XV. Brief Recapitulation

WHEN a matrix fails to respond:

1. Take off cover and see whether the keyboard cam drops promptly at the touch of the key.
2. See if the keyboard cam revolves without slipping on rubber roll.
3. Look to see if the keyboard rod has full movement upward and downward.
4. See if the escapement pawls are worn or burred.
5. Look to see if matrices are clogged in channel.
6. See if a matrix in the channel has been bent or is lying flat in the magazine.
7. See if the matrix is striking on the front partition.
8. Examine the matrices to see whether the ears have been bent or bruised or burred.
9. See if the ears of the matrices, especially the lower ear on the character side, are badly worn so that they may drop into the escapement hole.
10. See whether a wrong-font matrix has by mistake been put into the magazine.
11. See if there is oil or grease or dirt of any kind upon the matrix.
12. See if the ears of matrices have been shaved by the mold so as to cause bad alignment.

The remedies for these troubles have been described in the previous pages.

ASSEMBLING OF MATRICES

The assembler slide must work smoothly and not jump or vibrate.

Care must be taken that there is no oil on the slide, and that the brake and brake block are sharp and do not have rounded corners; that the brake spring is not too strong, causing the assembler slide to resist the action of the assembler star, not so weak that it will jump when a thick matrix comes into the line.

The releasing screw must not be set too low.

The spring which returns the slide must bring it back smoothly, but not be so strong as to pound the assembler slide stop, or so weak as to allow it to clatter or jump.

The assembler chute spring must be adjusted so as not to retard the passage of the thinnest matrices and to hold back the thicker matrices only a very little.

SPACEBANDS

Spacebands must be cleaned daily.

Must be polished with graphite.

The use of "Notabur" is recommended.

Spacebands, when placed in the machine, must have the slides to the right.

There should be a full set of spacebands kept in the box all the time.

The spaceband pawls must be kept even, must be cleaned occasionally, and should stand normally one thirty-second of an inch below the shoulder.

The lost motion of the spaceband lever should be set so as to give the matrix a slight advantage over the spaceband.

DELIVERY SLIDE

The delivery slide is moved forward; that is, to the left of the operator, by a spring, and is returned by cam action. In the old machines the cam roller was upon an eccentric pin by means of which the return stroke could be adjusted.

The delivery lever cam-roller arm is adjustable upon the shaft, on all the later machines.

The delivery slide must come to the right sufficiently to catch the end notch of delivery pawl.

The pawl is thrown upward by a wire in the assembler elevator, and the height of this wire can be adjusted so as to just throw off the pawl.

The piston in the delivery air cylinder regulates the speed of the left-hand movement of the delivery slide. There is also in the top of the cylinder a small hole with a screw and notched washer by which the size of the hole can be regulated.

The delivery slide should carry the short finger just inside of the first-elevator jaw pawls before the machine starts.

There is a bracket with an adjusting screw on the later machines against which the delivery slide stops.

When the packing of the air piston is worn it must be renewed.

FIRST ELEVATOR

The rails in the first-elevator jaw upon which the matrices ride and the grooves with which the ears of the spacebands register must be exactly in line or just a trifle below the corresponding rails and grooves in the delivery channel. This distance should not exceed eight thousandths of an inch.

The position of the first-elevator jaw with reference to the line-delivery channel is obtained by the adjustment at the bottom of the first elevator. This adjustment consists of a barrel which has a connecting link to the first elevator. The adjustment of the elevator is made by turning the barrel. There is a little flat spring adapted to drop into the notches in the

top of the barrel and hold the barrel from turning on account of the jar of the machine. This little spring must be lifted out before the barrel is turned.

The front and back jaws of the first elevator must be kept parallel, and they should permit a matrix to enter and leave freely, but there should not be any greater looseness, or play, than just enough to permit this.

The first-elevator jaw is mounted upon the elevator slide, and this slide descends by its own weight and is lifted by cam action. As the elevator descends by its own weight, it should run freely in the gibs, but should not have any looseness, or side-play.

The first elevator, when it descends, should go far enough so that when it rests upon the vise, the lower ears of the matrices can enter the grooves of the mold freely.

The elevator rises slightly for alignment, as previously described.

When the elevator goes up after casting, to register with the upper channel, it must rise high enough so that the matrices when they pass under the pawl will register exactly with the second-elevator bar.

On many machines knife wiper is operated by first-elevator slide.

Care must be taken that this device does not bind the elevator slide so as to prevent its free descent.

VISE AUTOMATIC

The vise automatic prevents the mold disk and mold from coming forward unless the first-elevator jaw is down to its correct position.

As previously mentioned, the proper setting of this vise automatic is very important.

The adjustment of the vise automatic is made by a screw mounted in the head of the first-elevator slide, and which strikes the jaw as a bearing in the vise cap.

The vise automatic should be tested occasionally by putting a hair space on the vise cap where the screw regulating the down stroke will strike it. The automatic should stop the machine. If it does not, the vise automatic should be carefully reset.

THE VISE

The vise should never be opened when the mold disk is forward upon the locking studs.

As the vise is mounted on a pivot below, the bushings do not come out straight, but describe an arc when the vise is lowered. If the mold-disk bushings are over the locking studs when the vise is lowered, the vise can be forced open, but it will be sure to cause damage.

The vise can be lowered to two different positions. In the first position, the mold slide can be pulled forward a few inches. In the second, or lower, position, the mold slide can be entirely removed from the machine. This is seldom necessary.

The mold slide can be disconnected from the machine by a mold cam lever handle on the pump bracket.

On most machines it is necessary to remove the first-elevator back jaw guard before pulling out the mold disk.

The first elevator should be in its lowest position if the vise is to be lowered to the second position.

MOLD WIPER

The object of the mold wiper is to clean the mold of particles of metal which adhere to the mold.

There are two or three forms of this mold wiper, but in any case the mold wiper should be set so as to be against the mold when it is in the normal, or starting, position.

The mold wiper must be kept clean and working properly to get the best results in the operation of the machine. Some operators use a very little graphite rubbed into the felt of the mold wiper. If graphite is used, only a little is required.

CARE OF THE MOLD

Occasionally the mold should be removed from the disk, taken apart, and cleaned with a paste of graphite and a soft wooden stick. This is most important.

Any hard substance like steel or brass should never be used in polishing the mold.

The metal pot must never be allowed to remain against the mold for any length of time. It will take the temper out of the mold, cause it to warp, and is liable to ruin it.

When the mold comes forward it must not press against the matrix line at its first forward movement.

In this case the spacebands cannot be driven up, and the line cannot be properly justified.

On the other hand, when the mold comes up the second time against the matrices just before the cast takes place, it must press firmly and with very great force against the line.

If the pot-lever spring is too weak, what is called "spitting" takes place, and eventually a "squirt" is liable to occur.

When the mold disk goes forward upon the locking studs, the mold disk should rise very slightly, only two or three thousandths of an inch. It should go on smoothly and firmly forward upon the locking studs without chatter or jerk.

The mold disk must not travel too far through its momentum before it goes forward upon the locking studs.

The block which holds the mold-turning cam through the shoe may be too loose, in which case the shoe must be set closer to the block by means of the adjusting screws.

BACK KNIFE

The back knife must be set so as to press against the back of the mold and shave off the bottom of the slug, removing all the metal from the back face of the mold. If the back knife is set too tight it will shave, or scrape, the back side of the mold and make trouble. If set too loose, the slug will not be of the proper height, and pieces of metal will be left on the back of the mold, which, after they accumulate, may cause a "squirt."

METAL-POT

The adjustment of the metal-pot by the screws at the bottom of the pot legs has already been described. A correct lock-up is of the very greatest importance in the smooth operation of the machine.

A poor lock-up may result from a warped mouthpiece. In this case the mouthpiece ought to be brought to correct shape by means of a fine file. This is best tested by using Prussian blue, allowing it to register against the mold.

The second case of a bad lock-up is caused by a warped mold. If this warping is not too great, the mouthpiece can be fitted to it and the mold can be used for a long time. If the mold is badly warped it must either be repaired by grinding or discarded.

The holes in the mouthpiece must be kept open, otherwise there will be a poor face.

Under certain conditions the mouthpiece must be removed and the throat of the pot cleaned out. A tool is provided for this purpose. If pains are taken not to overheat the metal this will seldom be necessary.

AUTOMATIC PUMP STOP

Care must be taken that the pump stop is properly adjusted.

In most of the machines the pump stop is operated by the right-hand vise. When the right-hand vise is pushed out to the right, the catch, or lug, on the pump lever should just clear, allowing the pump lever to descend.

When once set, the tension of the pump-stop spring should not be altered.

DISTRIBUTOR BOX

When the ears of thin matrices are bent, the first thing to look for is to see whether the lift is raising the matrices over the shoulders of the rails. When the lift goes down, it should go only a very short distance, say, about ten thousandths of an inch below the matrix. The distributor lift should be examined occasionally to see whether it is being worn so that the matrix may slip off the lift, or in some cases the shoulder of the lift may be worn so that it will raise two matrices at once.

The bar point on the end of the rail in the distributor box will wear in time and may become too short, so that two thin matrices may be lifted at once.

When the bar point is worn, it is best to discard it and get a new one, and not attempt to lengthen it by peening, or anything of this sort.

If trouble is experienced in the dropping of matrices, the first thing to look for is to see whether the gears are properly timed. There is a "timing pin" in the gear which should prevent a wrong timing.

If for any reason the machine is stopped by the handle, when not in normal position, the spaceband-lever pawl should be locked and the distributor-shifter latch thrown in, so that when the machine is started neither the spaceband lever nor the distributor shifter will work until after the machine has come to the normal position, when both of them should be released.

CHANNEL ENTRANCE

The channel entrance should stand in such a relation to the distributor bar that a thin matrix like the letter "i" will fall immediately after it passes its partition. This should be watched when the machine is actually running and not when the distributor screws are turned by hand.

In some of the machines the channel entrance partitions are flexible and operate the automatic stop as shown in Fig. 117.

When matrices are removed from the channel entrance in case of a clog the partition should be looked at, and if bent should be brought back to its proper position.

After a long time it happens that the channel-entrance partitions sometimes lose their elasticity so that they must be removed and new partitions put in their place.

In the channel entrances in the later machines the partitions are thinner and fixed, and are not very likely to get bent or moved out of position.

THE MAGAZINE

The magazines, when removed from the machine, should be hung vertically upon a rack. They should never be allowed to rest flatwise or lean against a wall. Above all, magazines should never be piled one upon another.

In some offices where there is a good deal of dirt and dust floating in the air, especially in the summertime, it is necessary at certain intervals to clean out the magazines. In this case, the matrices should be entirely removed and the magazine thoroughly cleaned with a brush provided for the purpose.

If the matrices have become oily and have transferred the oil into the magazines, the magazines should be brushed out with French chalk. This will absorb the oil, and when the chalk has been thoroughly brushed out, the magazine will be clean and the matrices will run freely.

No exact rule can be given as to how often the magazines should be cleaned. In some offices it is necessary once a month, and in other offices once in six months is sufficient.

Some machinists use graphite in the magazines. Where this is done, *only a very little* should be used. It is best, if possible, to blow the dry graphite in with a small pair of bellows or something of that kind, and then brush the excess graphite out. Unless the operator or machinist has had experience in the use of graphite in the magazine it is not recommended.

ESCAPEMENTS

On the Models 5, 8, and 14 machines, also Models 18 and 19, the escapement is not attached to the magazine. The escapements are mounted in a brass member which can be removed separately from the machine. In this case it is easy to repair or remove a pawl which has become damaged or burred. When a pawl is in its lowermost position, it should just be in line with the bottom of the channel so that the ear of the matrix will slide over the pawl without either rising or falling. After a long time the pawls sometimes become worn, so that they are below the surface of the channel when they are in position. In such case the pawls should be discarded and new ones put in.

Oil should not be used around the escapement, but a little dry graphite can be brushed into the escapement with an old toothbrush. Oil must be kept away from the escapement, as it is almost sure to get on to the matrices and cause trouble.

In some climates that are moist, the pivot rods on which the escapement verges turn are liable to rust, in which case the verges may not turn freely. In this case the escapement rods may be removed and wiped with an oily rag and replaced. *Only enough oil must be used on these rods to prevent their rusting.*

The escapement bars, if carefully handled, will not suffer any damage. It is almost impossible in the action of the machine to injure this part. When off the machine, however, there is a possibility of damage, and in this case it can usually be repaired by the use of a fine file. Great care should be taken, however, in this matter, as this part is made with extreme accuracy and an inexperienced man can easily ruin an escapement bar, which is an expensive part to replace.

CARE OF TRIMMING KNIVES

There are two kinds of knives used in the Linotype machine, two called "side knives," and the other, "the back knife." The back knife trims the bottom of the slug while the mold disk is revolving. The side knives trim the sides of the slug as it is ejected out of the mold into the galley.

Proper care of the knives is of importance. The sharp edge of the knives is easily nicked or damaged by a hard instrument. In working around the machine, care must be taken not to bring a screwdriver or anything of that sort in contact with the edges of the knives. This sometimes happens when cleaning out a squirt or driving out a stuck slug.

The edges of the knives should be sharp, but should not have a razor edge. If the edge is too sharp it will tend to dig into the slug. When the knives become dull, or if they get nicked by accident, it is best to send them to the factory or agency to be reground. This requires a duplicate set of knives so that the machine may not be stopped while the knives are being sharpened.

Knives can be successfully sharpened by those who have some mechanical skill by the use of a lapping block and a very fine emery.

The edge of the side knife is not exactly at right angles with the bottom of the knife, but has an opening of about one-half degree. Unless the operator or machinist has considerable skill it is better to have the knives ground by the factory or an agency, as above suggested.

The back knife is more easily sharpened than the side knives, and this can be done on an emery wheel or a lapping block. If sharpened in this way, the feather edge of the knife should be stoned off.

"DON'T"

Don't oil the escapements. The oil will surely get on to the matrices.

Don't put oil in the magazine. In other words, don't be foolish.

Don't slam the channel entrance when closing it. It may injure the parts of the automatic stop.

Don't pound the magazine to make the matrices drop. You are liable to bend the plates and make a bad matter worse.

Don't forget, when pulling down the channel entrance, to do so quickly, as opening it slowly is liable to cause a matrix to fall into the magazine flatwise.

Don't attempt to remove a magazine without first inserting the locking bar. If you do, the matrices will spill on the floor.

Don't forget to close the cover on the lower magazine before starting to remove it. The matrices may run out.

Don't expect a rusty or bent locking bar to work freely. Clean it. If bent, straighten it.

Don't delay ordering new keyboard rubber rolls when grooves have become worn in those in use. Time spent in correcting transpositions and double letters is worth money.

Don't release the lock on the left-hand side of Model 5 magazine, except with the magazine-locking bar.

Don't insert the keyboard-locking bar of a double-magazine machine unless the magazine-locking bar is in place. A matrix will run out of each channel.

Don't try to change the register of a double-magazine machine from upper to lower with the keyboard-locking bar in place.

Don't keep pulling on the starting and stopping lever when machine "stalls." See that the friction clutch is clean and that the leather shoes are properly packed.

Don't force the first elevator when a tight line prevents its dropping far enough to release the vise automatic. Ruined matrices will result, and a "squirt" is bound to follow if you do.

Don't strike the keybutton impatiently and repeatedly if a matrix fails to respond. Locate the difficulty and correct it.

Don't try to force in the magazine-locking bar. It should enter freely. If not, the trouble is probably due to a defective matrix failing to slide over the pawl. This should be removed, or pushed back in place, before inserting the locking bar.

Unless in a great hurry, do not punch out "stuck," or hot, slugs with the ejector lever. Back the machine up slightly, release the ejector-lever adjustable pawl, and allow machine to come to normal position, open the mold cap and remove the slug by hand. Driving out slugs tends to round off mold edges, which will produce feathers on the bottom of slugs.

Don't turn a magazine upside down, or in such a way that the lugs of the matrices jump out of the channel at the opening in the lower end of the magazine. If it is found necessary at any time to turn the magazine upside down, after placing it on the machine, push the matrices back by running the finger along the opening at the end of the magazine, and see that the matrices fall in the proper places in the channel. This should be particularly guarded against in the lower magazine.

When about to go to press and something happens to the machine, don't go at it blindly with a screwdriver and wrench, changing every adjustment in sight. You will only lose time. Investigate and find out what is the trouble before applying a remedy.

Don't abuse the machine when it balks or stops or fails to function properly. It is because you have neglected something, or something has broken. The machine is the most reasonable thing in the world, no matter how unreasonable it may seem.

Don't forget that the machine always does the best it can, in view of the treatment it receives.

Don't forget that time spent in keeping the machine clean, oiled where oil is necessary, and free from rust, is time well spent. This is a case where "an ounce of prevention is worth a pound of cure."

Don't forget that with fair, intelligent treatment, you will find the Linotype one of the most obedient and useful servants in the world.

THE ERECTION OF THE LINOTYPE

First, ascertain if there is a door or window wide enough to admit the machine without dismantling, and if not, a suitable opening should be provided, for it would prove expensive and unsatisfactory if, at the last minute it should be found necessary to strip the machine to the base.

The largest assembled section of any model Linotype is the base, which is shipped firmly bolted to heavy wooden skids and completely enclosed in a box measuring 44½ x 52½ x 66½ inches and weighing 2,000 pounds.

Provided your building contains an opening large enough to admit this section, it is best to place the base in position before removing the boxing; however, it is frequently necessary to strip the boxing from the skids, which reduces the section to a width at its narrowest point to 36 inches, thus allowing it to pass through a 36-inch door frame by careful handling.

If for any reason it is impossible to make above provisions, the width of machine may be reduced still further by removing the driving pulleys and shaft, but to accommodate a smaller opening complete dismantling becomes necessary.

Foundation.—To insure smooth running, freedom from vibration must be had, therefore, if possible, a concrete foundation covered with a tight wood floor or galvanized iron mat to prevent grit from the concrete into the machine bearings is recommended.

An ordinary floor constructed of 2 x 12 inch joist spaced 12 or 16 inches center to center will hold a Linotype, but for safety and efficiency the foundation should be the best obtainable.

Power.—The ideal method of driving a Linotype is by use of a direct connected geared motor. The speed of the main driving pulley on the Linotype, which is 14½ inches in diameter, should be from 66 to 68 revolutions per minute. To ascertain the size of pulley required on shaft, if driven from a line shaft, multiply the diameter of the main driving pulley on the Linotype (14½ inches) by the number of revolutions desired (66 to 68), and divide the product by the revolutions of the driving shaft. The quotient will be the diameter of the pulley required.

Floor Space.—The actual space occupied by a Linotype is 25 square feet. The distance from front of keyboard to outside of step on rear of machine is 5 feet, and the width, including all overhang, is 5 feet. In order to give a proper working space all about the machine, the total floor space apportioned should be not less than 76 square feet. There should be 3 feet clear in the front and 18 inches in the rear, these added to the machine space (5 feet) make 9 feet, 6 inches, from front to rear. On the left hand side of the machine there should be a working space of 18 inches, and the same amount on the right hand side, this added to width of machine (5 feet) makes 8 feet as the total space required in width. For the Model 8 allow 5 feet 4 inches for each machine and 20 inches between machines in addition. The Model 14 requires a width of 6 feet, 4 inches and 2 feet between machines in addition.

The following diagram will serve as a guide in laying out floor space and finding location for gas pipe, where piping comes from beneath; also for electric wiring and water piping for the water-cooled mold. Where gas connections cannot be made from below, it is best to drop pipe from a point directly above.

The diagram shows floor plan for a Model 8 Linotype. The diagram represents the machine as standing in a floor space 60 inches square. Every

part of the machine comes inside of this space except the step, which projects about three inches beyond the line. The points on ceiling and floor for gas, water piping, and electric light wiring are indicated on the diagram, with their distance from the boundary line given in inches. The distance between the feet of the machine is given to enable its location on the floor over joists, etc. By careful study of this diagram all preparations can be made for installing the machine in advance of its arrival; that is, the electric wiring can be put in and brought to the points indicated in the dia-

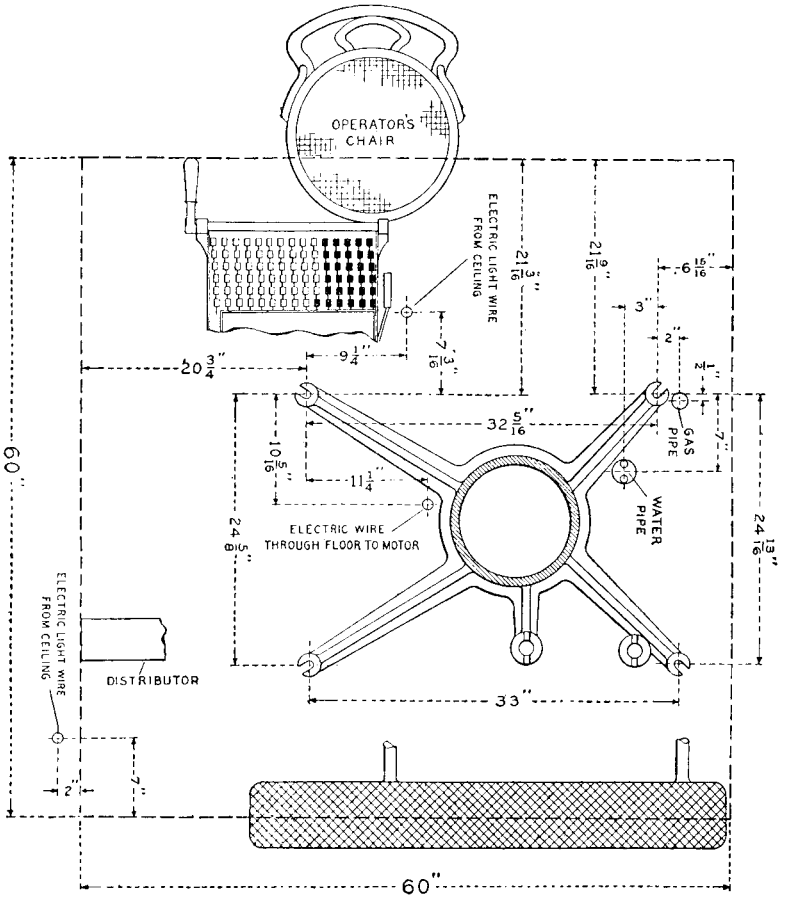

FIG. 132.—Floor diagram.

gram and the connections put in so that when the machine arrives the electrician will only have to make the connection with the machine. The same can be done with the gas and water piping. It is important that this should be attended to in advance of the arrival of the Linotype, as these connections should be made as soon as the machine is placed in position.

The location of a machine is dependent on such a variety of circumstances that it would prove an almost impossible task to lay down any one specific rule for guidance. For example, convenience in transmitting power from a line shaft might arbitrarily fix a certain location in one office, where the use of an individual motor or gasoline engine in another office would entirely eliminate this phase of the question.

Another determining feature is the matter of light, especially where daylight alone is depended upon; on the other hand, where artificial light is available, this feature need not be considered.

The floor plan shown is for a Model 8. The same plan can be used for a Model 14, except that 12 inches additional space must be allowed at right of machine for auxiliary magazine.

The Linotype should be installed and adjusted *only* by skilled mechanics familiar with the construction and mechanical action of their various parts. Such men are to be found in the leading offices of all large cities. An incompetent man may cause trouble, delay, and injury to the machine.

The Linotype machines are constructed with the greatest possible care and by the use of standard tools, jigs, and gauges. Every machine is tested before leaving the factory, to the end that every part and every detail may be absolutely true and correct. No change or alteration whatever in any of its parts should be permitted in the process of installation.

ARRANGING AND DRIVING LINOTYPES

In order that each new user may decide as to the arrangement of machines best adapted to meet the conditions of his office, where the special Linotype motor is not used, we give below the various plans that have proved satisfactory.

Source of Power.—Linotypes may be driven from any existing shaft having a uniform speed of rotation, or from an electric motor, gas engine, or water motor. Each machine requires *one-fourth of a horsepower,* but an allowance somewhat in excess of this amount is recommended to insure steadiness of motion. The most economical and practical method of drive is by individual electric motor designed for the purpose. Illustrated literature and prices may be had on application.

Drive Machine from Below.—Where possible to avoid it, do not drive the machine from an overhead shaft. There are many advantages in belting upward to the driving pulley. Do not cut belt openings through the floor. Have your driving shaft above the floor in every instance.

Uniform Speed Important.—The speed of the main driving pulley, which is fourteen and one-half inches in diameter, should be from 66 to 70 revolutions per minute, *and no faster.* Fluctuation in the speed will seriously interfere with the operation of the machine and reduce the output.

Heating the Metal.—The most modern, up-to-date method is the Linotype electric pot. There are many advantages peculiar to the electric

principle of heating that particularly recommend this pot to those who wish to avail themselves of the most modern and efficient plant equipment. The electric method is primarily clean, safe, quick, economical and easily controlled. The necessity for ventilating systems is, for instance, eliminated, as there is an absence of open flames and the resultant products of combustion. Again, while the output of the Linotype is increased, the life of the metal is conserved by the close and accurate regulation of temperature, preventing the consumption of tin, which is the most expensive element that enters into type metals. As the metal is uniformly heated from within the crucible a high temperature can be applied at the start and the metal can be quickly reduced to a fluid state. This would be unsafe with gas or any system by which heat is applied externally, as the rapid expansion would endanger the crucible. The Linotype electric pot delivers the molten metal to the casting point at the exact temperature registered in the crucible. This insures a perfect cast of each character and slugs that are solid and close-grained.

Next to the electric pot, gas is the fuel most generally used. The Linotype gas burner will consume about 13 cubic feet of gas per hour. A plant governor should be installed on the gas supply pipe in order to maintain a uniform gas pressure.

For those localities where neither electricity nor gas can be obtained, there is the gasoline-kerosene burner which provides a thoroughly efficient and satisfactory source of heat for the metal pot of the Linotype. Special descriptive literature will be furnished on request.

LIGHTING

For daylight the machines, if possible, should be arranged to receive light from above or from one side. The best arrangement is to have the light coming to the left side of the operator.

Gas lights may be arranged in any suitable position. For electric lights, each machine is provided with a removable support, or holder, in front of the operator.

VENTILATION

In order to keep the air of the room cool and pure, we recommend the use of an overhead ventilating pipe leading to a chimney, or other flue, and provided with branches, or feeders, leading down to the top of the metal-pots of the machine. In most States this arrangement is required by law. This is not required when the electric pot is used, one of the numerous advantages of being electrically equipped.

Even where the electric pot is used, a good ventilation without draught upon the operator or upon the metal pot is very desirable, and in fact, necessary. In the newer composing rooms, attention is being paid to this matter of ventilation, and in older rooms it will well pay the proprietor to see to it that the air of the composing room is pure and healthful.

COMPARATIVE WEIGHTS OF LINOTYPE SLUGS

BODY AND MEASURE	Solid Mold, Slugs per lb.	Recessed Mold, Slugs per lb.	Solid Mold, Slugs in 100 lbs.	Recessed Mold, Slugs in 100 lbs.	Solid Mold, Ems in 100 lbs.	Recessed Mold, Ems in 100 lbs.
6-pt., 13 ems, solid.....	19½	..	1,950	....	50,700	....
6-pt., 13 ems, on 7-pt...	17	..	1,700	....	44,200	....
6-pt., 13 ems, on 8-pt...	15	..	1,500	....	39,000	....
8-pt., 13 ems, solid.....	15	..	1,500	....	29,250	....
8-pt., 13 ems, on 9-pt...	13	..	1,300	....	25,350	....
8-pt., 13 ems, on 10-pt..	12	18	1,200	1,800	23,400	35,100
10-pt., 13 ems	12	15	1,200	1,500	18,720	23,400
10-pt., 22 ems	7¼	9	725	900	19,140	23,760
10-pt., 30 ems	5½	6½	550	650	19,800	23,400
11-pt., 13 ems	11½	14	1,150	1,400	16,307	19,852
11-pt., 22 ems	6½	8⅓	650	834	15,600	20,016
11-pt., 30 ems	5	6	1,000	600	16,365	19,638
12-pt., 13 ems	10	12½	600	1,250	13,000	16,250
12-pt., 22 ems	6	7¼	425	725	13,200	15,950
12-pt., 30 ems	4¼	5⅓	900	534	12,750	16,020
14-pt., 13 ems	9	10½	500	1,050	10,026	11,697
14-pt., 22 ems	5	6	384	600	9,425	11,310
14-pt., 30 ems	3⅝	4½	....	450	9,869	11,565
18-pt., 13 ems	..	9	....	900	....	7,803
18-pt., 22 ems	..	5⅔	....	567	....	8,318
18-pt., 30 ems	..	4¼	....	425	....	8,500
24-pt., 13 ems	..	7½	....	750	....	4,875
24-pt., 22 ems	..	4½	....	450	....	4,950
24-pt., 30 ems	..	3⅓	....	334	....	5,010
30-pt., 13 ems	..	6½	....	650	....	3,380
30-pt., 22 ems	..	4	....	400	....	3,520
30-pt., 30 ems	..	2¾	....	275	....	3,300
36-pt., 13 ems	..	5¾	....	575	....	2,495
36-pt., 22 ems	..	3⅓	....	334	....	2,450
36-pt., 30 ems	..	2½	....	250	....	2,500

NEWSPAPER AND BOOK MEASUREMENTS

NEWSPAPER MEASUREMENT

13 EMS PICA	5½-Point	6-Point	7-Point	8-Point	9-Point	10-Point
Ems in line.....	28⅔	26	22¼	19½	17⅓	15½
Lines in 1,000 ems....	35⅓	38½	45	51⅓	57⅔	64½
Inches in 1,000 ems....	2⅔	3¼	4⅜	5⅔	7¼	9
Ems in 22-inch column.	7,900	6,785	4,970	3,865	3,050	2,520

BOOK-WORK MEASUREMENT

SIZE	21 ems: Ems per Line	21 ems: Lines in 1,000 Ems	21 ems: Inches in 1,000 Ems	23 ems: Ems per Line	23 ems: Lines in 1,000 Ems	23 ems: Inches in 1,000 Ems	25 ems: Ems per Line	25 ems: Lines in 1,000 Ems	25 ems: Inches in 1,000 Ems
6-point	42	24	2	46	21⅔	1¾	50	20	1⅔
8-point	31½	32¼	3½	35	28⅝	3¼	37½	26½	3
10-point	25¼	39½	5½	27⅝	36	5	30	33⅓	4⅝
11-point	23	43½	6¾	25	40	6⅛	27¼	36¾	5⅝
12-point	21	48	8	23	43½	7¼	25	40	6⅔

TABLE OF TYPE MEASUREMENTS

The Following Table Shows the Number of Ems in Running Inch in Columns from 10 to 30 Picas Wide

WIDTH OF COLUMNS IN PICAS

	10	11	12	13	14	15	16	17	18	19	20
6-point	240	264	288	312	336	360	384	408	432	456	480
7-point	177	194	212	229	247	265	282	300	318	335	353
8-point	135	148	162	175	189	202	216	229	243	256	270
9-point	107	117	128	139	149	160	171	181	192	203	213
10-point	86	95	104	112	121	129	138	147	155	164	173
11-point	71	79	86	93	100	107	114	121	128	136	143
12-point	60	66	72	78	84	90	96	102	108	114	120

WIDTH OF COLUMNS IN PICAS

	21	22	23	24	25	26	27	28	29	30
6-point	504	528	552	576	600	624	648	672	696	720
7-point	371	388	406	424	441	459	477	494	512	529
8-point	283	297	310	324	337	351	364	378	391	405
9-point	224	235	246	256	267	277	288	299	309	320
10-point	181	190	199	207	216	225	233	242	250	259
11-point	150	157	164	171	178	185	192	200	207	214
12-point	126	132	138	144	150	156	162	168	174	180

———o———

The foregoing description of the Linotype machine and the various accessories does not cover every detail of the different models and of special devices which have been put upon the various machines. While every detail of these different models has not been described, the general principle and most of the important mechanical details in all models are identical. Where there are slight differences anyone with mechanical ability can readily perceive their action.

If the various machines and mechanical functions in the foregoing pages are carefully studied and understood, the slight variations in the different models will offer no difficulty.

There are a number of so-called "attachments" which can be placed on the Linotype machine for doing special work. There is an attachment called the "Greek attachment," so called because it was first used on the machines for setting the Greek language. This is used in a few cases on foreign machines where there are a large number of special characters and accented letters.

There is another attachment called the "quadding-out attachment." By the use of this attachment, where work is very open, like some forms of legal work, considerable extra speed can be obtained by the use of this attachment, as it saves the operator's putting in nearly a whole line of quads and spacebands. This quadding out attachment is in use in a few offices where this special work is done.

There are a number of special molds such as the "fudge mold" mentioned in this book, and other special molds have been constructed for special purposes.

Special knife blocks have been made in some cases so as to take care of an overhanging initial letter.

A special device has recently been made for casting large leads and inserting them alongside of the slugs in the galley for a particular class of work.

It has not been deemed best to illustrate and describe all of these "attachments." They would occupy quite a space, and as each one of them is used only in a very small number of offices where special work is required, the vast majority of our customers would have no interest in them.

The printing art in the last thirty-five years has advanced with wonderful rapidity. Special characters, special devices, and special arrangements for accomplishing some particular object are continually being developed. It is the desire and the policy of the Mergenthaler Linotype Company to assist its customers in every possible way and the industry may rely upon the fact that every important demand of the art will be met.