should be locked-up with the length parallel to the long way of the chase.

The head of the form should always be placed at the left or bottom of the chase, depending upon the shape, because these are the feeding sides, or the sides to which the sheets are fed on the press. This will bring the impression the right way for reading on the tympan

of the press, and will also keep the feed edges uniform so the sheets may be trimmed when printed.

Locking of Form. There are two methods by which forms may be correctly locked. They are; first, Furniture within Furniture method; and second, Chaser method.

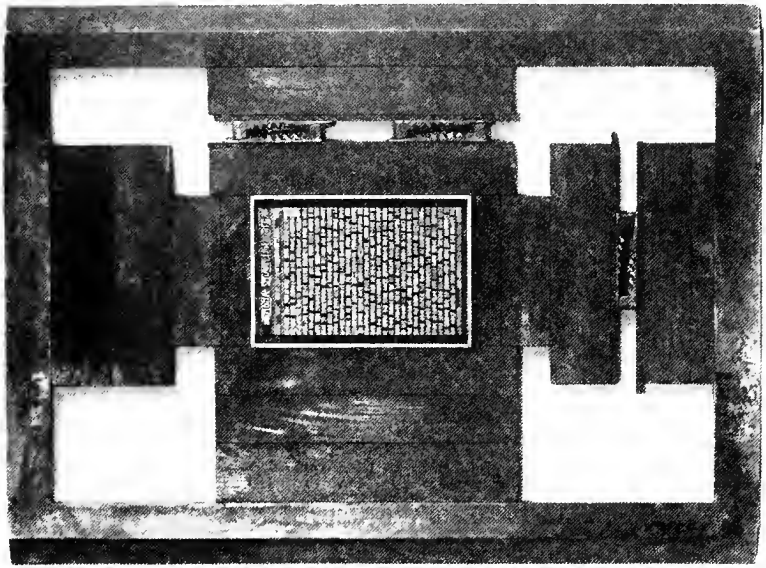


Fig. 59.—Furniture-Within-Furniture Method of Imposition.

The furniture within furniture method is so called because part of the furniture is fitted within other furniture. This method can only be used where the width of the form conforms to the lengths of the furniture, such as, twenty picas in width.

In this case a piece of furniture the same length as the width of the job is placed at each end of the form, and a longer piece is placed on each side so that it overlaps the end pieces. In no case should the string be removed from the type until it is completely enclosed with furniture. Fill out the bottom and left side between

the form and the chase with larger furniture. The best method is the pyramid style in which each succeeding piece is longer than the others. This will distribute the stress on the side of the chase over a longer space, and will not only hold the type more securely but will lessen the possibility of cracking the chase. It is better to use fewer pieces of wider furniture than many strips of the narrower, because it is easier to lock them solidly.

The top and right sides should be filled in in the same manner excepting that space should be allowed for the quoins, and a strip of reglet on each side of the quoins. The reglet is inserted to take the wear, due to the friction of the quoins, off the furniture. The best position of the quoins is about midway between the form and the chase, because it prevents the furniture from bulging and also gives a more even tension on either side when locked. Never place the quoins directly against the chase because the metal will not bind sufficiently to secure safe lockups.

If the Hempel quoins are used, they should always be placed so that the inside quoin slides toward a solid side; that is, those at the top should slide to the left, while those on the right should slide toward the bottom. If they are reversed, they will slide toward the open sides, or quoin sides, and will be apt to twist the form when locked. The number of quoins used will be determined by the size of the form, the only rule being to use all that are necessary for a secure lock-up.

The Chaser method, which is so called because of the overlapping furniture, may be used for any size form, and is the one most commonly used. The only difference between this and the former method is that furniture used around the form is longer than the size of the form, and each piece overlaps the one preceding it. In this way the furniture may slide from any side and when locked it can bind the form on all sides.

The furniture is then built around the form and the quoins inserted the same as before. This method is very suitable for locking small forms such as envelopes, cards, etc., but the furniture used around the form must be wide enough to allow for building around it.

Before locking any form, the quoins should be tightened with the fingers, and the form planed down with a type planer. This will even the form so that all the type will be smooth for the printing surface. Care must be taken not to force the type down because there may be something underneath it that should be removed. After the form is planed down the quoins will then be

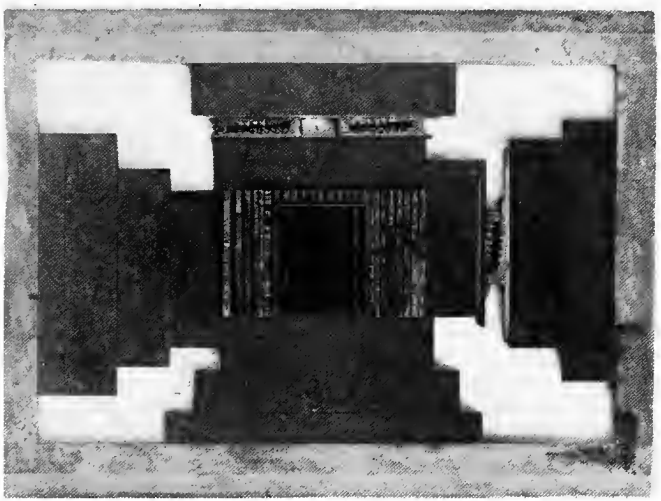


Fig. 60.—Chaser Method of Imposition.

tightened a little at a time until all are securely tight. The form will then be tested for lifting by drawing the chase to the edge of the stone and raising it slightly from the front. The type matter should be pressed with the fingers to insure that it is tight, and if any parts are loose the form must be unlocked and such parts justified until they lift perfectly. Never take a chance on loose type remaining in place, because it may raise on the press and be broken off by the rollers crossing it. It is time saved to have it right at first.

Double Forms

There are several methods of running two forms together at once on a press. They may be listed as follows: Two-on, Work and Turn, Double Page, and Register forms. The lock-up may be the same for any of these forms, but the arrangement or "imposition" will depend upon the method.

Fig. 61.—Imposition of Two Forms in Chase.

Two-On. Forms are run two-on for the purpose of printing forms in duplicate on a single sheet. The number may be increased to as many forms as the size of the press will accommodate, but the idea remains the same. The object in running forms in this manner is to save press feeding, because with each impression on the press two or more copies will be printed which may be cut to size later. This method is profitable only when the time for extra composition of the job does not equal the time for the extra press work, and this must be decided

before setting the job. For instance, it would not pay to spend ten hours on the composition of two like forms that would take only four hours to run off on the press, because the total time would be fourteen hours, while if one form were set in five hours and the press work doubled to eight hours, the total time would be only thirteen hours. Of course, the cost of operations must also be taken into consideration, and may make such a job profitable.

When the forms are to be run two-on they are placed side by side in the chase with furniture between to provide for a double margin. This is so that when they are cut in two, each sheet will have the proper margin on each side. The best way to arrange the forms for printing position on a sheet is to fold a sheet of paper of the proper size through the center, place it over the forms and center each form between the fold and the edge of the paper. This will give the amount of marginal space to be filled in between forms. When this is done, equalize the length of the forms and the furniture between them and treat as if it were a single form.

Work-and-Turn. The Work-and-Turn Method implies that the sheets are to be printed on both sides, or turned over for the second impression. It is used when two pages, those printed on both sides, are to be printed in duplicate. This method is always profitable because only one form of each side is composed and the press work is reduced to half. The forms are imposed side by side with a proper margin between them the same as for the two-on method, disregarding the order of priority. The sheets are fed through the press, and after the first side is dry they are turned over and refed, giving the same impression on both sides, but if they are turned properly the second page will come on the back of the first, and the first on the back of the second. When they are cut in two, there will be as many sheets printed on both sides as there were impressions on the press. This cuts the press work to one-half, because if run a single page at a time it would require two impressions for each sheet.

Double Page. The double page method is used when two pages of a booklet or circular are to be printed on opposite pages rather than on both sides. This method is often used for printing school papers where two pages are to be printed at once. The pages which are to be run together will be determined by the total number of pages. In an eight-page paper, pages one and eight, two and seven, three and six, and four and five will be run together. The easiest way to determine the pages which go together is by making a dummy of folded sheets and numbering them consecutively while assembled, then when disassembled they will indicate the pages which belong together. It will be noticed that the first and last pages always run together, and the increasing low numbers with the decreasing high numbers. It will also be noticed that the odd numbers are always on the right and the even numbers on the left. This aids in the arranging of the forms, because they will occupy the same position in the chase, only up-side down.

Register Forms. When a tabular job is composed in two forms so that the vertical rules are to register with the horizontal rules, they may be run together on a double sheet. This reduces the impressions to one-half because of the double run. In this case the forms must be reversed after the first run is completed, so that the second form will run over the first, and in this way two complete copies of two runs each will be done with but two impressions. It is necessary in any register job to very accurately impose the forms in the chase so that they will register exactly. There are devices made especially for adjusting register jobs without unlocking the chase, but many offices are not equipped with these devices. It is best in locking any register job to insert a few leads at the bottom and left side, so that small adjustments may easily be made by rearranging the leads.

When first locking a register form for the press it is well to make chalk marks on the quoins and furniture indicating their positions, so that when the forms are reversed they will occupy the same relative position for register. The exact amount of furniture must be re-

placed for the second form and the quoins must be put into their original position every time the form is unlocked and a change made.

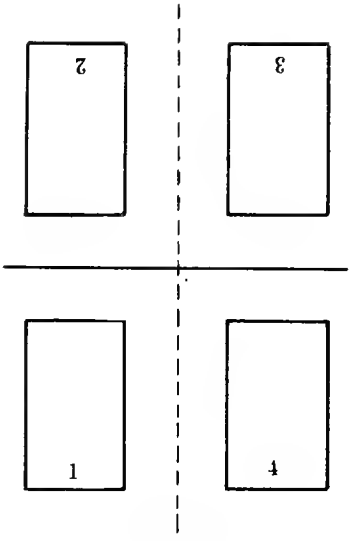
Multiple Forms

The imposition of multiple forms is usually applied to book pages where large numbers are to be printed at once. They must be so arranged that when they are printed and the sheets folded, the page numbers will appear in consecutive order. The imposition of book page forms is more closely connected with cylinder presses than platen presses, and the forms may not be practically useful in many smaller shops, but the problems which they present are valuable for class work. Blocks of wood may be used to simulate type pages if necessary.

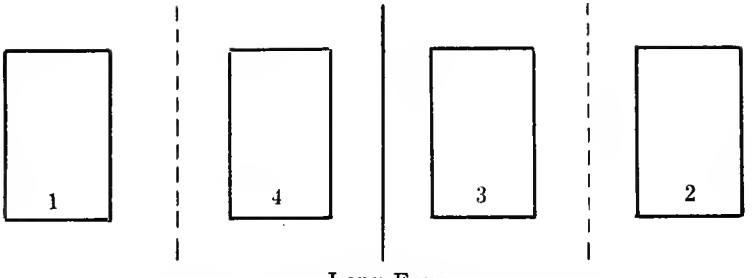
With a little experimenting it will be seen that the pages cannot be arranged in consecutive order, side by side on the stone, but rather the pages that back each other must be placed in opposite parts of the form. The number of pages that can be run at once varies from four to about sixty-four, depending upon the size of the pages and the chase. Sometimes even a larger number than this is run where the pages are very small. Almost any multiple of four pages may be run, but the usual method of arrangement is by the geometrical progression, as 4, 8, 16, 32, 64, etc. Most large forms are imposed by the aid of diagrams printed for this purpose, unless the workman is accustomed to such work, but it is well for any impositor to be able to figure out the desired arrangement, and to know the arrangement up to at least eight pages.

There are two methods of printing to get the pages to back up properly. They are: first, the Work-and-Turn method in which the same form is printed on both sides of the sheet, by merely turning the sheet over; and second, the Sheetwise method in which the sheets are printed on one side with one form and backed up with another.

Inasmuch as the sheets have to be folded after they are printed the method of folding must be taken into consideration in the makeup of the forms. The larger



Square Four.



Long Four.

Fig. 62.—Imposition of Four-Page Forms.

number of pages the more folds there will be, therefore, the more space allowed for margins. It also makes a difference in the method of imposition whether the sheets are to be folded by hand or by machine. There must be enough margin to allow for trimming on three sides after the folded pages are bound together.

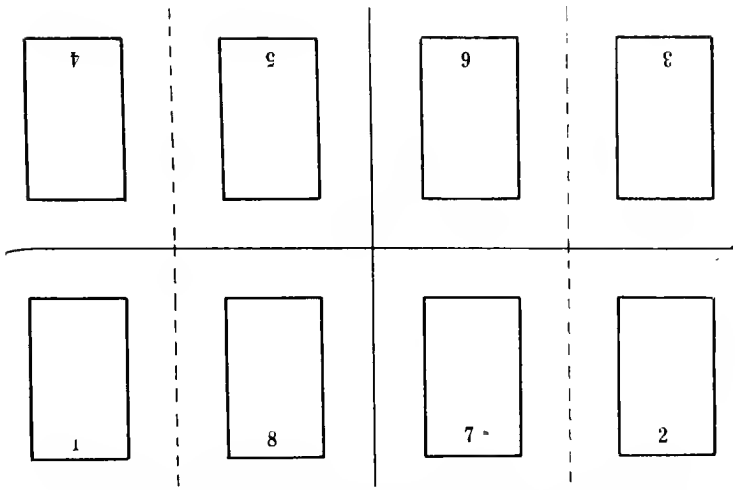


Fig. 63.—Imposition of Eight-Page Form. (Usual Method.)

Four Page Forms. The two methods of laying four-page forms are shown in Fig. 62. It will be observed that the long four is the same as the square four excepting that the pages 2 and 3 are at the side of 1 and 4 instead of head to head.

In the square four, the sheet is turned so that page 2 backs on page 1, and page 3 on page 4. The sheet is then cut between them as indicated by the straight line. The long four is turned the long way so that pages 2 and 3 back on 1 and 4, the cut being between 4 and 3. The long 4 may also be arranged with pages 3 and 4 on the outside, which is useful when the fourth page is blank.

Eight Page Forms. The eight-page forms may also be imposed in several methods two of which are shown in the illustration.

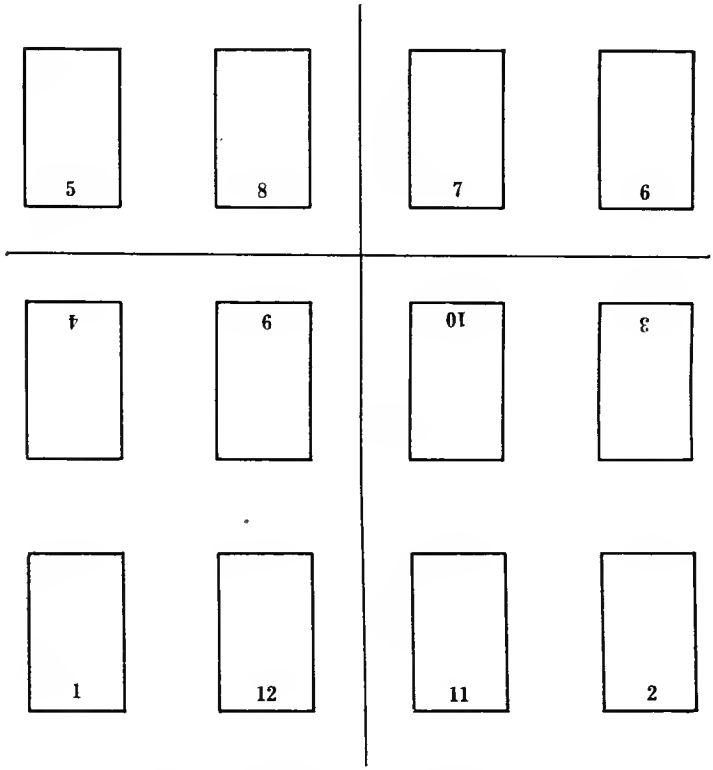


Fig. 64.—Imposition of Twelve-Page Form.

The square eight is turned so that the pages on the right back on those on the left, as 2 on 1, etc., and two cuts are necessary as indicated by the lines. In the long eight the pages are end to end instead of side by side, and must be turned the long way for the back-up.

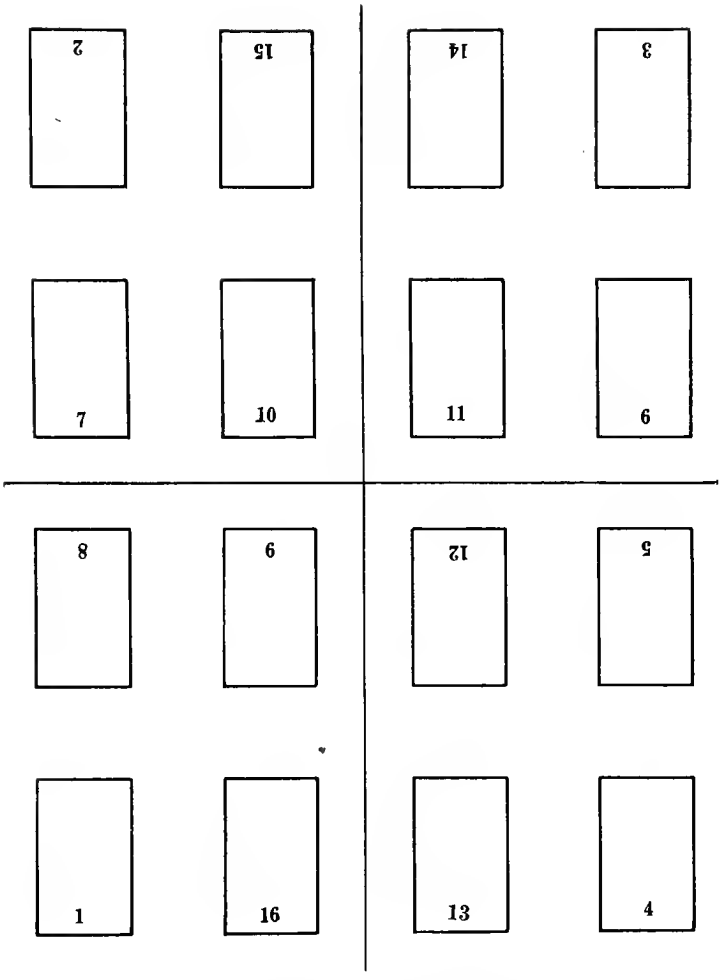


Fig. 65.—Imposition of Sixteen-Page Form.

Other Forms. Many other multiple page forms can be worked out, some of which can be laid out in several different ways, but the space in this book will permit only the showings of several of the most ordinary, such as the 12 and 16 pages.

The various page schemes can be worked out on a folded dummy on which the page numbers are marked to aid in imposing any of the forms.

SHOP WORK

GROUP 1—SINGLE FORMS

JOB 1. EVEN SIZE FORM

Specifications

1. Use form of width or length equal to length of furniture, i. e., some multiple of five picas.
2. Place at center of chase with length of form parallel to length of chase. (Form tied.) Heading to left or bottom.
3. Furniture same length as even sides of form will be placed against these sides, preferably of ten pica width.
4. Furniture longer than the remaining sides will be placed against these sides, overlapping the included furniture.
5. The bottom (near side) and left will be filled out with furniture of consecutive increasing lengths, to edge of chase.
6. The top and right sides will be filled out the same excepting that spaces for quoins and reglets will be allowed about midway between form and edge of chase.
7. Insert quoins with a strip of reglet (either pica or nonpareil) on each side, and as long as adjoining furniture.
8. Remove string from form and tighten quoins with fingers.
9. Plane form with type planer and mallet.
10. Tighten quoins with key, gradually, turning first one and then the other until form is secure in all places.

Instructions. This method of lockup is used when the form happens to be in even furniture lengths in length or width. If it be otherwise the furniture will bind upon itself and the pressure will not be upon the form. It may also be used by increasing the size of the form to the required size by adding slugs of furniture of proper thickness.

Care must be taken to have the stone absolutely clean beneath the form so that the type will plane down evenly.

In selecting furniture, be sure that the edges are true and that it is not warped or crooked, so that a firm lockup may be assured.

It is not necessary to tighten quoins so that they strain the chase. If the form is properly justified it will not be necessary to bow the chase with the pressure of the quoins.

Be sure that every part lifts before removing the chase from the stone.

JOB 2. ODD SIZE FORM

Specifications

1. Use form of dimensions, both length and width, which do not equal the regular lengths of furniture.
2. Place on stone at center of chase with length parallel to length of chase. Heading at left or bottom.
3. Place furniture ten picas wide and the nearest size larger than the form at the top and bottom. The piece at the bottom should be placed flush with the left edge of form and projecting over at right, and the piece at top flush with right edge of form and extending over at left.
4. Select two pieces of furniture ten picas wide and in length not quite equal to the total width of the form and furniture already in place, and place at ends so that each piece overlaps the one adjoining. See Fig. 60.
5. Fill out with furniture of consecutive increased lengths at left and bottom to edge of chase.
6. Fill out top and right in like manner allowing space for quoins and reglets.
7. Insert the number of quoins necessary at top and right to insure a firm lockup. One quoin for about every three inches of form space is sufficient.
8. Remove string and tighten quoins with fingers.
9. Plane form with type planer and lock with key.

Instructions. This is the most usual method of locking forms because it can be used for any size. Care must be taken to use furniture of proper lengths and width to completely surround the form and yet not bind on each other. The quoins must be locked a little at a time so that the pressure may be evenly distributed from both directions. Test the form for lifting properly before removing from the stone.

JOB 3. SMALL CARD FORMS

Specifications

1. Use small form intended for ticket or envelope corner, disregarding dimensions.
2. Place on stone slightly above center of chase with length parallel to length of chase. Heading at left or bottom.
3. Surround with metal furniture on both sides such that the exact lengths are obtained to enlarge the rectangular size of the form to about twice the size.
4. Use overlapping furniture around newly constructed form, as in Job 2.

5. Fill out with consecutively longer furniture at left and bottom.
6. Fill out with furniture in the same manner at top and right, allowing space for quoins and reglets.
7. Insert quoins and remove strings from form.
8. Tighten quoins with fingers and plane the form.
9. Tighten quoins with key and test for lifting.

Instructions. Care must be taken, where metal furniture is used to enlarge the size of the form that the parts interlocked are not too long, because they would bind and prevent the pressure against the form. It is necessary to enlarge the size of the form because the amount of binding surface is insufficient to insure a firm lockup.

If the form be a ticket the best position for it in the chase is centered longitudinally and slightly above the center, for ease in feeding. If it be an envelope corner, the best position is left of the center far enough to enable the feeding of envelopes at the center of the platen.

GROUP 2—DOUBLE FORMS

JOB 1. TWO-ON FORM

Specifications

1. Use two forms which are duplicate in every respect.
2. Place on stone side by side so that their lengths are parallel to the short dimension of the chase, and so that their combined center is the center of the chase.
3. Have headings at bottom in case of vertical forms, and inside in case of horizontal forms.
4. Place metal furniture between them equal to twice the width of the margin desired on the printed sheets.
5. Treat the whole as a single form and lock according to specifications in Job 2, Group 1.

Instructions. This form is printed in duplicate, one-half the impressions necessary for a single form, and cut in two when finished. It is absolutely necessary that the marginal space between the forms be exactly double the desired margin and it may be necessary to adjust to point measurements with leads and slugs. Use at least one quoin above each separate form to insure a firm lockup.

JOB 2. WORK AND TURN

Specifications

1. Use two forms which constitute the two sides of a single printed sheet.
2. Place on stone side by side as in job one, irrespective of page numbers.
3. Have headings at bottom or inside according to shape of the forms.
4. Place metal furniture between them equal to twice the desired margin on printed sheet.
5. Treat the whole as a single form and lock with overlapping furniture.

Instructions. This form is printed on one-half the number of desired sheets, but the sheets are double size. After it is printed and the ink is dry, the sheets are turned over and the same form is printed on the reverse side. This will bring page 1 on the back of page 2, and 2 on the back of 1, thereby printing two complete sheets on both sides with one-half the impressions. The sheets are then cut in two, giving the total number of single sheets.

JOB 3. SHEETWISE

Specifications

1. Use two forms which are to print two separate pages of a booklet of eight pages.
2. The page numbers must be taken into account and will be grouped as follows: 1 and 8, 2 and 7, 3 and 6, and 4 and 5 will run together.
3. Place any pair of these pages side by side on the stone with with the headings at the bottom (near side) and the even numbered page at the left and the odd number at the right.
4. Allow double space between them for ample margin on each page either folded or cut.
5. Lock up according to specifications in Job 1.

Instructions. This double form is printed on one side of the sheet only after which two other conjoining pages are printed in the same way upon the reverse side. For instance, if the first form consists of pages 1 and 8, the form which is printed on the reverse side will consist of pages 2 and 7. This will bring page 2 on the back of page 1, and 7 on the back of page 8 in their proper sequence when assembled with the remaining pages.

GROUP 3—MULTIPLE FORMS

JOB 1. FOUR PAGE FORMS. (SQUARE FOUR)

Specifications

1. Use four pages which constitute a four-page circular when complete.
2. Arrange them in a square four as shown in Fig. 62.
3. Pages 1 and 4 will be side by side, and pages 2 and 3 with the headings at the outer margin.
4. Double margin must be allowed between all forms, both head and side, so that the desired margin will result on each page when cut and folded.
5. Treat whole as single form after margins have been formed by placing metal furniture between pages, and lock with two quoins at top and two at sides.

Instructions. In imposing a form of four or more pages, it is best for the student to make a sketch of the arrangement, numbering the pages and indicating positions of headings, to follow.

This form is printed on both sides of the sheet, being turned so that pages 1 and 4 come on the back of 2 and 3, and cut as indicated by the solid line in Fig. 62. The dotted line indicates the folding margin, thus forming two complete four-page circulars with two press impressions.

The lockup man must always have the necessary information regarding the size of the sheet, width of margins, etc., before attempting to impose the form.

This method may also be used for a section of a large multiple of book pages, in which case the order of pages will be changed.

JOB 2. FOUR PAGE (LONG FOUR)

Specifications

1. Use four pages which form a complete circular when completed.
2. Arrange them according to the long four as shown in Fig. 62.
3. Place all of the pages side by side with the headings at the bottom.
4. The solid line, which indicates the cutting margin, forms a dividing line between two temporary forms. Pages 1 and 4 then constitute the left form, and pages 3 and 2 the right form. The even numbers will then take the right positions while the odd numbers will be at the left.

5. Place metal furniture equal to twice the marginal width between each form.
6. Treat whole as a single form and lock in chase, using four quoins at top and two at the right side.

Instructions. This arrangement is not ordinarily used because of the awkwardness in feeding, but may be necessary due to shape and size of forms. The result is the same as in the square four, giving two complete four-page, folded circulars for the same number of impressions, but the sheet is turned sidewise instead of lengthwise of the forms for lockup on the press. This method may also be used for a section of a larger number of book pages, in which case the page number must be computed for consecution.

JOB 3. EIGHT PAGE FORM

Specifications

1. Use eight pages which will constitute a complete eight-page booklet when finished.
2. Arrange these on stone according to order given in Fig. 63.
3. Place pages 1, 8, 7, and 2 side by side with headings at bottom, and pages 4, 5, 6, and 3 with headings at top.
4. Fill in space between forms with metal furniture equal to twice the marginal width, plus a two-point lead to allow for folding.
5. Treat whole as a single form and lock up in chase.

Instructions. This form is printed and turned as before, and then cut twice giving two complete eight-page booklets of eight pages each. Two folded sheets when assembled will give the complete booklet.

GROUP 4—RULE AND REGISTER FORMS

JOB 1. RULE FORMS (BEARERS)

Specifications

1. Use a form which is partly composed of brass rules which would tend to groove rollers.
2. Impose same in chase allowing space at each side at the edge of chase for insertion of bearers.
3. Insert bearers at either side so that the surface lies evenly on sides of chase.
4. Lock form the same as for any job.

Instructions. Bearers are used to support rollers while travelling across ruled forms to prevent grooving. They must be longer than the length of the form to insure that rollers will be raised while crossing the entire rule length. Be sure that there are no sharp edges on the bearers because they would be as harmful as the rules.

JOB 2. REGISTER FORMS

Specifications

1. Use two rule forms in which an impression from each upon the same sheet is required to complete the printing of intersection straight lines.
2. Place them side by side upon the stone so that horizontal lines in each form are relatively correct position for printing on the other form.
3. Test this alignment of component parts by use of a straight edge placed across both forms.
4. Allow double marginal space between both forms and insert metal furniture.
5. Mark exact positions of corresponding elements of forms on furniture to enable a correct rearrangement of forms for second run.
6. Lock up as for any form, only make accurate corrections for the slightest change in position due to press of quoins.

Instructions. Every register job must be very accurately imposed to the smallest fraction of an inch, otherwise it will show off-register on the printed sheet. This form is run on a double sheet for one-half the required number. The forms are then reversed in the chase and relocked for absolute register on the first run. The second run is then made over the first, completing the cross ruling in two impressions. The sheets are then cut in two, giving the number of the total impressions.

IV—PLATEN PRESS WORK

PRESSWORK

General

The term Presswork is applied to the operations necessary for securing printed impressions from a press. It involves two distinctly different methods of obtaining impressions from type forms which are, by aid of Cylinder presses and by Platen presses. As the names imply, the cylinder presses print by means of revolving cylinders, and the platen presses by means of a flat printing surface known as the platen.

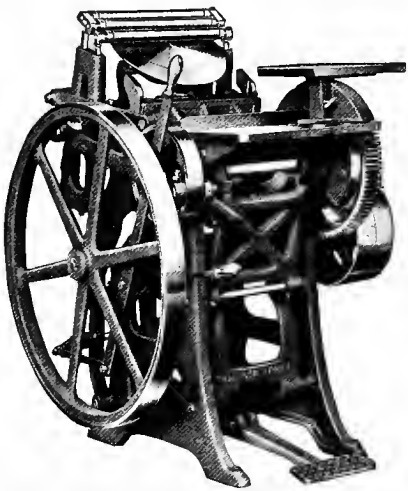


Fig. 66.—Chandler & Price Press.

Cylinder presses are used for the printing of large forms, such as newspapers, etc., and there are many different types in use. Some have the type forms placed on a flat travelling bed which works in conjunction with a revolving cylinder for obtaining the impression, while in others the impression is made by a continuous passage of paper between pairs of cylinders. In the latter the type is cast in the form of stereotype semi-cylinders and clamped on to the type cylinders. Cylinder presswork is an occupation in itself, and, inasmuch as these presses are seldom found in school shops, will not be treated in this text.

Platen presses include all types of presses in which the impression is taken on a flat surface, and from a flat type form. There are numerous makes on the market

but the most commonly used press today is one which has evolved from the old Jones-Gordan Press, now bearing the name of Chandler & Price, the manufacturers.

This press is probably best suited to school use, due to its comparative simplicity in operation, and efficiency

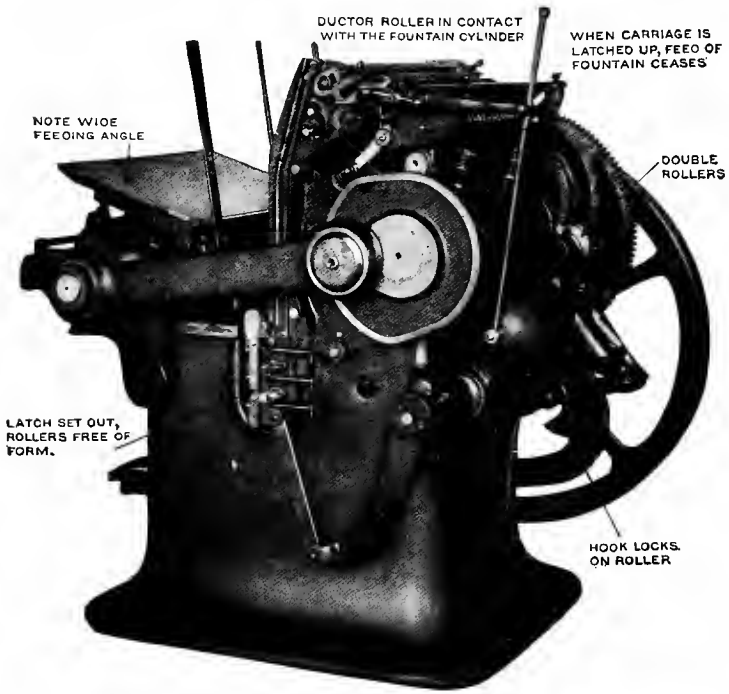


Fig. 67.—Colt's Armory Press.

for smaller jobs. It may also be termed prerequisite to the larger and more complicated presses, because it offers the clearest conception of the fundamentals necessary for operation of the more complex machines.

Another type of platen press which is rapidly coming into general use for the better grade work is shown in the illustration.

This press is capable of giving a much stronger impression due to its heavy construction, and has a more efficient means of ink distribution by a series of rollers in the rear of the press. It also features over the old style platen press in that it avoids vibration between the platen and the form at the time of impression. This is accomplished by having the type form stationary with the entire motion on the part of the platen, and the platen slides directly into place instead of rocking as in the case of the "clam shell" type. These presses are used for high grade cut work, color work, embossing, etc., where a higher pressure and more perfect impression is desired.

Parts and Functions

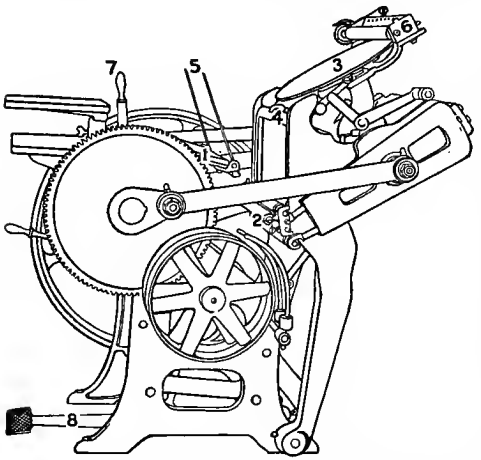


Fig. 68.—Nomenclature of Platen Press Parts.

1. Platen.
2. Rollers.
3. Ink Disk.
4. Chase Bed.
5. Grippers.
6. Ink Fountain.
7. Throw-off Lever.
8. Foot Treadle.

In learning to operate a platen press, the first thing that is necessary is to know the names and functions of the separate parts. Many parts, such as the fly wheel, gears, shafts, etc., which are common to most machines, will not be discussed, but only those parts which are distinctive to the operation of the platen presses will be treated.

The Platen. The platen, from which the press gets its name, is the metal surface which receives the impres-

sion. It is flat and smooth on top, and shaped to fit the shaft upon which it rocks below. The upper surface is held in position by means of four adjusting screws for the purpose of equalizing the impression. At the upper and lower edges of the surface are clamps which hold the tympan in place. Inasmuch as the impression is taken by the platen, it must be kept clean and smooth at all times, and be capable of adjustment for variation in type forms. Most of the adjustment is made by varying the amount of packing paper clamped on to the platen, and by equalizing the impression by means of make-ready.

Grippers. The grippers, or paper fingers, as they are sometimes called, are long metal blades which automatically close against the platen when the press closes. They are held into place on a track at the lower edge of the platen by bolts, which allow them to be moved to the desired position. The motion of the grippers is caused by a small roller passing over a curved track, and a spring, at the lower left-hand side. Their purpose is to prevent the inked type from pulling the printed sheet from the platen when the press opens.

The Bed. The flat metal surface which supports the chase and the type form is known as the bed of the press. It is directly opposite the platen so that the two may close together to give the impression. The form is locked into place by resting on two grooved lugs at the bottom, and clamped at the top. The clamp is held down by a strong spring to prevent its loosening while the press is in motion. On the Gordon type press the bed moves forward to meet the platen, while on some of the heavier types it remains stationary.

Ink Disk. The disk found on most platen presses serves as a distribution plate for the ink. It is centered on a shaft which enables it to revolve when the press is in motion. Some are made in two sections, one within the other, and geared so that they turn in opposite directions, with the idea of more efficient distribution. These however, are discontinued excepting by special order because of the inconvenience in removing the ink lodged in the crack between the plates.

The ink is fed on to the disk either by hand or by an ink fountain, and is distributed over the plate by rollers which pass over it, and by the turning of the disk. It is best to form the habit of adding ink to the upper left hand corner of the disk when the form is on the press because the disk turns clockwise and will practically distribute the ink before it crosses the type. This will avoid blotches of ink from smearing the sheets.

Rollers. There are usually three rollers on the Gordon type press which serve two functions; first, to distribute the ink upon the disk; and second, to carry the ink over the type form. They are made of a composition of principally glue and glycerine cast on steel cores. At the ends they are supported by round trucks which rest on the side bearers of the press, causing them to turn. These trucks are detachable and are made in several sizes to suit the size of the rollers, and to allow for shrinkage.

Fig. 69.—Small Ink Fountain.

Throw-Off Lever. The throw-off lever, which is a lever located at the left side of the platen, is used whenever it is desirable to miss an impression. When it is forward, in the normal position, the back shaft is cammed so that the bed of the press does not quite meet the platen when the press is closed, thus preventing an impression. When the throw-off is in the back position it reverses the camming motion and lunges the bed forward enough to cause an impression. This is very necessary to prevent undesired impression, and the operation must become reflexive on the part of the press feeder.

Accessories. Many presses have ink fountains attached for the purpose of continually feeding ink while the press is in operation. Some fit entirely across the back of the disk, known as full length fountains, while others are small and are located in the upper left hand corner of the plate. In either case a metal roller is

turned through an ink chamber which coats it with a thin film of ink, which in turn feeds the ink to the press rollers.

The supply of ink can be regulated by a thumb screw in the rear which regulates the distance of the roller from the blade within the chamber. When the throw-off lever is forward the press rollers do not rise high enough to touch the fountain, thus avoiding an excess of ink on the disk when none is being used.

Counting machines are very convenient for registering the number of impressions taken at any time. When properly set at the beginning of any job they will indicate when the run is completed. Several kinds are in use and may be attached to almost any press.

Fig. 70.—Counting Machine.

The count is made by striking against the rear shaft and is, therefore, controlled by the throw-off lever. This prevents registering when no impression is being made.

Press Rollers.

It is well that every student understand the composition and care of the press rollers so that he may intelligently use and preserve them. The life of rollers is almost indefinite, depending upon the care both while in use and off the press. As was stated before, the composition used for rollers is chiefly glue and glycerine, with small parts of such other substances as glucose, varnish, etc. The bulk of the composition is glue, while the glycerine supplies the moisture absorbing quality of the rollers.

Rollers are cast in accordance with the season of the year, depending upon the amount of moisture necessary to withstand the various temperatures. Thus, rollers cast in the summer have less glycerine than those in the winter, because the warmer temperature keeps the rollers naturally softer. Summer rollers turn hard in winter, while winter rollers are likely to melt on the press if used in the summer. If left to the roller casting companies to decide, they will usually cast the rollers according to the temperature of the season in which they are done, but for all practical purposes rollers may be divided into three classes: Summer rollers, Winter rollers, and Midseason rollers. Rollers cast in mid-fall or mid-spring, if properly seasoned before using, may be used at almost any time of the year, excepting in extremely hot or cold weather.

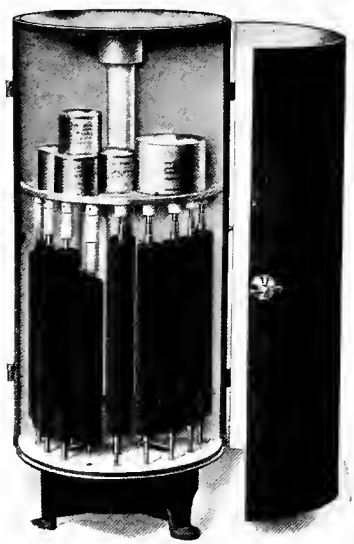


Fig. 71.—Roller Cabinet.

When rollers are first received from the casters they are of a bright green color, and are said to be "green" because they are not seasoned. At this stage the surface has not yet become firm enough to withstand the friction on the press, and the proper suction quality has not been developed. They must, therefore, be set aside to season for several weeks before they are ready for use. This seasoning takes place best when concealed from the air to avoid hardening by oxidation. The usual method is to cover them with a thin film of soft ink or grease, and set away, properly supported, in a cool place until needed. After they are thoroughly seasoned

the color has changed from green to a light brown, and a durable surface has developed.

A necessary article of equipment which is often overlooked in many shops is a cabinet for rollers. Unless some cabinet is used which will support the rollers without touching the surface, they will soon be flattened and ruined.

The use and care of rollers can best be summed up in the following list of cautions, which should not only be read, but applied.

1. Always be sure that rollers are at lowest position on press when standing idle.
2. Never allow rollers to remain on type form or ink disk. Same will flatten and leave grooves in the composition.
3. Be sure that rollers are absolutely clean and free from dust before inking.
4. Never allow ink to harden on rollers because it damages the surface to remove it.
5. In cleaning rollers rub lightly with soft rag, and use some mild cleaning solution. Gasoline and kerosene, half and half, is best.
6. Never run rollers across ruled forms unless rule edges are protected, or bearers inserted in chase.
7. Care should be taken in inserting chase not to jam against rollers.
8. Always have rollers supported in free position when out of press.
9. New rollers should be concealed from air until properly seasoned.
10. Never expose rollers to extreme temperatures.

Care of Press

One of the first duties of a pressman is to learn to care for the press. A printing press, like any much used piece of machinery, must have regular attention to keep its parts in working order. Unless all parts work smoothly at all times there will develop a vibration which is not only harmful to the press but which will soon prove harmful to the type being printed.

Oiling the Press. Every press which is being used daily, should be oiled before starting the day's work. This important necessity is too often neglected, and nothing is more harmful than to run a dry press. Every oil hole, joint, and bearing should be kept continually lubricated to prevent friction and wear. It will be necessary to turn the press to several positions to locate all the places requiring oil, and some of the most important holes are in inconvenient places. If the oil cups appear to be full before oiling it is because they are clogged with dirt and need cleaning. This can easily be done with a thin piece of wire. Never leave them until the oil is feeding properly because it may result in a hot bearing.

The cross arms and main shafts require more attention than the smaller, due to the added strain put on them. One of the most common places for presses to give out due to lack of oil, is in the cam, and the roller within the large gear which drives the platen. If the cam becomes worn, or the roller flattened or irregular, it will cause the platen to jerk and it will be impossible to obtain a perfect impression. In case there is a grinding or a squeak at any time, some place needs oiling. Do not give up until it is found. A few drops are sufficient and more than this will run onto the press and be wasted.

A good grade of machine oil is best for all parts, excepting the gears which should have a slightly heavier form of lubricant.

Cleaning the Press. Another of the duties of a beginner is usually to clean the ink from the press. Though it requires but little skill, it is a job which should be done carefully and thoroughly.

When a press is to be cleaned for a different color or a fresh run of ink, it will be necessary to remove the rollers in order to clean them properly. Ordinarily it can be cleaned without removing the rollers from the press.

Many pressmen make the mistake of pouring the cleaning solution on the disk of the press while it is running, to work it in and soften the ink. This only

spatters the ink around and causes it to run into inconvenient places to clean. The best method is to start with a dirty rag and clean as much off the disk as possible, and then finish with a clean rag until absolutely clean. In case there may be some hard specks of dry ink on the disk, these may be removed with a spatula, so long as it does not scratch the surface of the plate. Next run the rollers up to a position where the top roller does not quite touch the disk, for in this position it may be easily turned while cleaning. Using a soft rag, rub lightly across the surface and turn the roller until it is entirely clean. If the grippers interfere, they may be held down with the other hand while rubbing. After the top roller is cleaned, run it onto the disk, bringing the second roller into position for cleaning, and so on until all are clean. It may be necessary to reclean the disk and possibly the rollers before all traces of the ink have been removed. For ordinary purposes the best solution is a mixture of gasoline and kerosene, because this will remove most inks very readily and is not injurious to the rollers. If the ink has become hardened it may be necessary to use a weak solution of carbolic acid, which will remove the ink without damage to the rollers.

Make-Ready

Make-ready may be defined as the science of preparing the impression of a type form on the press in readiness for printing. Strictly speaking it may only include those operations necessary for equalizing the impression, but as treated here it includes all the steps necessary for preparing a form to print.

After the form is inserted into the press the first thing to do is to see that the grippers are clear from where the form will meet the platen. The best way is to form the habit of moving them to the extreme sides of the platen until ready for use, because if by mistake an impression be taken over the grippers it will smash the type flat.

Next, the paper clamped over the platen, which is known as "tympan," should be removed and the platen

brushed off to ascertain that there are no bits of dirt clinging to it. A very minute particle may cause a difference in the impression.

There are several methods of arranging the tympan on the press, and expert pressmen will differ as to the best method. The method depends somewhat upon the nature of the job to be printed and may present problems for the pressman, but for the most jobs the following method will prove satisfactory.

A drawsheet, which is a heavy sheet of oiled paper, is used for the top of the tympan. It must be large enough to cover the platen and to allow for clamping over the edges at the top and bottom. This is placed on the platen by clamping the bottom first and then stretching it tightly with the fingers while the top bale is clamped. This will give it a smooth tight surface. Next, select a smooth piece of pressboard, which is a tough cardboard especially for this purpose, and insert under the drawsheet by raising the top clamp. Between the pressboard and the drawsheet insert about two sheets of thinner paper which are slightly smaller than the platen. This pressboard and paper beneath the drawsheet are called "packing," and the size of the type form will determine the amount necessary. For instance, a very small form, such as a name card, requires very little packing, while a large, heavy form may require many sheets. This is true because, where a large amount of type is used, it will require more pressure to make it all print uniformly. The pressman must also know the adjustment of each individual press because it may require more or less packing for the same size form. The safest rule is to put on less packing than what he knows is enough at first, because the impression is easily built up, and will cause no damage to the type.

After the packing has been inserted, reclamp the drawsheet and pull the first impression by hand. It is best never to start the power on a press until the job is ready to run. If the packing is right the impression on the drawsheet will be rather faint, but from this it is easy to judge how much more should be added.

The next step is to set the gauge pins which hold the sheets in place for feeding. The width of the margins of the sheets should first be decided upon and should be marked with points upon the drawsheet the exact distance from the left and bottom of the impression. At least two points should be made on each side so that

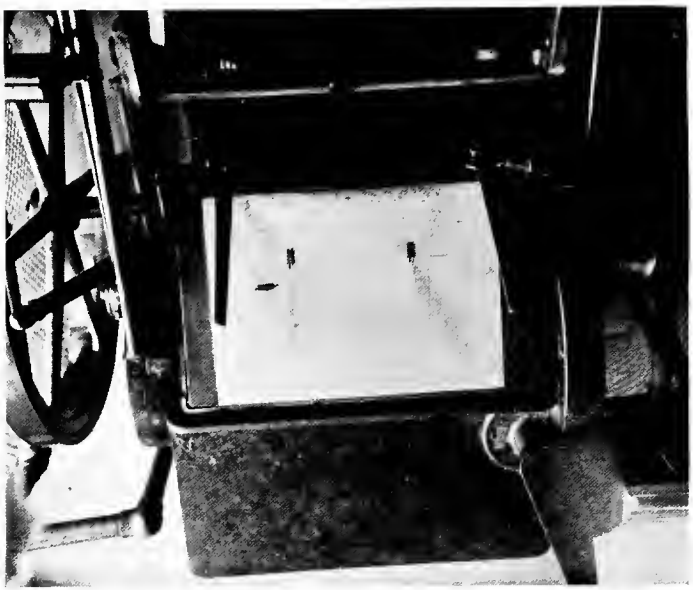


Fig. 72.—Layout of Tympan.

a straight line may be drawn through them. This will bring the lines at right angles to each other as indicated in the illustration.

The pins are then placed two at the bottom and one at the left, because this is the most convenient way of feeding the sheets against them. The first pin should be placed about one inch from the left corner, and the other about the same distance from the right end of the sheet. The end pin should be about the same distance from the lower corner. Most beginners make the mis-

take of placing the end pin too high up, which causes inconvenience in feeding. The pins should be started exactly on the line, and after going through at least one of the packing sheets below the drawsheet should return to the surface. This gives them two points of stability, and will prevent twisting in the paper. The reason for extending the pins through the packing sheets is to permit the placing of a sheet against the pins below the drawsheet later on.

In case spring tongue pins are used, the tongues which project must be adjusted so that they will not interfere with the impression. After the pins are all set a trial impression may be taken on the proper size sheet, and the margins inspected. If the impression is crooked it may be trued by raising or lowering the pins. The equality of the margins may be checked by drawing a straight edge across the paper, or by folding and hold-

Fig. 73.—Overlay Knife.

ing it up to a light. When the pins are accurately placed they may be set with sealing wax, or, in case of some pins, may be tapped into fixed position.

The impression may still be far from perfect and the next step is to equalize it so that all parts are clear and of uniform tone. There are two methods of equalizing the impression: one by building up on the tympan, or Overlaying; and the other by building back of the type form, or Underlaying.

The best method of overlaying is to first mark out the low places on a printed sheet and then paste thin pieces of paper over these low places. In case a variation of overlay is needed overlapping thickness may be necessary.

After the overlay sheet is dry insert it accurately against the pins below the drawsheet. It may also be necessary to cut out certain high parts in the makeready sheet to relieve excessive impression.

Another common method of overlaying is to use a double drawsheet, in which case the upper sheet is unclamped at the bottom and raised until the impression is taken on the under sheet, then reclamped and a second impression taken. This gives two impressions, one directly above the other, and the overlay can be made on the under drawsheet. The objection to this is that after the pins are set it is inconvenient to work on the under sheet.

It is often necessary to raise certain parts of a form which may be low, and this is especially true of forms containing cuts or worn type. The variation between parts may be too extreme for practical overlay and in this case an underlay is resorted to. An underlay is often necessary, too, when the rollers are shrunk so that the ink does not properly cover the form. In such case it may be necessary to place a sheet of paper back of the entire form.

In many large shops making ready is the work of a specialist and much time is spent to obtain almost perfect impressions. Presswork is largely judged from the make-ready on the job and unless it is right, good work cannot be expected.

Press Feeding

Press feeding, which is the process of feeding the sheets into the press for printing, can only be learned by actual operation, and skill is mostly the result of continued practice. Most beginners have difficulty because of nervousness and lack of confidence, but when control is accomplished the motions soon become reflexive and the operations mechanical. The movements in press-feeding, may be thought of as habits, and these habits may be right or they may be wrong depending upon the way the beginner is first instructed. If a press feeder starts at the beginning by being careful, feeding accurately, and watching the impression, he will soon acquire speed and with it these same good habits.

The stock to be fed is placed on the feedboard at the right of the press, in the position best suited for feeding against the pins with the least turning of the

sheets. If the sheets cling together, thus preventing rapid handling, the pile may be fanned out by rubbing the thumb nail over the top. This will slant the pile so that the sheets slightly project over each other, thus making them easy to grasp with the fingers. Before starting the press see that everything is ready. The grippers should be properly set, the throw-off lever in the forward position, and the tympan clean. The ink from the first impression should be cleaned from the tympan with a cloth and benzine, taking care not to move the gauge pins. To start the press it is best to start motion by turning the fly wheel with the hand, thus relieving the strain on the motor. Where an adjustable speed contrivance is used it is also best to give the motor a little additional power to start and then slow down to the desired speed. This is because the load is greater for starting than for regular running and may cause a burnout in the motor windings.

For a beginner the speed should be very slow, not to exceed 800 impressions an hour, if possible, because it will give time to think of the necessary movements. The main thing is for the feeder to adjust his movements with the movements of the press, and to not become confused. Do the right thing at the right time and never worry about losing a sheet of paper. It is better to spoil a thousand sheets rather than to suffer an injury to the hands.

The sheets are fed into the press with the right hand by grasping them between the thumb and fingers. If the sheets are large it will be easier to control them by taking hold well into the hand rather than with the tips of the fingers. Start the feeding motion as the platen is opening so that ample time will be had to accurately insert the sheet before it closes again. Never follow the platen in with the hand to readjust a sheet, because this may cause an accident. After the first sheet is in place send the right hand back immediately for another sheet for the next impression. The throw-off lever is operated with the left hand, and should be drawn back as the press opens, and pushed forward as it closes. The printed sheets are removed from the platen by the left

hand also when the press is open and will not interfere with the necessary operation of the throw-off lever. The throw-off must always be used to avoid an impression when the sheets are not fed accurately, or are not fed at all. If the impression is taken on the drawsheet it will be necessary to stop and clean it off; otherwise it will make an off-set on the back of the next sheet printed. It is well for the beginner to go through the movements of feeding a few sheets with the throw-off lever forward, and then to become accustomed to shifting the lever without inserting the sheets. It is much more economical to feed one thousand sheets an hour and do it well, than to run two thousand sheets an hour and have to throw half of them away. Each sheet should be touching all three gauge pins at every impression or the margins will be unequal. It is well to form this habit even on unimportant jobs because it will be absolutely necessary for jobs which must be fed to register.

SHOP WORK.

GROUP 1.—OPERATION OF PRESS

JOB 1. OILING THE PRESS

Instructions

1. Oil the press completely, including every oil hole, bearing, and joint which may wear from friction.
2. Grease the gears, and cam and cam-way in the large gear wheel, with a heavier lubricant.
3. First, start at the front of the press and oil all parts.
4. Second, fill the oil cups on the cross-arms at each side.
5. Third, oil all parts in the rear of the press.
6. Fourth, put a few drops of oil on each of the rods of the roller carriage.
7. Wipe all excess oil from the press parts, and from the floor.

If left on, oil gathers dirt and tends to clog up the oil-ways.

JOB 2. INKING THE PRESS

Instructions

1. Be sure that the ink disk and rollers are clean and free from dust before applying the ink.
2. Ink the press before inserting the type form.
3. Be sure that the tympan clamps are closed before starting the press.
4. Start the press slowly and add ink in small quantities at the upper left-hand corner of the disk.
5. Put on a trifle less than is deemed necessary for the job. It is easier to add more ink later than it is to remove it if it is too heavy.
6. Run the press slowly during the distribution because the distributing property of the rollers is better if they travel slowly.
7. The size of the type form will determine the amount of ink necessary to a large extent. Small printing forms require less than large forms.

8. If ink is added during the process of printing, apply it in very small quantities at the upper left side of the disk when the rollers are down.

JOB 3. WASHING THE PRESS

Instructions

1. If the press is to be washed for new color, the rollers must be removed and cleaned separately. Where the same color is to be repeated, the press may be washed without removing the rollers.
2. Use a mild cleaning solution and soft rags which do not shed lint. Gasoline and kerosene mixed half-and-half make a good solution for cleaning.
3. First, wash the disk, with the rollers down, by pouring a little of the solution on it. Remove all specks of hardened ink and rub until thoroughly clean.
4. Second, wash the rollers, one at a time, by turning them in position just off the edge of the disk. Run the clean rollers onto the disk as they are cleaned.
5. Third, run the rollers to top position at the disk and clean the plate below them.
6. Fourth, clean the rollers again with a clean cloth as they are moved slowly down the disk.
7. Fifth, reclean the disk with a clean rag.

GROUP 2—MAKE-READY

JOB 1. TYPE BODY FORM

Instructions

1. Insert the chase in the press and move the grippers to a position clear of impression.
2. Prepare the tympan, using a new drawsheet, and a smooth press-board for packing. If additional packing is necessary use sheets of thin paper.
3. Have less than enough packing for the required impression for the trial print.
4. Take an impression on the drawsheet by turning the press by hand.

5. Set the gauge pins (two at the bottom and one at the left), by drawing marginal lines on the drawsheet.
6. If the job is too low on the sheet, the pins must be moved up; if too high, the pins must be moved down.
7. Wash off the tympan with a clean rag and gasoline.
8. Take a trial impression on a cut sheet.
9. From this impression determine the amount of additional packing necessary.
10. Mark any low places which will require extra packing and overlay by packing pieces of tissue paper over these places marked on a sheet.
11. Insert the overlay sheet beneath the drawsheet so that it comes against all three pins.
12. If the form contains type characters which are badly worn and are not type-high, they may be raised slightly by underlaying with strips of paper.
13. When the impression is perfect move the grippers to the margins of the sheet, but not within the limits of the impression.

JOB 2. ENVELOPE FORMS

Instructions

1. Prepare the tympan the same as for Job 1.
2. Take a trial impression on the drawsheet and set the pins so that the impression comes about one-quarter inch from the top, and three-eighths inch from the end of the envelope corner.
3. Take an impression on an envelope and verify the margins and the positions.
4. It will be noticed that the impression is uneven due to varying thicknesses of envelope folds. Hold the envelope to the window, or light, and cut out the portions which are three thicknesses, leaving one thickness. Cutting must be accurate with an overlay knife.

5. Insert this envelope against the pins below the drawsheet so that the single thickness will register with the triple thickness of the envelopes fed.
6. When the impression is even, adjust the grippers in readiness for feeding.

JOB 3. CUT FORMS

Instructions

1. Prepare the tympan the same as for a type body form.
2. Take a trial impression on the drawsheet, being sure that the packing is not too high.
3. Set the gauge pins accurately and move the grippers to a position where they will prevent the cuts from pulling the sheets from the tympan. Be sure that the grippers do not extend over the edge of a cut block.
4. Take an impression on cut stock by hand to ascertain that the sheet is not pulled off by inked form.
5. If the cut is much higher than the surrounding type, it may be necessary to remove it and plane the back down until it is type high. If it is only slightly high, cut out around the impression of the cut and insert it below the drawsheet. This will raise the type impression and reduce the impression of the cut.
6. If the cut is low, paste a piece of paper or cardboard the required thickness on the back of the cut. This will raise the cut to the same height as the type.
7. If the cut is low at the sides or corners, place pieces of thin paper at the back of spots that are low.
8. If the cut is low only at the center, an overlay must be made on a printed sheet and inserted below the drawsheet. Never paste an overlay on top of the drawsheet because it will interfere with the feeding.

9. If the cut contains high lights and low lights (contrasting light and dark tones), it may be necessary to overlay the dark parts to obtain the proper contrast.
10. If the impression pulls the sheets from the platen in spite of the grippers, it may be necessary to extend rubber bands or strings horizontally across between the grippers, crossing in the margins of the sheets.

JOB 4. RULED FORMS

Instructions

1. Prepare the tympan as for a regular form.
2. Pull a trial impression on the drawsheet and set the pins for the desired position.
3. If the rules are sharp, such as hair-line face, adjust the impression to suit the type parts of the form.
4. If the rules are of a wider face, adjust the impression for the form as a whole.
5. If sharp rules press into the paper, it will be necessary to cut away such places in the tympan below the drawsheet until an even impression is obtained.
6. If the rule sections are low, it will be necessary to overlay on the tympan. It may be necessary to spot up single sections of the rule where parts are worn.
7. It may be impossible to obtain a perfectly even impression when a sharp rule is used in combination with type in a form but the rule impression should not be noticeable from the rear of the sheet.

JOB 5. EMBOSSING

Instructions

1. The first essential for embossing is a die on which the design is cut or engraved.
2. The second essential is a compound for making the counter die on the platen. A prepared compound may be obtained which gives best results.

3. Embossing requires great pressure, and a strongly built press is most satisfactory.
4. Remove the rollers from the press because they are not needed.
5. Insert the die, securely locked in the chase, into the press.
6. Glue a sheet of cardboard directly on the platen to prevent moving. Have the cardboard large enough to accommodate the gauge pins.
7. Spread a little of the embossing compound on the cardboard at the point where it will come in contact with the die. Smooth down to about one-sixteenth of an inch and cover with a thin piece of tissue paper which has been oiled.
8. Go over the inside of the die with an oiled cloth to prevent sticking to the counter.
9. Close the press giving a prolonged impression so that the counter will be accurately formed by pressing the compound into the die.
10. Remove the tissue paper and examine the counter for imperfections. If any part is imperfect, add a little more compound and repeat the impression.
11. Trim the surplus compound from the tympan, allowing only the counter to remain.
12. Let the press stand open until the counter is hard as stone. From twenty to thirty minutes is usually sufficient.
13. Set the gauge pins so that the embossing registers accurately upon the sheet.

GROUP 3—FEEDING

JOB 1. SMALL SHEETS

Instructions

1. Grasp the paper with the thumb and fingers of the right hand and bow it slightly without crimping the paper.
2. Insert into the press as the platen opens Do not wait until the platen is entirely open.

3. Strike all three pins before releasing the paper and remove the hand as the press starts to close. Do not place the paper onto the tympan and slide it into place because the tendency is for the sheet to bound away.
4. Remove the sheets with the left hand by placing the index finger on the margin and drawing them to the edge of the platen where the thumb may grasp the under side.
5. If the job is tickets, it is best to either wear a sandpaper finger tip, or grasp with the fingers at the lower edge and the thumb at the upper edge for removing.
6. Adjust movements to the movements of the press, and use the throw-off lever whenever necessary to avoid an impression.

JOB 2. LARGE SHEETS

Instructions

1. Fan the sheets so that the edges will be easier to grasp for feeding. Fan by rubbing the pile with the thumb nail until the sheets project consecutively.
2. Grasp the sheets at the center with the thumb and little finger beneath, and the other fingers outstretched above. Take hold well of the sheet to add to control.
3. Insert in the press as the platen opens, with a sliding motion rather than raising, to prevent bowing.
4. Strike all three pins before releasing the fingers.
5. Remove the sheets with the left hand by grasping with several fingers above in the margin, if possible, and the thumb below.
6. Care must be taken not to touch the inked surface of the printed sheet with the ingoing sheet while feeding.

JOB 3. ENVELOPES

Instructions

1. If envelopes are to be opened before feeding, they will be fed with the flaps toward the feeder. If they are to be fed closed, the flap side will be fed away from the feeder.
2. To open flaps hold a bunch of envelopes in the left hand and, taking hold of the flap with the right hand, slide the flaps within each other until all are together. Bend the flaps back and place on the feed table toward the feeder.
3. Feed by the same method as for small sheets, being careful that they do not spring away from the pins as the press closes.
4. If fed with the flaps open, the flaps may be closed with the thumb of the left hand as they are taken from the press.

V—PRINTING INKS

INK

Manufacture of Ink

Although the manufacture of printing inks is not a part of the printing trade, a slight knowledge will help immensely in the proper use of inks. Many printers know which inks to use on certain jobs, but know not why they use them. Others use the same inks on all jobs and wonder why they do not get results. Of course the first case is much the better, but the progressive printer wants to understand why he does things so he can act intelligently in case of trouble. There is as much difference between inks as there is between the papers on which they are used, and, unless the right kind and color of ink is used, the job never looks well. Much wasted time in trying to get a good print can also be saved if the pressman is able to trace the trouble in the ink.

The manufacture of ink is quite a complicated subject and involves many scientific processes which are not exposed to the public. The general constituents, however, and the way in which they are mixed are all that are necessary for a knowledge of their uses. In the old days printers used to mix their own ink on a slab with dry color and varnish and could make it crudely to suit themselves, but today all we have to do is to use it, and it behooves us to use it right.

Constituents. Ink is mainly composed of pigments and varnish ground together in proper relations to one another to suit different grades of work. The pigments are derived by chemical precipitation from three sources, or kingdoms, as follows:

Mineral Kingdom—Native pigments, artificial pigments.

Vegetable Kingdom—Native pigments, lakes and indirect products.

Animal Kingdom—Native pigments, lakes and indirect products.

From the mineral kingdom some of the native pigments are ultramarine blue, yellow ochre, raw ambre, raw sienna, and India red. These are obtained largely from imported earths. Some of the artificial mineral pigments are, Chinese white, pure scarlet, emerald green, etc., and are derived through chemical action. Almost any pigment can now be closely duplicated by artificial means.

Among the pigments derived from the vegetable kingdom are: indigo, from the leaves of the indigo plant, and yellow lake, from the quercitron bark.

From the animal kingdom are: India yellow, a deposit from the urine of a camel; sepia, from the secretion of the cuttle fish; carmine, from the cochineal insect; and indirectly, lamp-black, the soot of burning vegetable oils.

All pigments are not suited for printing because they do not possess the chemical properties for combining with varnishes, and for producing the clear, even impression required from inks.

The varnishes used are mainly linseed and rosin oils, which are boiled until proper consistency or viscosity is obtained. The former is used in the better grade of inks on account of the property it possesses for absorbing oxygen from the air. When printed into a thin film it forms a smooth, hard coating, dries rapidly and does not rub off. The rosin varnish is used in cheaper inks, dries much more slowly, and is intended for softer paper where it may soak into the stock. Both of these varnishes are made in America, and the linseed oil is very often adulterated causing a great deal of trouble in the working of the inks. The adulterants are usually fatty or mineral oils such as cotton seed and fish oils. These are much cheaper than linseed oil and account for variances in prices of inks.

The drying varnishes are of two kinds; oxidizing, and penetrating. The former, as the name implies, dries by the action of air without soaking into the stock. The other penetrates into the paper, carries the pigment and varnish with it, fixing it firmly.

Mixing. The ink is made by grinding the pigment and varnishes together in a machine with massive chilled iron, hollow rollers, known as an ink mill. The substances are poured into this machine in proper proportions and ground until thoroughly mixed, sometimes requiring six or seven grindings.

Different mills are kept for different colors because it is difficult to wash all of the color out of them. The least speck of one color will throw the next color off

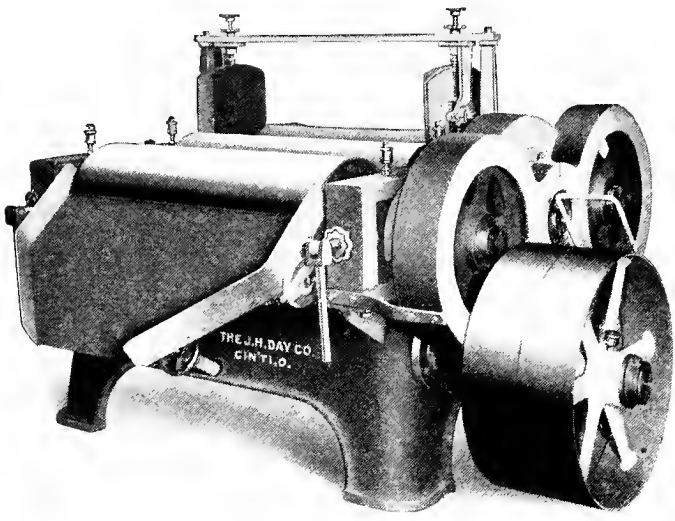


Fig. 74.—Ink Mill.

shade. Some inks must be ground hot and others cold, and for this reason the rollers are hollow so that water of the proper temperature may be run through them. An ink maker must be a chemist, a dyer, a color printer, and above all have a perfect eye for colors. If given a sample color he must be able to make ink to match exactly, and at the same time have it suitable for the particular kind of work for which it is to be used.

Properties and Uses

Covering and Coloring Properties. The covering and coloring properties of inks are not infrequently confused but are distinctly different.

The covering power is one of the most, if not the most important property of a pigment and it varies greatly in different pigments. It is that property which an ink has for covering the stock evenly and absolutely. If it allows the color beneath it to show through it is not esteemed a good covering ink, that is, it is not opaque.

An ink may be almost transparent and yet be of a very bright color, such as carmine, lakes, ultramarines, etc. This is known as coloring property. Of course inks may possess both qualities or they may be sadly deficient in one or the other. Cover papers usually require inks that have both good covering and coloring qualities so that the color of the stock will be entirely covered and at the same time be true to color.

Suiting Ink to Stock. The kind of ink used on any job should be determined by the paper stock. Rough, heavy colored stocks need an entirely different kind of ink from smooth paper. The colored papers require an opaque ink—that is, ink made from such pigments that no light is able to penetrate through it. A heavy cover ink has about twice as much pigment in it as the ordinary transparent ink.

If the stock be bond paper a stiff tacky ink is necessary for good results. The surface of this kind of paper is hard and a soft ink will not adhere evenly. An enameled stock has a sensitive coating and a soft ink must be used to prevent the tack of the ink from pulling off the coating. Different kinds of paper also require different amounts of ink depending upon their absorbing qualities.

Half-Tone Inks. Half-tone cuts are usually printed on a smooth, coated stock and therefore require a soft ink with great covering ability. The best results in half-tone black printing are obtained by carrying the body of the ink as heavy as the surface of the paper will stand

without "picking." This will leave a black impression by carrying very little ink. Many pressmen reduce half-tone inks with varnish to prevent picking the stock. This is altogether wrong because varnish is colorless and while it lessens the tack, it also destroys the color. The ordinary half-tone ink is mixed with a No. 1 varnish because this grade is best suited for high finished papers. The same ink ground in No. 000 varnish, three grades softer, is best for reducing in case the ink picks. If this is added gradually it will adapt itself to the surface of the paper and will not destroy the coloring quality of the ink.

The very best grade of half-tone ink should be used for platen press work, because the distribution is not nearly as good as on cylinder presses.

Job Blacks. Job inks are made heavier and stronger than inks intended for half-tone work. They are ground in a more tacky varnish and dry more quickly and harder. These inks are only intended for paper having a firm surface and would pull the coating from enameled stocks. If it is desired to reduce blacks to be used on laid or woven papers, it may be done by adding a little half-tone black.

Ink Mixing. It is frequently necessary for a pressman to match a specified color of ink by mixing ink that he has in stock. This he can do if he has a well developed color perception and understands his inks. A glass plate is best suited for this purpose because it is easily kept clean, and a palette knife is best for mixing. The colors must be kept free from dirt because a small speck of coloring substance may throw the whole mixture off.

If a certain color is to be matched it is best to rub a small quantity of the original thinly on a piece of paper, because this will best show the true color. The proper colors, whose added value will produce the desired color, will then be mixed. A knowledge of water colors will be a great aid in obtaining colors from combinations of other colors, and also in the proportions needed. The darker color should always be added to the lighter gradually until the proper tone is achieved.

Tints are made by adding the body color to Mixing White ink, never the reverse. Add a little at a time, experimenting until the proper tint is secured. If a shade is desired, add black, or some darker color to a volume of the lighter color. Mix thoroughly until the new color is uniform throughout.

Ink Troubles and Remedies. Ink troubles are usually the fault of the pressman in not knowing the proper care and uses of inks. In many cases much time lost and anxiety may be saved by good judgment and simply understanding the nature of ink. If left exposed to the air it soon loses much of its moisture and a crust forms over the top. Not only is the crust wasted, but specks of this crust will mix with the ink below it when removed. These specks cake the ink in the disk, cling to the rollers, and fill the type in the form. Ink of this nature can never be used with good clean results.

Temperature has a great effect upon ink. If ink gets cold it becomes thick and will not spread properly. If it gets too warm it gets soft and loses its tack. The best temperature for ink is about 70 degrees F. The remedy for cold ink is to raise the temperature until it becomes natural. For warm, soft ink, add a stiffer ink or varnish.

If ink is too stiff and picks the paper, it should be reduced. If it causes a mottled impression it requires a heavy varnish to give it tack. If it offsets, the ink is too heavy, or requires more drying.

The doctoring of inks with prepared liquids and pastes should be avoided as much as possible. In a few cases the patent chemicals may be helpful, but, unless the pressman knows what the result will be, he will most likely destroy some of the working properties of the ink. None but a chemist can tell what the reaction of chemicals will do, and what may help one ink may be absolutely wrong for another. The best method is to have two grades of the same ink for reducing and adding tack.

Mixing of Colors and Tints.

Green—Yellow and Blue.
Orange—Yellow and Red.
Purple—Red and Blue.
Maroon—Lake Red, Black.
Flesh—Yellow, White, Red.
Gray—White, Yellow, Black.

Drab—White and Black.
Cream—Yellow and White.
Pink—White and Vermillion.
Snuff—Yellow and Bismark Brown.
Old Gold—White and Persian Orange.
Lemon—Chrome Yellow and White.
Violet—Red, Blue, White.
Chocolate—White, Red, Black.
Rose—White, Yellow, Vermillion.
Salmon—White, Yellow, Red.
Lilac—Red, White, Blue.
Dove—White, Vermillion, Blue.
Brown—Yellow, Red, Black.
Buff—White, Yellow, Red, Black.
Pearl—White, Blue, Yellow, Black.
Olive—White, Yellow, Green, Black.

SHOPWORK
GROUP 1—INK MIXING
JOB 1. TINT MIXING

Instructions

1. Select a standard color from which to mix a tint of this color.
2. Use a clean glass plate upon which to mix.
3. Use a palette-knife for mixing.
4. Use mixing white ink for the body and add color to the white in small amounts; never the reverse.
5. Use the amount of white ink necessary for the job, and the color added will prevent shortage.
6. Mix thoroughly after each addition of color, and test on white paper for the desired tone.
7. When the desired tint is obtained, mix for several minutes to insure that the color is even and will not streak when used.
8. Tabulate data of proportionate amounts for future reference.

JOB 2. COLOR MIXING

Instructions

1. Select a color from the list of color combinations given in this section.
2. Use a clean glass plate to mix inks upon.
3. Use a palette-knife for mixing.
4. Mix a little more than is necessary for a given job, because it may be difficult to match if more is needed.
5. Decide which color is the body color of the several colors to be used, and add other colors to it.
6. Add colors in small quantities to the body and mix thoroughly after each addition until a single color results.
7. Examine the mixture continually so that too much of any one color will not be added.
8. When the desired color is obtained compare it with a printed specimen of the same color for correctness.
9. Remember the general proportions used of each color for future use.

JOB 3. MATCHING COLORS

Instructions

1. Select some unusual color of ink from stock and spread a little on white paper with your finger.
2. Use this color for a sample to match by using other colors.
3. Decide which is the predominant color and use this color for the body of mixing.
4. Add other colors which will be likely to help in obtaining the desired tone in small quantities, and after mixing inspect for results.
5. When the approximate color is obtained spread a little on white paper and compare it with the original. Decide from this what is necessary for the true color.
6. White and black inks may be used to lighten or darken the tone, but great care must be used not to add too much.
7. When the true color is derived examine with an eye microscope for corrections.
8. Keep data on colors and amounts used so that a formula may be computed.

VI—PAPER

PAPER MAKING

The subject of paper, that indispensable medium which bears and preserves the printed history is far too broad to treat generally in any one textbook. Therefore, only those facts which are of vital importance for the printer's working knowledge can be treated here in abstract form. Probably no other substance has such extended use in so many various forms, functioning in every form of business, and yet is so little known and appreciated as paper. We seek and admire many of the designs and much of the information which it bears, and totally ignore the background which underlies them.

The term paper had its origin from the papyrus plant, which was first used by the Egyptians by splitting the stalk of the plant and pasting the layers together to make a sheet. Other early forms of paper were made from skins of sheep and goats, and of these our present parchments and vellum are imitations. Until well into the eighteenth century paper was all made by hand, and for this reason it was expensive and found only among the better classes. The first paper mill was erected in England in 1498, and the first was built in this country near Philadelphia in 1690, both of which made paper on a large scale by hand. In the middle of the eighteenth century several machines were invented which aided in the making of paper and these mark the dawn of our large paper industries.

The most important part of paper is made of fiber, which is the strength yielding element. This fiber is always a vegetable product. Almost any kind of vegetable fibers can be used in paper making, but those which are longest, strongest, and cheapest are the best. Of our native fibers, flax, cotton, and wood are most used. The better grades of papers are made from linen (flax), and cotton fibers, obtained from old rags and trimmings from shirt and collar factories. The largest part of the

papers used for printing purposes, however, is made from wood pulp because of a comparatively lower price.

Rag Paper. When paper is made from rag fiber the process is much simpler than when made from wood fiber. The first process is to reduce the fiber to a pulp, and if the linen or cotton rags are white they only have to be dusted and cooked with steam in an alkaline solution. If the rags are mixed they must first be sorted and graded before cooking. After the pulp is formed the next process is to bleach it with a chlorine solution so that it will be white. It is then sent through the Beater and Refining engine where the fiber is beaten and ground into the socalled "stuff," and thence to the paper machine where it is finished.

Wood Pulp. Inasmuch as most of the paper which is used in the printshop is wood pulp paper we are more interested in the process of its manufacture. The detailed processes of the various kinds of paper differ somewhat in manufacture but the general routine is the same.

Almost any kind of wood, such as poplar, spruce, birch, maple, hemlock, etc., can be used for paper making, but the larger part of the papers made in this country are made from spruce and hemlock. The pulp mills, whose business it is to produce the pulp in bale form, are usually located near the source of supply, and along rivers where water power is obtainable. For this reason many of the largest mills are located in Canada at the edge of large forests. The trees are cut down, graded, and hauled to the mill, where they are cut into short logs and stripped of their bark. The bark does not contain the fiber element and only the hard part is used for pulp.

The logs are put on incline tracks and carried by chains to the hoppers where they are held against huge grindstones and ground to fine chips. They are next elevated to the top of a large kettle called the "digester" or cooker, in which they are cooked in a sulphite solution until the fibers are separated and become softened, but not decomposed. After the fiber has been thoroughly washed it is ready for the pulp machine, if it does not require

bleaching, as in case of some kinds of wood used for print papers. If it is to be bleached, the fiber, which is in soft, moist form, is run into a vat where it is bleached with a chlorine solution. It is then washed thoroughly to relieve it of all chemicals, and run on to the pulp machine. The pulp machine consists of a long canvas belt and a large wooden cylinder with a table in front of it. The pulp is picked up by the belt passing through it and travels in a continuous layer on the upper surface to the cylinder which revolves in conjunction with the belt, and collects the pulp in the form of a blanket. When the blanket of pulp has accumulated to the desired thickness around the cylinder it is stripped off onto the table and folded in the form of bales. It is now ready for shipment to the paper mill where it is made into paper.

Manufacture of Paper. At the paper mill, which may be located distant from the pulp mill, the pulp is again mixed with water into liquid form. It is first put into a "Beater," which beats the pulp and again separates the fibers. Here the other constituents which go to make up the paper such as fillers, coloring material, etc., are added, and all are thoroughly mixed. From the beater the "stuff" as it is now called, is put into the refining-engine, or "Jordan," where it receives its final mixing and grinding. It then passes through a sand trap which contains running water, and the sand and other foreign substances separate from the stuff and sink to the bottom. It is then ready for the paper machine.

The paper machine is a long machine consisting largely of rollers through which the paper passes in the process of its making. The ends of the machine are known as the "wet" end and the "dry;" the wet end where the plastic stuff enters, and the dry end where the finished product comes off. A gate is stationed at the wet end which controls the passage of the stuff into the machine. It is seldom changed, however, because the thickness of the paper is adjusted by changing the speed of the machine itself. As the stuff emerges from the gate it flows upon a belt made of fine copper mesh

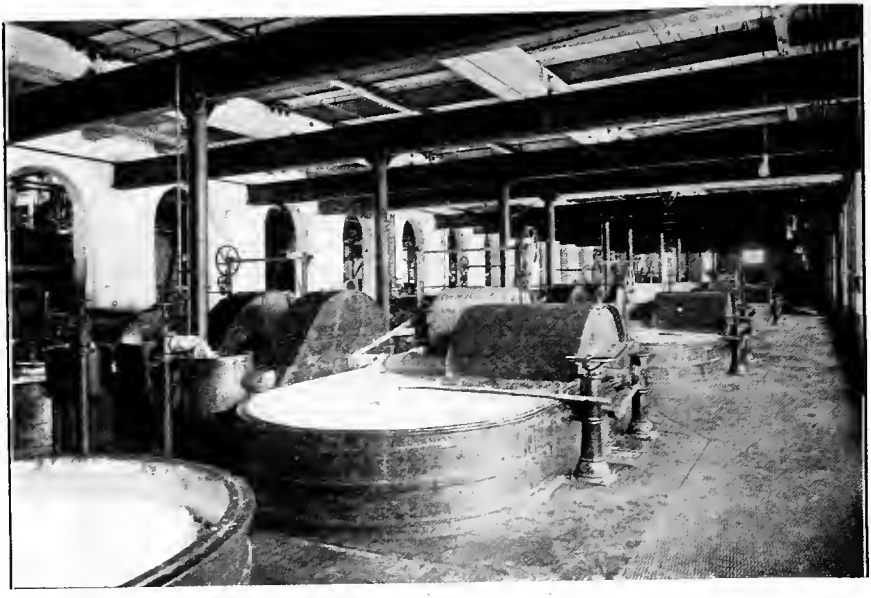


Fig. 75.—Paper Beater.

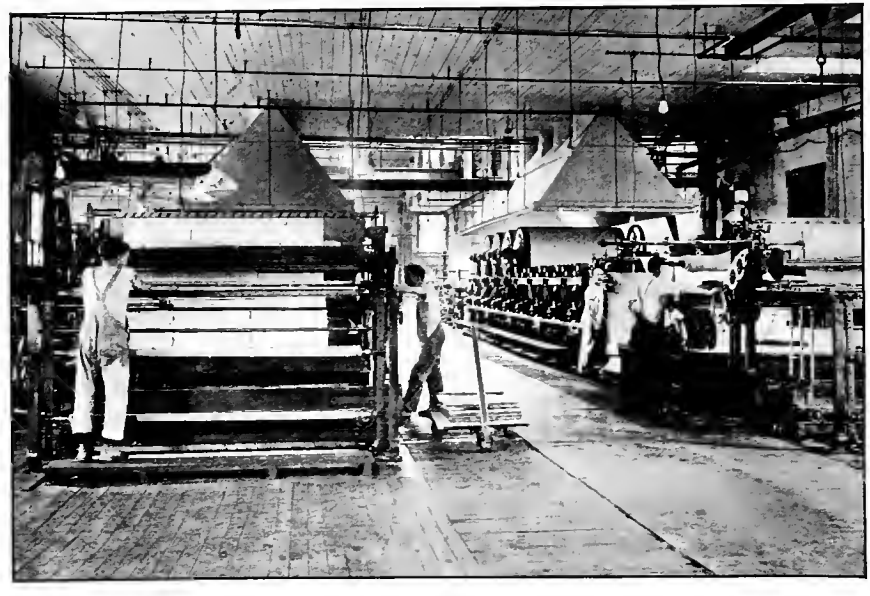


Fig. 76.—Dry End of Paper Machine.

which moves forward at a uniform rate. A sideways vibration of the belt tends to set the fibers at various angles causing them to mat together. While moving forward on the screen much of the water soaks through, and suction boxes are located beneath the belt to aid in removing the water. Rubber belts, known as "deckles," prevent the stuff from running off the sides of the screen. The paper then passes between felt covered rollers and drying rolls until all the moisture has been pressed and steamed out of it. As soon as it becomes dry it continues in the form of a paper web independently of belts, through many rolls where it undergoes various finishing processes.

If the paper is to be "watermarked" with a name or trademark, it passes beneath a "dandy-roll" on which the design is raised with thin wire. The weight of the cylinder presses the mark into the moist paper, making it thinner in that place. After it is thoroughly dry it passes through calendar rolls which give it the finish desired.

When the paper leaves the dry end of the machine it is wound in large rolls ready for shipment, unless it is to be cut into sheet sizes. The cutting is done on machines automatically, directly from the rolls, after which the sheets are counted and packed in ream or case lots.

Kinds and Uses of Papers

There are many different kinds and varieties of papers on the market for printing purposes today, in fact so many that it would be impossible to name and describe each one separately. The bulk of these papers which are representative for the school shop, however, may be classified into six main groups according to their general characteristics and uses. There are many special kinds that are hard to classify under any of these heads, and it is impossible to draw lines distinctly dividing the groups because they tend to blend from one class into the next.

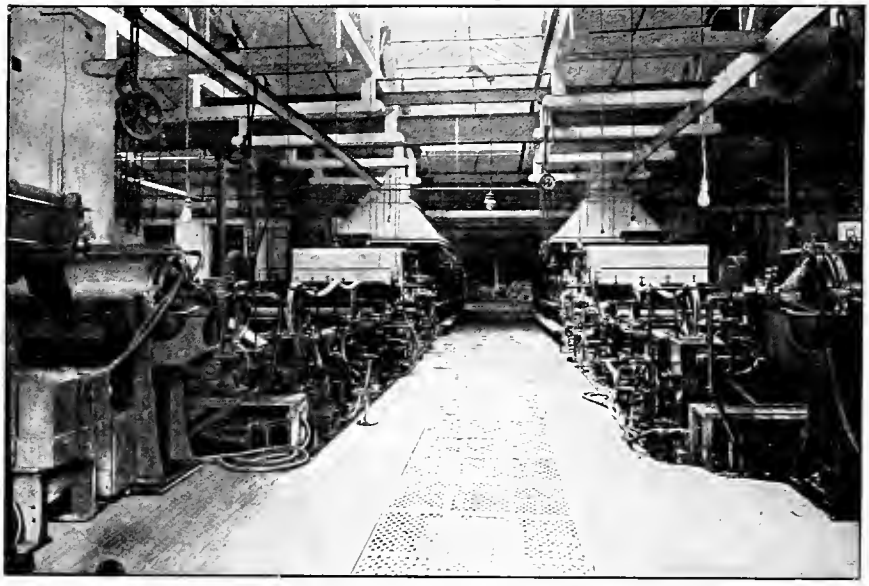


Fig. 77.—Wet End of Paper Machine.

Fig. 78.—Paper Stacked Ready for Inspection.

1. News Print.
2. Book Papers.
   Machine Finish, Supercalendered, Antique Book, English Finish, Offset Papers, Uncoated and Coated Book.
3. Writings.
   Bonds, Fines, Typewriter Papers, Ledgers, Linens, and Special Finish.
4. Card Boards.
   Binder's Boards, Index Bristol, Mill Bristol, Tag Board, Coated Boards, Etc.
5. Cover Papers.
6. Onion Skins and Tissues.

News Print. Print papers are among the cheapest grades of papers, used for newspapers, cheap circulars, posters, etc., and are made largely from wood pulp and with very little finish.

Print is shipped in flat sheet reams (500 sheets) for flat-bed presses, and in large rolls for use on rotary presses. It is not suitable for pen writing, and therefore can only be used for straight printing purposes.

Book Papers. Book papers are divided into several classes, such as, M. F. (Machine Finish), Supercalendered, Antique, Enameled, etc., and there is a vast difference in the different kinds. The most common of these is the soft, dull-finish, known as the Machine Finish paper which is used for most books, magazines, circulars, etc. The enameled papers, known as coated, are also extensively used for printed matter where cuts occur, and where a luster is desired. They are given an extra coating of enamel and finished very smoothly, either highly polished or dull finished. The majority of book papers are made from wood pulp to which is added a cellulose filler which gives it a firmer body. It is difficult to distinguish some of the cheaper book papers from some of the better print papers unless one has a good knowledge of papers.

The following are the standard sizes and weights based on the substance number plan:

Size		Weight										
25	x 38	30	35	40	45	50	60	70	80	90	100	120
22	x 32	22	26	30	34	37	45	52	60	67	74	89
24	x 36	27	32	36	41	45	55	64	73	82	91	109
25	x 38	30	35	40	45	50	60	70	80	90	100	120
26	x 29	24	28	32	36	40	48	56	64	72	80	95
26	x 40	33	38	44	49	55	66	76	88	98	110	131
28	x 42	37	43	50	56	62	74	86	99	111	124	148
28	x 44	39	45	52	58	65	78	91	104	116	130	155
29	x 52	48	56	63	71	79	95	111	127	143	159	190
30½	x 41	40	46	53	59	66	79	92	105	119	132	158
32	x 44	44	52	59	67	74	89	104	119	133	148	178
33	x 46	48	56	64	72	80	96	112	128	144	160	192
34	x 44	47	55	63	71	79	95	110	126	142	157	189
35	x 45	50	58	66	75	83	100	116	132	149	166	199
36	x 48	55	64	73	82	91	109	127	146	164	182	218
38	x 50	60	70	80	90	100	120	140	160	180	200	240
41	x 61	79	92	105	118	132	158	184	211	237	263	316
42	x 56	74	87	99	111	124	149	173	198	223	248	297
44	x 56	78	91	104	117	130	156	182	207	233	259	311
44	x 64	88	104	118	134	148	178	208	238	266	296	356

Writings. Writings are so termed because of their adaptability for writing purposes. They are extensive in character, ranging from bonds and ledgers, which have a hard finish and suitable for pen writing, to flats which are only suitable for pencil and typewriter uses. Bonds are used for practically all of the better forms of commercial blanks and stationery, and are usually made from rags and linens.

Ledgers are very similar to the bonds in many respects, having the dull finish and firm, even texture, but are heavier in weight. They are used for blanks and forms which are to be used for records, and documents of a more permanent nature. They are made of both wood pulp and rags, and due to their added thickness may conceal many imperfections which would be obvious in bonds.

The Flats and Typewriter papers are generally of the cheaper grades of papers used for writing purposes,

having a smooth surface, but of a less solid texture. They are usually sized and finished and are often suitable for pen writing. They are used for printed blanks, tablets, and cheaper grades of commercial stationery. While most flats are made from wood pulp, many contain a mixture of wood and rag fiber. It is often difficult to draw a solid line between these and some of the better grades of print and book papers.

The following sizes may be considered as regular:

14 x 17	26 x 34	17 x 26
17 x 28	19 x 24	18 x 23
28 x 34	24 x 38	23 x 36
16 x 21	19 x 26	21 x 33
21 x 32	26 x 38	30 x 38
16 x 26	19 x 28	20 x 38
17 x 22	28 x 38	28 x 40
22 x 34	19 x 30	28 x 42½
22 x 25½		

Cardboard. Cardboards include a very wide range of heavy papers of a board nature, such as bristols, tagboards, strawboards, coated boards, and many others. They are used for many purposes such as tickets, business cards, record cards, binding boards, etc., in fact almost anywhere a stiff texture is needed. Cardboards are made from many different kinds of fiber, depending upon the variety, but most of them are made from wood and straws. Some are made the required thickness when run through the paper machine, while others are made in layers of paper and pasted together, as indicated by the names two-ply, three-ply, six-ply, etc. The mill bristols are of this make-up.

The following may be considered regular sizes:

Size	Weights
25½ x 30½	—110—140—170—220
20½ x 24¾	— 72— 91—111—143
22½ x 28½	— 91—115—140—181

Cover Papers. Cover papers also include many kinds and varieties of stock of many weights, colors, and finishes, but are more suited to the one use, that of covers for booklets, pamphlets, etc. They are not intended for writing purposes, and therefore are usually softer and rougher in finish than the previous kinds of stock. Great care must be used in selecting the covers for each indi-

vidual job for appropriateness in texture, color, weight, etc., and for this reason they are not often carried in stock in large quantities. One of the best ways for a student to become acquainted with the various kinds of papers is to examine the sample cabinets furnished by jobbing houses. The samples will be found interesting as well as instructive, and the advertising designs often furnish ideas for the proper use of the stock together with harmonious colors of ink and stock.

The regular sizes are as follows:

(*a*) Regular Sizes—
20 x 26 }
23 x 33 } and multiples thereof

(*b*) Regular Substances—
20 x 26—25, 35, 40, 50, 65, 80, 90.

Onion Skins and Tissues. The papers under this group are of light weight and thin in nature, and are used for purposes where a very thin paper is desired. These papers are made from both rag and wood fiber and vary from a smooth, glazed finish to that of the character of thin bonds.

Regular sizes of Onion Skins and Manifolds:

14 x 17	19 x 24
17 x 22	22 x 34
17 x 28	

Regular sizes of the Tissues:

10 x 15	18 x 24
12 x 18	20 x 30
15 x 20	24 x 36

Special Stocks. Other kinds of papers which are often kept in stock, but which are not as commonly used as those listed are: Gummed paper for labels, stickers, etc.; Blotting paper, both plain and coated for printing; Wrapping paper, for package wrapping; Binding papers, such as Marble finish, Carbons, etc.; and Tympan papers, for use on presses.

The sizes of papers in flat sheets vary somewhat with different dealers, and almost any size may be obtained in large amounts upon special order, but the given sizes are now nearly standard in all parts of this country. The standardization of paper sizes prevents the whole-

sale dealers from carrying enormous supplies of odd size stock, and thereby reduces the amount of unnecessary investment.

Sizes and Weights

In ordering paper for any given job the size will be determined by the size of the sheet to be printed, that is, the size which will cut to the best advantage with the least amount of trim or waste.

Weights. The weights of paper vary with the different kinds, sizes and thicknesses, though in most papers there is a regular substance weight upon which all sizes are based. This substance weight is a weight which is applied to some regular size of stock, and upon which all other sizes of the same grade of paper are computed. The weight is based upon the number of pounds per ream, or 500 sheets, in flat papers and cardboards, and per hundred sheets in most cover stocks. When we say that a sheet of paper is 24 lb. stock, we mean that it comes from a ream of paper that weighs 24 lbs. for the given size.

In ordering paper from catalogs the weight is usually indicated by the number directly following the size, as, 17 x 22—24, in which the size is 17″ x 22″ and the weight is 24 lbs. per ream.

Relative Weights. By relative weights of paper is meant the relation between sizes for the same substance weight. For instance, we may have a ream of 19 x 24—28 bond which is a suitable weight for a job, but the size is entirely unsuitable for economy in cutting. It is found that 17 x 22 would be the best size, so the problem is to find what weight it would be from the 19 x 24—28 basis. We can find this by finding the weight of one square inch, by dividing the known weight, or 28, by the known size, 19 x 24, and multiplying the result by the desired size or 17 x 22, which would give us the desired weight. This may be summed up in the following formula in which cancellation will simplify the work:

$$\frac{\text{Known Weight} \times \text{Desired Size}}{\text{Known Size}} = \text{Desired Weight.}$$

Stock Figuring and Cutting

The subject of stock figuring deals with the calculating of the paper necessary for any given job and the cost of the same. Each job involves a new problem for computation and must be figured very accurately to avoid waste and mistakes. The nature of the stock should also be known because some papers, especially cover papers, have grains which permit folding only one way.

The number of sheets of stock necessary for the job is first determined by the number of sheets of the desired size that can be cut from the sheet. This is found by dividing the desired size into full sheets as follows:

Desired size for job— 6¼″ x 9½″
Size of stock ————19 ″ x 25 ″

	6¼	x	9½		9½	x	6¼
¼—19	x	25	—6	0—19	x	25	—0
	3	x	2 =6 to sheet		2	x	4 =8 to sheet

It will be noted that by dividing the 19 by 6¼, and the 25 by 9½, only 6 can be cut to the sheet, with a strip of trim 6″ x 19″. In the second case, by reversing divisors, we can get 8 to the sheet without waste.

From this we can see that it is always advisable to try both ways to be sure of the most economical method of cutting. Occasionally it will be found that neither way will give the largest possible number, and it is always well to draw a diagram for a check.

The number of sheets of stock required for the entire job can next be found by dividing the desired number of cut sheets by the number which can be cut from one sheet of stock. For instance, if the desired number is 5,000 and the number that can be cut to the sheet 9, then the number of sheets required will be 5,000 divided by 9, or 556. Where a fraction of a sheet occurs, the full sheet is always taken.

The price of the stock can next be found by multiplying the price per ream by the number of reams needed. For instance, if the weight of the paper is 24 pounds to the ream at 20 cents a pound, the price of the ream

will be \$4.80. For 556 sheets it will be $\frac{556}{500} \times \$4.80 =$ \$5.34. Of course in actual practice a few extra sheets are allowed for spoilage, and the figures may be more approximate, but it is well to form the habit of figuring accurately at the beginning.

Paper Cutting. The cutting of the paper does not appear difficult, but it takes considerable practice to do it accurately.

Fig. 79.—Hand Paper Cutter.

The paper cutter as shown in the illustration consists mainly of a bed upon which the paper is placed and measured, a clamp for holding it in position, and a cutting knife.

The adjustable gauge at the rear must be set for the desired measurement by turning the small wheel in front. A brass rule in the bed extends backward and

forward from the cutting line and is graduated into inches and fractions of an inch. In most cases the measurement is made on the back rule and the front rule is used as a check, because the paper is jogged to the back gauge.

In placing the paper into the cutter it is best to take a few sheets at a time and jog them evenly against the back gauge at the left housing to assure a square cut. As large a number as desired can be cut at once, up to the capacity of the cutter. It is always advisable to have a strip of heavy cardboard below where the paper is to be cut to avoid spoiling the last few sheets, and also to prevent the impression caused by the pressure of the clamp. When the paper is in place, screw the clamp down tightly and cut it with a steady pull of the lever. Never chop it off because it will show on the edge of the paper. Many of the larger shops have power paper cutters in which the knives are operated by power rather than a hand lever. This saves time and energy and enables the cutting of much more stock at once.

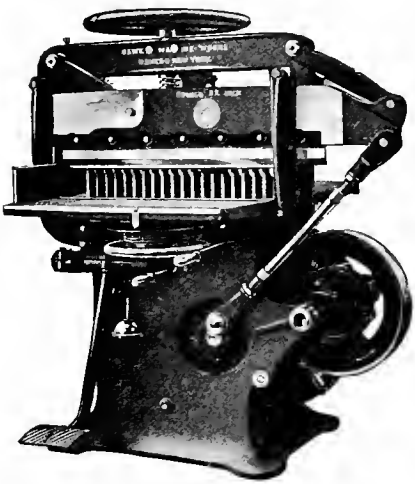


Fig. 80.—Power Paper Cutter.

There are many problems of cutting that cannot be taken up here, and will only be met through experience. A beginner must keep a cool head so that he will make no mistakes, and take time enough to be very exact. At all times he must be careful not to get his fingers under the cutting knife, because it will cut fingers as easily as it will paper.

Stock Cutting Tables[1]

With large scale production and labor saving machinery in effect in the printing industry, it would hardly be economical to spend time figuring stock problems by

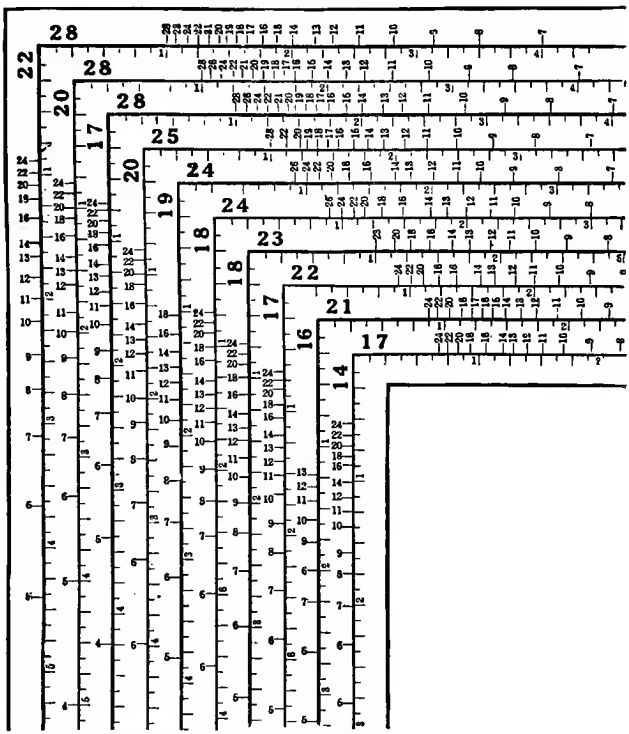


Table No. 1.

long hand methods and with paper and pencil. For this reason a series of tables have been prepared by Mr. R. T. Porte, of the Porte Printing Co., Salt Lake City, Utah, which will quickly and accurately furnish the results desired for any step of stock cutting, and cost figuring, by merely reading the correct table.

[1]This section, including the tables, is reprinted with revisions with the permission of Mr. R. T. Porte from an article published in the **Inland Printer**, April, 1919.

	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
1	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
2	250	500	750	1000	1250	1500	1750	2000	2250	2500
3	167	334	500	667	834	1000	1167	1334	1500	1667
4	125	250	375	500	625	750	875	1000	1125	1250
5	100	200	300	400	500	600	700	800	900	1000
6	84	167	250	334	417	500	584	667	750	834
7	72	143	215	286	358	429	500	572	643	715
8	63	125	188	250	313	375	438	500	563	625
9	56	112	167	223	278	334	389	445	500	556
10	50	100	150	200	250	300	350	400	450	500
11	46	91	137	182	228	273	319	364	410	455
12	42	84	126	168	209	250	292	334	375	417
13	39	77	116	154	193	231	270	308	347	385
14	36	72	108	144	179	215	250	286	322	358
15	34	67	100	134	167	200	234	267	300	334
16	32	63	94	125	157	188	219	250	282	313
17	30	59	89	118	148	177	206	236	265	295
18	28	56	84	112	139	167	195	223	250	279
19	27	53	79	106	132	158	185	211	237	264
20	25	50	75	100	125	150	175	200	225	250
21	24	48	72	96	120	143	167	191	215	239
22	23	46	69	91	114	137	160	182	205	228
23	22	44	66	87	109	131	153	174	196	218
24	21	42	63	84	105	125	146	167	188	209
25	20	40	60	80	100	120	140	160	180	200
26	20	39	58	77	97	116	135	154	174	193
27	19	38	56	75	93	112	130	149	167	186
28	18	36	54	72	90	108	125	143	161	179
29	18	35	52	70	87	104	121	138	156	173
30	17	34	51	67	84	100	117	134	150	167
31	17	33	49	65	81	97	113	130	146	162
32	16	32	47	63	79	94	110	125	141	157
33	16	31	46	61	76	91	107	122	137	152
34	15	30	45	59	74	89	103	118	133	148
35	15	29	43	58	72	86	100	115	129	143
36	14	28	42	56	70	84	98	112	125	139
37	14	28	41	55	68	82	95	109	122	136
38	14	27	40	53	66	79	93	105	119	132
39	13	26	39	52	65	77	90	103	116	130
40	13	25	38	50	63	75	88	100	113	125

Table No. 2.— Giving the Amount of Stock Necessary for a Job.

The first thing necessary in figuring the stock for any given job is to find the number of desired size sheets that can be cut per sheet of stock. This can be done by dividing the desired dimensions into the dimensions of the large sheet. It is much quicker, however, to use a scale having the various stock sizes of sheets marked on it, and a diagram showing how many can be cut from the different sizes. Such is too large to be reproduced in full in this book, but enough is shown to illustrate how it can be used.

Some of the paper houses issue scales of this character as advertisements and it will be found of great value if one is obtained.

	First Color	Each Extra Color	Binding.
250 or less	10%	5%	5%
500 or less	6	4	4
1,000 or less	5	2½	2½
5,000 or less	4	2½	2
10,000 or less	3½	2½	2
25,000 or less	2½	2½	2
Over 25,000	2	2	2

Table No. 3.—Showing Allowance for Spoilage.

Having found the number of pieces of the required size that can be cut from the full sheet, the next thing is to find the number of full sheets necessary for the job. For this table No. 2 will be employed. The given scale shows exactly how many sheets of paper are necessary, and by using decimals almost any quantity can be figured.

For example, suppose the job calls for 4,000 pieces which will cut twenty-three out of a sheet. To figure this out with pencil and paper requires some few minutes, but by referring to the scale the amount is found immediately. It will require 174 sheets to do the job.

But the scale gives only the actual number of sheets without allowing for spoilage. For this reason the third table is used which shows what percentage of paper should be added in order to allow for spoilage.

As we figured 4,000 on the job, suppose we add four per cent to the 174 sheets, which is about 6 sheets. All right, but how many pounds of paper would this amount to if the job is to be printed on 17 x 28, substance No. 20? We must find the ream weight of that size paper and substance numbers, and by referring to the scale of the substance numbers (Table No. 4) we find the ream weight to be 25½ pounds.

Having found the ream weight we must next find the weight of 180 sheets. The long way is to multiply the number of sheets by double the ream weight and point off three decimals:

180 sheets of paper.
51 the weight of 1,000 sheets.

180
900

9180 result.

By pointing off three decimals we find that the weight of the paper is 9.18 pounds—providing no mistake has been made. A better, quicker, and more accurate method is to use a positive scale like that shown in table No. 5, which gives the most used ream weights of bonds, flats, and book papers, and the various numbers of sheets from 5 to 500.

What does the scale give? 100 sheets, 5.10 and 80 sheets, 4.08; total, 9.18—a single operation and done without the possibility of any mistake occurring in the figures.

If the job requires 1,800 sheets instead of only 180, simply move the decimal point one figure to the right and you have 91.8 pounds. If the job calls for 18,000 sheets, move the decimal one more figure and you have 918 pounds.

The same method may be used in figuring book-paper, but here we may have another complication, as it may be necessary to figure the number of sheets required for a book or 128 pages, running 16 page forms, and 2,000 copies. To figure this out requires some time as it is necessary to get the number of forms, and to remember

WRITINGS.

Size	Substance Number								
	13	16	20	24	28	32	36	40	44
16 x21	11½	14½	18	21½	25	28½	32½	36	39½
16 x42	23	29	36	43	50	57	65	72	79
17 x22	13	16	20	24	28	32	36	40	44
17 x28	16½	20½	25½	30½	35½	40½	46	51	56
18 x23	14½	17½	22	26½	31	35½	40	44½	48½
18 x46	29	35	44	53	62	71	80	89	97
19 x24	16	19½	24½	29½	34	39	44	49	53½
20 x28	19½	24	30	36	42	48	54	60	66
20 x56	39	48	60	72	84	96	108	120	132
21 x32	23	29	36	43	50	57	65	72	79
22 x34	26	32	40	48	56	64	72	80	88
22 x38	29	36	44½	53½	62½	71½	80½	89½	98½
22½x22½	17½	21½	27	32½	38	43½	48½	54	59½
22½x28½	22½	27½	34½	41	48	55	61½	68½	75½
22½x34	26½	32½	41	49	57½	65½	73½	82	90
23 x36	29	35	44	53	62	71	80	89	97
24 x38	32	39	49	59	68	78	88	98	107
28 x34	33	41	51	61	71	81	92	102	112

BOOK PAPERS.

Size	Substance Number						
	40	50	60	70	80	100	120
24x36	36	45	55	64	73	91	109
25x38	40	50	60	70	80	100	120
28x42	50	62	74	86	99	124	149
29x52	64	80	96	112	126	158	190
32x44	60	74	89	104	119	148	178
35x45	66	83	100	116	133	166	199
36x48	72	90	110	128	146	182	218
38x50	80	100	120	140	160	200	240

Table No. 4—Standard Substance Numbers.

Number Sheets.	REAM WEIGHT — BONDS OR FLATS.																											
	13	14	15	16	16½	17	17½	18	18½	19	19½	20	20½	21	21½	22	22½	23	23½	24	24½	25	25½	26	26½	27	27½	28
5	.13	.14	.15	.16	.17	.17	.18	.18	.19	.19	.20	.20	.21	.21	.22	.22	.23	.23	.24	.24	.25	.25	.26	.26	.27	.27	.28	.28
10	.26	.28	.30	.32	.33	.34	.35	.36	.37	.38	.39	.40	.41	.42	.43	.44	.45	.46	.47	.48	.49	.50	.51	.52	.53	.54	.55	.56
15	.39	.42	.45	.48	.50	.51	.53	.54	.56	.57	.59	.60	.62	.63	.65	.66	.68	.69	.71	.72	.74	.75	.77	.78	.80	.81	.83	.84
20	.52	.56	.60	.64	.66	.68	.70	.72	.74	.76	.78	.80	.82	.84	.86	.88	.90	.92	.94	.96	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12
25	.65	.70	.75	.80	.83	.85	.88	.90	.93	.95	.98	1.00	1.03	1.05	1.08	1.10	1.13	1.15	1.18	1.20	1.23	1.25	1.28	1.30	1.33	1.35	1.38	1.40
30	.78	.84	.90	.96	.99	1.02	1.05	1.08	1.11	1.14	1.17	1.20	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47	1.50	1.53	1.56	1.59	1.62	1.65	1.68
35	.91	.98	1.05	1.12	1.16	1.19	1.23	1.26	1.30	1.33	1.37	1.40	1.44	1.47	1.51	1.54	1.58	1.61	1.65	1.68	1.72	1.75	1.79	1.82	1.86	1.89	1.92	1.96
40	1.04	1.12	1.20	1.28	1.32	1.36	1.40	1.44	1.48	1.52	1.56	1.60	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96	2.00	2.04	2.08	2.12	2.16	2.20	2.24
45	1.17	1.26	1.35	1.44	1.49	1.53	1.58	1.62	1.67	1.71	1.76	1.80	1.85	1.89	1.94	1.98	2.03	2.07	2.02	2.16	2.21	2.25	2.30	2.34	2.39	2.43	2.48	2.42
50	1.30	1.40	1.50	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.76	2.80
55	1.43	1.54	1.65	1.76	1.62	1.87	1.93	1.98	2.04	2.09	2.15	2.20	2.26	2.31	2.37	2.42	2.48	2.53	2.59	2.64	2.70	2.75	2.81	2.86	2.92	2.97	3.03	3.08
60	1.56	1.68	1.80	1.92	1.98	2.04	2.10	2.16	2.22	2.28	2.34	2.40	2.46	2.52	2.58	2.64	2.70	2.76	2.82	2.88	2.94	3.00	3.06	3.12	3.18	3.24	3.30	3.36
65	1.69	1.82	1.95	2.08	2.15	2.21	2.28	2.34	2.41	2.47	2.54	2.60	2.67	2.73	2.80	2.86	2.93	2.99	3.06	3.12	3.19	3.25	3.32	3.38	3.45	3.51	3.58	3.64
70	1.82	1.96	2.10	2.24	2.31	2.38	2.45	2.52	2.59	2.66	2.73	2.80	2.87	2.94	3.01	3.08	3.15	3.22	3.29	3.36	3.43	3.50	3.57	3.64	3.71	3.78	3.85	3.92
75	1.95	2.10	2.26	2.40	2.48	2.55	2.63	2.70	2.78	2.85	2.93	3.00	3.08	3.15	3.23	3.30	3.38	3.45	3.53	3.60	3.68	3.75	3.83	3.90	3.98	4.06	4.13	4.20
80	2.08	2.24	2.40	2.56	2.64	2.72	2.80	2.88	2.96	3.04	3.12	3.20	3.28	3.36	3.44	3.52	3.60	3.68	3.76	3.84	3.92	4.00	4.08	4.16	4.24	4.32	4.40	4.48
85	2.21	2.38	2.55	2.72	2.81	2.89	2.98	3.06	3.15	3.23	3.32	3.40	3.49	3.57	3.66	3.74	3.83	3.91	4.00	4.08	4.17	4.25	4.34	4.42	4.51	4.59	4.68	4.76
90	2.34	2.52	2.70	2.88	2.97	3.06	3.15	3.24	3.33	3.42	3.51	3.60	3.69	3.78	3.87	3.96	4.05	4.14	4.23	4.32	4.41	4.50	4.59	4.68	4.77	4.86	4.95	5.04
95	2.47	2.66	2.85	3.04	3.14	3.23	3.33	3.42	3.52	3.61	3.71	3.80	3.90	3.99	4.09	4.18	4.28	4.37	4.47	4.56	4.66	4.75	4.85	4.94	5.04	5.13	5.23	5.32
100	2.60	2.80	3.00	3.20	3.30	3.40	3.50	3.60	3.70	3.80	3.90	4.00	4.10	4.20	4.30	4.40	4.50	4.60	4.70	4.80	4.90	5.00	5.10	5.20	5.30	5.40	5.50	5.60
200	5.20	5.60	6.00	6.40	6.60	6.80	7.00	7.20	7.40	7.60	7.80	8.00	8.20	8.40	8.60	8.80	9.00	9.20	9.40	9.60	9.80	10.00	10.20	10.40	10.60	10.80	11.00	11.20
300	7.80	8.40	9.00	9.60	9.90	10.20	10.50	10.80	11.10	11.40	11.70	12.00	13.30	13.60	13.90	12.20	13.50	13.80	14.10	14.40	14.70	15.00	15.30	15.60	15.90	16.20	16.50	16.80
400	10.40	11.20	12.00	12.80	13.20	13.60	14.00	14.40	14.80	15.20	15.60	16.00	16.40	16.80	17.20	17.60	18.00	18.40	18.80	19.20	19.60	20.00	20.40	20.80	21.20	21.80	22.00	22.40
500	13.00	14.00	15.00	16.00	16.50	17.00	17.50	18.00	18.50	19.00	19.50	20.00	20.50	21.00	21.50	22.00	22.50	23.00	23.50	24.00	24.50	25.00	25.50	26.00	26.50	27.00	27.50	28.00

	28½	29	29½	30	30½	31	31½	32	32½	33	33½	34	34½	35	35½	36	39	40	40½	44	46	48	49	61	53½	56	64	
5	.29	.29	.30	.30	.31	.31	.32	.32	.33	.33	.34	.34	.35	.35	.36	.36	.39	.40	.41	.44	.46	.48	.49	.51	.54	.56	.64	
10	.57	.58	.59	.60	.61	.62	.63	.64	.65	.66	.67	.68	.69	.70	.71	.72	.78	.80	.81	.88	.92	.96	.98	1.02	1.07	1.12	1.28	
15	.86	.87	.89	.90	.92	.93	.95	.96	.98	.99	1.01	1.02	1.05	1.05	1.07	1.08	1.17	1.20	1.22	1.32	1.38	1.44	1.47	1.53	1.61	1.68	1.92	
20	1.14	1.16	1.18	1.20	1.22	1.24	1.20	1.28	1.30	1.32	1.34	1.36	1.38	1.40	1.42	1.44	1.54	1.60	1.62	1.76	1.84	1.92	1.96	2.04	2.14	2.24	2.56	
25	1.43	1.45	1.48	1.50	1.53	1.55	1.58	1.60	1.63	1.65	1.67	1.70	1.73	1.75	1.78	1.80	1.95	2.00	2.03	2.20	2.30	2.40	2.45	2.55	2.68	2.80	3.20	
30	1.71	1.74	1.77	1.80	1.83	1.86	1.89	1.92	1.95	1.98	2.01	2.04	2.07	2.10	2.13	2.16	2.34	2.40	2.43	2.64	2.76	2.88	2.94	3.06	3.21	3.36	3.84	
35	2.00	2.03	2.07	2.10	2.14	2.17	2.21	2.24	2.28	2.31	2.35	2.68	2.42	2.45	2.49	2.52	2.73	2.80	2.84	3.08	3.22	3.36	3.43	3.57	3.85	3.92	4.48	
40	2.28	2.32	2.36	2.40	2.44	2.48	2.52	2.56	2.60	2.64	2.68	2.72	2.76	2.80	2.84	2.88	3.12	3.20	3.24	3.52	3.68	3.84	3.92	4.08	4.28	4.48	5.12	
45	2.57	2.61	2.66	2.70	2.75	2.79	2.85	2.88	2.93	2.97	3.02	3.06	3.11	3.15	3.20	3.24	3.51	3.60	3.65	3.96	4.14	4.32	4.41	4.59	4.83	5.04	5.76	
50	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.55	3.60	3.90	4.00	4.05	4.40	4.60	4.80	4.90	5.10	5.35	5.60	6.40	
55	3.14	3.19	3.25	3.30	3.36	3.41	3.47	3.52	3.58	3.63	3.69	3.74	3.80	3.85	3.91	3.96	4.29	4.40	4.46	4.84	5.06	5.28	5.39	5.61	5.89	6.16	7.04	
60	3.42	3.48	3.54	3.60	3.66	3.72	3.78	3.84	3.90	3.96	4.02	4.08	4.14	4.20	4.26	4.32	4.68	4.80	4.86	5.28	5.52	5.76	5.88	6.12	6.42	6.72	7.68	
65	3.71	3.77	3.84	3.90	3.97	4.03	4.10	4.16	4.23	4.29	4.36	4.42	4.49	4.55	4.62	4.68	5.07	5.20	5.27	5.72	5.98	6.24	6.37	6.63	6.96	7.28	8.32	
70	3.99	4.06	4.13	4.20	4.27	4.34	4.41	4.48	4.55	4.62	4.69	4.76	4.83	4.90	4.97	5.04	5.46	5.60	5.67	6.16	6.44	6.72	6.86	7.14	7.49	7.84	8.96	
75	4.28	4.35	4.43	4.50	4.58	4.75	4.73	4.80	4.88	4.95	5.03	5.10	5.18	5.25	5.33	5.40	5.85	6.00	6.08	6.60	6.90	7.20	7.35	7.65	8.03	8.40	9.60	
80	4.56	4.64	4.72	4.80	4.88	4.96	5.04	5.12	5.20	5.28	5.36	5.44	5.52	5.60	5.68	5.76	6.24	6.40	6.48	7.04	7.36	7.68	7.84	8.16	8.56	8.96	10.24	
85	4.85	4.91	5.02	5.10	5.19	5.27	5.36	5.44	5.53	5.61	5.70	5.78	5.87	5.95	6.04	6.16	6.63	6.80	6.89	7.48	7.82	8.16	8.33	8.67	9.10	9.52	10.88	
90	5.13	5.22	5.31	5.40	5.49	5.58	5.67	5.76	5.85	5.94	6.03	6.12	6.21	6.30	6.39	6.48	7.02	7.20	7.26	7.92	8.28	8.64	8.82	9.18	9.63	10.08	11.52	
95	5.42	5.51	5.61	5.70	5.80	5.89	5.99	6.08	6.18	6.27	6.37	6.46	6.76	6.65	6.75	6.84	7.41	7.60	7.70	8.36	8.74	9.12	9.31	9.69	10.17	10.64	12.16	
100	5.70	5.80	5.90	6.00	6.10	6.20	6.30	6.40	6.50	0.60	6.70	0.80	6.90	7.00	7.10	7.20	7.80	8.00	8.10	8.80	9.20	9.60	9.80	10.20	10.70	11.20	12.80	
200	11.40	11.60	11.80	12.00	12.20	12.40	12.60	12.80	13.00	13.20	13.40	13.60	13.80	14.00	14.20	14.40	15.60	16.00	16.20	17.60	18.40	19.20	19.60	20.40	21.40	22.40	25.60	
300	17.10	17.40	17.70	18.00	18.30	18.60	18.90	19.20	19.50	19.80	20.10	20.40	20.70	21.00	21.30	21.60	23.40	24.00	24.30	26.40	27.60	28.80	29.40	30.60	32.10	33.60	38.40	
400	22.80	23.20	23.60	24.00	24.40	24.80	25.20	25.60	26.00	26.40	26.80	27.20	27.60	28.00	28.40	28.80	31.20	32.00	32.40	35.20	36.80	38.40	39.20	40.80	42.80	44.80	51.20	
500	28.50	29.00	29.50	30.00	30.50	31.00	31.50	32.00	32.50	33.00	33.50	34.00	34.50	35.00	35.50	36.00	39.00	40.00	40.50	44.00	46.00	48.00	49.00	51.00	53.50	56.00	64.00	

REAM WEIGHT — BOOK PAPERS.

Number Sheets.	30	36	37	40	44	44½	45	50	52	55	60	62	64	65	70	73	74	78
5	.30	.36	.37	.40	.44	.45	.45	.50	.52	.55	.60	.62	.64	.65	.70	.73	.74	.78
10	.60	.72	.74	.80	.88	.89	.90	1.00	1.04	1.10	1.20	1.24	1.28	1.30	1.40	1.46	1.48	1.56
15	.90	1.08	1.11	1.20	1.32	1.34	1.35	1.50	1.56	1.65	1.80	1.86	1.92	1.95	2.10	2.19	2.22	2.34
20	1.20	1.44	1.48	1.60	1.76	1.78	1.80	2.00	2.08	2.20	2.40	2.48	2.56	2.60	2.80	2.92	2.96	3.12
25	1.50	1.80	1.85	2.00	2.20	2.23	2.25	2.50	2.60	2.75	3.00	3.10	3.20	3.25	3.50	3.65	3.70	3.90
30	1.80	2.16	2.22	2.40	2.64	2.67	2.70	3.00	3.12	3.30	3.60	3.72	3.84	3.90	4.20	4.38	4.44	4.68
35	2.10	2.52	2.59	2.80	3.08	3.12	3.15	3.50	3.64	3.85	4.20	4.34	4.48	4.65	4.90	5.11	5.18	5.46
40	2.40	2.88	2.96	3.20	3.52	3.56	3.60	4.00	4.16	4.40	4.80	4.96	5.12	5.20	5.60	5.84	5.92	6.24
45	2.70	3.24	3.33	3.60	3.96	4.01	4.05	4.50	4.68	4.95	5.40	5.58	5.76	5.85	6.30	6.57	6.66	7.01
50	3.00	3.60	3.70	4.00	4.40	4.45	4.50	5.00	5.20	5.50	6.00	6.20	6.40	6.50	7.00	7.30	7.40	7.80
55	3.30	3.96	4.07	4.40	4.84	4.95	4.95	5.50	5.72	6.05	6.60	6.82	7.04	7.15	7.70	8.03	8.14	8.58
60	3.60	4.32	4.44	4.80	5.28	5.34	5.40	6.00	6.24	6.60	7.20	7.44	7.68	7.80	8.40	8.76	8.88	9.36
65	3.90	4.68	4.81	5.20	5.72	5.79	5.85	6.50	6.76	7.15	7.80	8.06	8.32	8.45	9.10	9.49	9.62	10.14
70	4.20	5.04	5.18	5.60	6.16	6.23	6.30	7.00	7.28	7.70	9.40	8.68	8.96	9.10	9.80	10.22	10.36	10.92
75	4.50	5.40	5.55	6.00	6.60	6.68	6.75	7.50	7.80	8.25	9.00	9.30	9.60	9.75	10.50	10.95	11.10	11.70
80	4.80	5.76	5.92	6.40	7.04	7.12	7.20	8.00	8.32	8.80	9.60	9.92	10.24	10.40	11.20	11.68	11.84	12.48
85	5.10	6.12	6.29	6.80	7.48	7.57	7.65	8.50	8.84	9.35	10.20	10.54	10.88	11.05	11.90	12.41	12.58	13.26
90	5.40	6.48	6.66	7.20	7.92	8.01	8.10	9.00	9.36	9.90	10.80	11.16	11.52	11.70	12.60	13.14	13.32	14.04
95	5.70	6.84	7.03	7.60	8.36	8.46	8.55	9.50	9.88	5.45	11.40	11.78	12.16	12.35	13.30	13.87	14.06	14.82
100	6.00	7.20	7.40	8.00	8.80	8.90	9.00	10.00	10.40	11.00	12.00	12.40	12.80	13.00	14.00	14.60	14.80	15.60
200	12.00	14.40	14.80	16.00	17.60	17.80	18.00	20.00	20.80	22.00	24.00	24.80	25.60	26.00	28.00	29.20	29.60	31.20
300	18.00	21.60	22.20	24.00	26.40	26.70	27.00	30.00	31.20	33.00	26.00	37.20	38.40	39.00	42.00	43.80	44.40	46.80
400	24.00	28.80	29.60	32.00	35.20	35.60	36.00	40.00	41.60	44.00	48.00	49.60	51.20	52.00	56.00	58.40	59.20	62.40
500	30.00	36.00	37.00	40.00	44.00	44.50	45.00	50.00	52.00	55.00	60.00	62.00	84.00	65.00	70.00	73.00	74.00	78.00

Number Sheets.	80	86	89	90	91	99	100	104	109	119	120	124	130	140	148	149	150	178
5	.80	.86	.89	.90	.91	.99	1.00	1.04	1.09	1.19	1.20	1.24	1.30	1.40	1.48	1.49	1.50	1.78
10	1.60	1.72	1.78	1.80	1.82	1.98	2.00	2.08	2.18	2.38	2.40	2.48	2.60	2.80	2.96	2.98	3.00	3.56
15	2.40	2.58	2.67	2.70	2.73	2.97	3.00	3.12	3.27	3.57	3.60	3.72	3.90	4.20	4.44	4.47	4.50	5.34
20	3.20	3.44	3.56	3.60	3.64	3.96	4.00	4.16	4.36	4.76	4.80	4.96	5.20	5.60	5.92	5.96	6.00	7.12
25	4.00	4.30	4.45	4.50	4.55	4.95	5.00	5.20	5.45	5.95	6.00	6.20	6.50	7.00	7.40	7.45	7.50	8.90
30	4.80	5.16	5.34	5.40	5.46	5.94	6.00	6.24	6.54	7.14	7.20	7.44	7.80	8.40	8.88	8.94	9.00	10.68
35	5.60	6.02	6.23	6.30	6.37	6.93	7.00	7.28	7.63	8.33	8.40	8.68	9.10	9.80	10.36	10.43	10.50	12.46
40	6.40	6.88	7.12	7.20	7.28	7.92	8.00	8.32	8.72	9.62	9.60	19.92	10.40	11.20	11.84	11.92	12.00	14.24
45	7.20	7.74	8.01	8.10	8.19	8.91	9.00	9.36	9.81	10.71	10.80	11.16	11.70	12.60	13.32	13.41	13.50	16.02
50	8.00	8.60	8.90	9.00	9.10	9.90	10.00	10.40	10.90	11.90	12.00	12.40	13.00	14.00	14.80	14.90	15.00	17.80
55	8.80	9.46	9.79	9.90	10.01	10.89	11.00	11.44	11.99	13.09	13.20	13.64	14.30	15.40	16.28	16.39	16.50	19.58
60	9.60	10.32	10.68	10.80	10.92	11.88	12.00	12.48	13.08	14.28	14.40	14.88	15.60	16.80	17.76	17.88	18.00	21.36
65	10.40	11.18	11.57	11.70	11.83	12.87	13.00	13.52	14.17	15.47	15.60	16.12	16.90	18.20	19.24	19.37	19.50	23.14
70	11.20	12.04	12.46	12.60	12.74	13.86	14.00	14.56	15.26	16.66	16.80	17.36	18.20	19.60	20.72	20.86	21.00	24.92
75	12.00	12.90	13.35	13.50	13.65	14.85	15.00	15.60	16.35	17.85	18.00	18.60	19.50	21.00	22.20	22.35	22.50	26.70
80	12 80	13.76	14.24	14.40	14.56	15.84	16.00	16.64	17.44	19.04	19.20	19.84	20.80	22.40	23.68	23.84	24.00	28.48
85	13.60	14.62	15.13	15.30	15.47	16.83	17.00	17.68	18.53	20.23	20.40	21.08	21.10	23.80	25.16	25.33	25.50	30.26
90	14.40	15.48	16.02	16.20	16.38	17.82	18.00	18.72	19.62	21.42	21.60	22.32	22.40	25.20	26.64	26.82	27.00	32.04
95	15.20	16.34	16.91	17.10	17.29	18.81	19 00	19.76	20.71	22.61	22.80	23.56	23.70	26.40	28.12	28.31	28.50	33.82
100	16.00	17.20	17.80	18.00	18.20	19.80	20.00	20.80	21.80	23.80	24.00	24.80	26.00	28.00	29.60	29.80	30.00	35.60
200	32.00	34.40	35.60	36.00	36.40	39.60	40.00	41.60	43.80	47.60	48.00	49.60	52.00	56.00	59.20	59.60	60.00	71.20
300	48.00	51.60	53.40	54.00	54.60	59.40	60.00	62.40	65.40	71.40	72.00	74.40	78.00	84.00	88.80	89.40	90.00	106.80
400	64.00	68.80	71.20	72.00	73.80	79.20	80.00	83.20	87.20	95.20	96.00	99.20	104.00	112.00	118.40	119.20	120.00	142.40
500	80.00	86.00	89.00	90.00	91.00	99.00	100.00	104.00	109.00	119.00	120.00	124.00	130.00	140.00	148.00	149.00	150.00	178.00

All weights figured in pounds and hundredths of pounds—decimal system.

Table No. 5.

that if sixteen pages are printed at a time, every sheet makes two complete signatures, and care must be taken to get it right.

Number Pages.	PAGES TO A FORM.							
	4	8	12	16	24	32	48	64
4.....	500	250	167	125	84	63	42	32
8.....	1000	500	334	250	167	125	84	63
12.....	1500	750	500	375	250	188	125	94
16.....	2000	1000	667	500	334	250	167	125
20.....	2500	1250	834	625	417	313	209	157
24.....	3000	1500	1000	750	500	375	250	188
28.....	3500	1750	1167	875	584	438	292	219
32.....	4000	2000	1394	1000	697	500	334	250
36.....	4500	2250	1500	1125	750	563	375	282
40.....	5000	2500	1667	1250	834	625	417	313
44.....	5500	2750	1834	1375	917	688	459	344
48.....	6000	3000	2000	1500	1000	750	500	375
52.....	6500	3250	2167	1625	1084	813	542	407
56.....	7000	3500	2334	1750	1167	875	584	428
60.....	7500	3750	2500	1875	1250	938	625	469
64.....	8000	4000	2750	2000	1375	1000	688	500
72.....	9000	4500	3000	2250	1500	1125	750	563
80.....	10000	5000	3334	2500	1667	1250	834	625
88.....	11000	5500	3667	2750	1834	1375	917	688
96.....	12000	6000	4000	3000	2000	1500	1000	750
104.....	13000	6500	4334	3250	2167	1625	1084	813
112.....	14000	7000	4667	3500	2334	1750	1167	875
120.....	15000	7500	5000	3750	2500	1875	1250	938
128.....	16000	8000	5334	4000	2767	2000	1384	1000
136.....	17000	8500	5667	4250	2834	2125	1417	1063
144.....	18000	9000	6000	4500	3000	2250	1500	1125

Table No. 6.—Sheets of Paper Required for Printing 1,000 Books.

But with the right kind of a table, such a thing should not cause worry. Table No. 6 gives the number of sheets required for 1,000 books, with pages from 4 to 144, and any size forms from 4 to 64 pages. Our example shows that a book of 128 pages run in 16-page forms will require 4,000 sheets for 1,000 copies. For 2,000 copies simply double the amount and we find we must buy 8,000 sheets, not including spoilage, to complete the job.

This brings us to the last thing in connection with figuring on paper. Having found that it takes 9.18 pounds of paper for the job, and the price is 23 cents per pound, we multiply the weight by the price, thus:

Pointing off four decimals we find the amount to be $2.12. As ten per cent is the amount recommended as the proper profit for handling paper, we add this amount and find the total cost to be $2.33.

PROBLEMS

Relative Weights

1. If a ream of bond paper 17 x 22 inches weighs 20 pounds, how much will a ream of the same kind of paper 19 x 24 inches weigh?
2. If a ream of enamel book paper 24 x 36 inches weighs 50 pounds, how much will a ream of the same kind of paper 25 x 38 inches weigh? 28 x 42 inches?
3. If a ream of M. F. book paper 33 x 46 inches weighs 95 pounds, how much will a ream of the same kind of paper weigh that is 22 x 28 inches?
4. If one-half a ream of flat paper 22 x 34 inches weighs 19 pounds, how much will 400 sheets of the same kind of paper weigh that is 16 x 21 inches?
5. If one ream of bond paper, royal, weighs 30 pounds, how much will a ream, double cap, of the same kind of paper weigh?

Stock Cutting

1. How many sheets 7 x 9 inches can be cut from a sheet 19 x 24 inches?
2. How many sheets 4 x 8½ inches can be cut from a sheet 24 x 36 inches?
3. How many booklet covers 3½ x 9 inches can be cut from a sheet of cover stock 22½ x 28 inches?
4. How many standard letterheads can be cut from 1 ream of 17 x 22 inch bond paper?
5. A man orders 5000 standard full size letterheads. How many sheets of 17 x 22 inch bond will it require for the order? How many reams?
6. An order is received for 500 four-page circulars (one folded sheet), folded size 3½ x 5, open size 7 x 5, to be cut from 19 x 24 book paper. How many sheets of paper must be cut if 5 per cent is allowed for press waste?
7. What will be the cost of stock for 8000 half size letterheads, 5½ x 8½, cut from 17 x 22 bond, 20 pounds to the ream, at 32 cents per pound?

8. What will be the cost of the stock for 2500 book marks 2 x 6½ inches, cut from 25½ x 30½ Index bristol at $4.00 per hundred sheets?
9. A man orders 4000 four page circulars, folded size 3 x 5 inches, fold 5 inch way, to be cut from 28 x 42—70 enameled book stock at 16 cents per pound. Find total cost for stock.
10. An order is received for 1800 eight-page booklets with covers. The pages to be 4 x 6, folded size, cut from 24 x 36—65 book stock at 18 cents per pound. The covers will overlap book pages ¼ inch on open sides, to be cut from 22½ x 28½ cover stock at $12.00 per 100 sheets. Find total cost for complete booklet stock.

Use of Tables

1. If 10 sheets of the required size can be cut to a sheet of stock, how many sheets must be cut for 3500 desired sheets?
2. If a sheet of book paper cuts 33 sheets of a desired size, how many sheets of stock will be required for 2000 desired size sheets?
3. How many desired size sheets must be cut when 5000 are ordered and receive one impression on the press?
4. If a sheet of 17 x 22 bond paper cuts into six two-thirds size letterheads, how many sheets of stock must be cut to supply an order of 10,000 letterheads printed in two colors?
5. If a ream of 17 x 22 bond papers weighs 28 pounds, what will a ream of 24 x 48 weigh of the same substance number?
6. If a ream of 26 x 29 book paper weighs 56 pounds, what will be the weight of a ream of 35 x 45 book paper of the same substance?
7. If a ream of 19 x 24 bond paper weighs 19½ pounds, how much will 200 sheets weigh?
8. If a ream of 28 x 42 book paper weighs 86 pounds, how much will 350 sheets weigh?

9. If 2000 booklets are ordered of 16 pages each, open size 5 x 7 inches, to be cut from 25 x 38—70 book stock at 15 cents per pound, what will be the total cost of the stock used?
10. An order is received for 1600 circulars, with two folds, folded size 3 x 5, open size 5 x 9, to be printed in three colors. They will be cut from 24 x 36—55 book stock at 22 cents per pound. How many sheets of stock will be cut including press waste, and what will be the total cost of stock for the job?

TECHNICAL TERMS AND DEFINITIONS

Alignment—Type characters are in alignment when the tops or bottoms of the letters, or both, are in a straight line.

Ascender—That part of a type character which projects above the body, such as: b, d, f, h, k, l, and t.

Bearers—Strips of metal, bent at right angles, used to lock in chases with rule forms for the purpose of supporting the rollers when crossing the form.

Bevelled Furniture—Wooden furniture with one end bevelled to form a taper, for locking rule forms at an angle in the chase, to prevent the rollers from becoming grooved and to insure better ink distribution.

Bind—A type form is said to bind when some element projects to prevent a square, even lockup in the chase.

Bleed—Printed sheets have been bled when they have been cut or trimmed into the printed matter.

Body Matter — Composition in straight paragraph form, set with body type, is known as body matter.

Body Type—Plain face type, less than 18 pt., used for body matter is called body type.

Bond—The name given to a kind of paper of hard, tough texture, usually made from rags or linen, used for stationery and business forms.

Brass Rule—Strips of brass in multiples of pica and nonpareil lengths, type-high, with faces designed for printing straight lines and borders.

Centered—A line of type is said to be centered when the characters are spaced so that the margins on each side will be equal.

Chase—A cast iron or steel frame, rectangular in shape, within which type forms are imposed and locked in readiness for the press.

Complementary Colors—Complementary colors are those colors whose added value equals a white. For instance, red is a complement of green, because green is a

mixture of blue and yellow and contributes the remaining colors necessary to form the color spectrum. See Color Spectrum.

Composing Stick—A metal tray with three sides, one of which is adjustable, within which type is set.

Composition—The process of assembling type characters into the combination or form desired for printing.

Condensed—Type of less than the standard width of lettering is known as condensed.

Copy—The written or printed material that is to be composed.

Cut—A type-high engraving or plate by means of which a drawing or photograph may be reproduced in printing.

Cylinder Press—A printing press in which the impression is taken upon a cylinder revolving in conjunction with a flat bed of type.

Dead—A type form is said to be dead when it has been printed and is ready for distribution.

Descender—That part of type character which projects below the body of the lower case letters. Such as: g, j, p, q, and y.

Dirty Proof—A proof of a type form which contains many errors.

Display Type—Type of pronounced design which is used for open display work.

Distribution—The process of returning type characters and composing materials to their proper places after having been composed.

Drawsheet—The top sheet of the tympan on a press. The one upon which the first impression is taken.

Drier—The drying element added to ink, usually a varnish.

Dummy—A preliminary layout of a book, magazine or pamphlet, for the purpose of ascertaining the page arrangement, appearance, and general makeup before printing.

Electrotype—Copper plated reproductions of type forms, or cuts, for the purpose of saving wear on type or printing in multiple.

Embossed—A printed surface or design which has been raised or sunk on the paper by means of matched dies.

Engraving—The process of printing from an engraved plate which raises the ink on the paper. It requires special machinery and inks, and is only practical on high class jobs.

Expanded — Type whose characters are designed thirty or forty per cent wider than the standard proportion of lettering.

Extended—Type whose characters are designed fifty or more per cent wider than the standard proportion of lettering.

Family—A complete collection of all sizes and styles of the same design of type, as, the Cheltenham family, or Century family.

Feed Edge—The name given to the sides of a type form locked in a chase which, when the impression is taken on the tympan of the press, will be bounded by the gauge pins.

Feeding—The process of inserting the sheets into the press to be printed.

Font—A complete collection of one size and style of type, containing a proper apportionment of each character according to its frequency in use in printing.

Form—A combination of type or printing surfaces which has been composed ready for an impression.

Furniture—Blocks of wood or metal less than type high, graduated in pica lengths and widths, used for building around type forms for locking in chases.

Galley—A metal receptacle used for type forms during composition, while being tied up, and before distribution.

Gauge Pins—Pin devices for insertion in the drawsheet of the tympan, against which the sheets of paper are fed.

Grippers — The metal fingers on the platen press which hold the sheets against the tympan to prevent pulling off by the inked form. On the cylinder press they are small clamps which hold the paper on to the cylinder until printed.

Half-Tone—A photo-engraving having a screen-like surface made up of fine cross lines, which reproduces pictures in their natural intensity of tones.

Hanging Indention—A paragraph of body matter in which the first line projects before the remaining lines.

Imposition—The process of arranging in the desired position and locking of type forms on an imposing stone.

Impression—A printed copy of a type form on a press.

Imprint—The name or trade mark of a printer or publisher appearing on printed matter.

Ink Disk—The circular plate, or disk, upon which the ink is fed and distributed on a platen press.

Ink Mill—A massive machine, composed of hollow steel rolls, used by ink manufacturers for grinding and mixing ink.

Italic—Type sloped, for the purpose of giving emphasis.

Job Type—Type used for job composition which involves display and variance in faces.

Justification—The spacing out of lines of type in the composing stick to the proper length.

Kerned—Letters in which a part of the face projects beyond the body of the type so that the letters will not be separated too widely. Often found in italic and script types.

Layout—A sketch made of a job to be composed, including specifications for arrangement, and kind and sizes of type to be used.

Leaders—Type characters in multiples of em sizes used for printing dotted or intermittent lines.

Leads—Thin strips of type-metal, less than type high, used for spacing between lines.

Letter Spaced—Words in which thin spaces have been inserted between the letters to avoid excessive spacing between words.

Lift—A type form is said to lift when every part is securely locked in the chase.

Ligatures—Two or more type characters conjoined and cast on a single body. As, fi, fl, ff, ffi, ffl, æ, etc.

Light Face—Type with a light printing surface in contrast to bold face types.

Line—A unit of measurement used to designate sizes of wood type, a line being equal to a pica.

Line Gauge—The printer's measuring rule graduated into picas and nonpareils.

Linotype—Type cast in line slugs on the type setting machines. The machines themselves are called Linotypes.

Lockup—The term applied to a type form locked up in a chase in readiness for the press.

Make-Ready—The name given to the process of preparing the impression for printing on the press.

Makeup—The process of assembling and justifying pages on the stone, usually applied to newspapers and magazines.

Medium—Type whose letters are designed the standard proportion in width.

Metal Furniture—Blocks of type metal, less than type high, in pica lengths and widths, used for filling in space in composition and locking up.

Monotype—Type characters cast individually and consecutively on a type setting machine. The Monotype consists of two machines, the Keyboard for perforating a paper roll, and the Caster which casts the type from the roll.

Nonpareil—A unit of the point system of measure, equal to six points or one-twelfth of an inch.

Offset—The impression on the back of a printed sheet, received from an inked tympan or from piling freshly printed sheets upon each other.

Old Style—The name given to Roman type of angular design in which mechanically perfect lines are not attempted. In old style type the light elements are not greatly contrasted from the heavy elements.

Opaque—Applied to inks with heavy coloring substance which prevents light from passing through. Opposite to transparent.

Overlay—The process of raising portions of the tympan with thin pieces of paper or other material for the purpose of equalizing the impression.

Packing—That part of the tympan beneath the drawsheet, added to increase the amount of impression.

Paper Cutter—A machine, both hand and power, for cutting paper stock into desired sizes.

Path Line—The line which connects the proof mark with the error in correcting proofs.

Pica—Unit of measure of the Point System, equal to twelve points or one-sixth of an inch.

Pi—A type form or part of a form which has been mixed up or confused is called pi.

Pigment—The coloring material used in the manufacture of inks.

Platen—The flat surface of a platen press which receives the impression.

Point—The unit upon which the printer's system of measurement is based. Approximately one seventy-second of an inch, or more exactly .01384 of an inch.

Points—The punctuation marks of a font of type are often referred to as points.

Point System—The printer's system of measurement is also known as the Point system.

Pressboard—Hard smooth cardboard used where a solid packing is needed in the tympan of the platen press.

Proof—The impression of a type form taken for the purpose of inspecting and correcting the job before being printed.

Proof Marks—Marks or symbols used to designate corrections to be made in a proof.

Proof Planer—A solid wooden block with a felt covered surface used to press the paper against the type while taking a proof.

Proof Press—A small press, either hand or automatic, upon which type forms may be proofed without locking in a chase.

Quads—Type bodies, less than type high, cast in multiples of em lengths, used for spacing out lines at the ends of paragraphs, and for indentions.

Quoins—Metal locking devices used for locking type form into chases.

Quoin Key—The key or device which fits into and turns the quoins for locking or unlocking.

Ream—A package of flat paper containing 500 sheets. Strictly speaking, a ream should contain 480 sheets, but in wholesale paper the established ream is 500 sheets.

Reducer—The name given to liquids and pastes used to lessen the amount of tack in inks.

Reference Marks—The reference marks usually included in cases of body type, commonly used in time-tables and to designate foot and margin notes in books and magazines, as: *, †, ‡, §, ‖.

Register—A type form is said to register when all the component parts print exactly in the proper position of a sheet.

Reglet—Thin strips of wood in pica and non-pareil thicknesses, less than type high, used for locking of forms and as substitutes for slugs in composition.

Revise—A second proof taken after corrections have been made to ascertain that the text is perfect.

Roller Trucks—The round pieces of metal at the ends of press rollers upon which they bear while travelling in the press.

Scoring—The process of grooving heavy paper or cardboards with a plane rule upon the press by a heavy uninked impression, for the purpose of folding.

Script—Type fashioned after handwriting with each letter joining those on either side, almost out of use due to excessive kerned letters.

Series—A complete collection of all the sizes of one style and design of type, such as, all the sizes of Century Expanded, or Century Bold.

Serif—The short crosslines at the ends of unconnected elements of letters.

Shade—A color which is darker than a standard by having black mixed with it.

Sheetwise—A term applied to presswork where a sheet is turned and both sides are printed with unlike forms.

Slugs—Strips of type metal less than type high, and five or more points in thickness, used for side spacing and filling in blank space in forms.

Sorts—The name given to spaces and quads, and extra type characters not included in a regular font of type.

Spaces—Type bodies less than type-high which are subdivisions of the em quad, used for spacing between words and for justification of lines.

Splicing—The process of joining two or more leads or slugs together for the purpose of obtaining a length equal to their total.

Stereotype—Printing plates of type and cut forms made by pouring molten metal into molds containing matrices made from the desired forms.

Stock—The term applied to paper in general which is kept on hand for printing purposes.

Squash Letters—Letters with added flourishes which are found in some fonts of type. They are usually capital letters and should be used only at the beginning or ending of a word and so that the flourishes extend away from the word. Th, th, ty, y, w, etc.

Tabular Composition—Composition of blanks or forms containing ruled columns or other intricate ruled sections.

Tack—The heavy body of a printing ink, due to a stiff varnish.

Thin Spaces—Spaces less than five em spaces used for letter-spacing and other fine spacing. Copper and brass spaces, one-half and one point in thickness are commonly used.

Throw-Off—The lever or device on platen presses used to prevent an impression.

Tint—An ink which has been lightened with white for the purpose of subduing the color.

Tweezers—Pincers used in removing type characters while making corrections in form.

Two-On—The term applied to running two forms, locked in a single chase for the purpose of decreasing the number of impressions. The sheets are then cut in two, giving twice the number of impressions taken.

Tympan—The sheets of paper which are clamped to the platen of the press, sometimes called packing.

Type-High—The height of type and other printing materials from the foot to the face. It is approximately eleven-twelfths of an inch, or more exactly .918 of an inch.

Typography—The art of setting or arranging type into desired groups for printing.

Type Planer—A solid wooden block with a smooth surface used to even type in the forms before locking in chase.

Typographic Design—The term applied to the architecture or arrangement of type materials into forms in accordance with the rules of art and design.

Underlay—The process of equalizing the impression on the press by means of inserting spots of paper beneath the type form.

Vignette—A half-tone cut whose lines fade away until they vanish on the surface of the paper.

Watermark—A trade mark or design pressed into some grades of paper during manufacture. The paper is thinner at this place and can be seen by holding to the light.

Wood Type—Type made of end-grain wood, in larger sizes to avoid excessive weight of type metal.

Work-and-Turn—The term applied to turning sheets and printing on both sides with the same form.

Zinc Etching—A cut made by etching a zinc plate with acid. Usually used for solid line reproduction.

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