LINOTYPE / INTERTYPE

Linecasting Machines

How They Differ

Compiled By

LEONARD A. SPENCER

Doctor of Linotypes

PREFACE-*Some Machine History*

Handsetting foundry type was a slow and expensive method which was an obstacle during the first centuries of printing. In late 1800's need for a better way became serious with invention of cylinder presses.

Mergenthaler Linotype and Lanston Monotype became leaders in this revolution. Monotype's way has survived and is being carried on by American Typecasting Fellowship members and others and likewise with slug casting machine usage.

Other survivors in hot metal have been Thompson foundry and Intertype and Ludlow slug casting machines.

Less successful companies have been Linograph and Rogers Typograph. Linograph was manufactured by three brothers, Hans Petersen being principal inventor. It was a simplified Linotype using smaller mats only five-eighths inch high with characters punched deep

enough to have low shoulder spaces similar to Ludlow slugs. Linograph machines were later modified to use standard matrices.

Ludlow Typograph was developed to produce display slug lines, principally for newspaper headlines and ads, although it was used commercially for setting six point lining gothics. It required hand assembly and distribution of characters so had that limitation.

Rogers Typograph was successful to the point that Linotype bought the firm and hired John Rogers as consulting engineer. Linotype then produced the Linotype junior, using Typograph principles, to eliminate competition from Unitype or Simplex foundry type assembling machines invented by J. Thorne. Typograph became quite popular in an improved version after World War II in Germany.

When photolithography made advancements, composition methods changed radically. At first, reproduction proofs were taken from hot metal forms, but soon ways to achieve the same result were engineered and most have fallen by the wayside.

Model 8 three-magazine machine was first marketed by Linotype in 1911 and in 1914 the Model 14 with a 28-channel auxiliary magazine with push button keyboard was added. These versions were top sellers.

Intertype started as International Typesetting Machine Company in 1911. Many of first machines were rebuilt Linotype bases with improvements patented by the new company. When World War I broke out, International Typesetting Machine Company was reorganized as the Intertype Corporation, and by 1917 had three machines for sale:

Model A one magazine, Model B two magazine, Model C three magazine. Intertype was first in cold type with its Fotosetter in 1950. This machine continued the circulating matrix principle but had film image instead of the punched character.

ASSEMBLING-*Keyboarding Characters*

Linotype featured a swinging keyboard in 1929, which made keyboard maintenance more accessible and easier to remove as a unit. However, the Intertype keyboard was not a problem to remove-just take out the reed rack and a few bolts and off it comes.

Linotype developed mechanism to operate side magazines from single keyboard. Intertype had separate power driven keyboard to actuate side magazine verges.

Assembler and assembler elevator parts on Intertype are same on all models. Linotype changed these parts several times, so there are many different size parts to contend with, which are not interchangeable.

Assembler slides and brake parts are different on the two machines.

Spaceband box action is different on these machines. Linotype has pawls that lift spacebands over sharp rail points. Intertype box mechanism pushes spacebands sideways past stop which is adjustable for different thickness of bands.

Reeds which carry action of keyboard up to trip verges on magazines have been problem with early Linotype models-until Comets and Elektrons made these parts removable as a unit. From the start, Intertype reed racks were removable by taking out two screws at

top and lifting unit up and out from keyboard.

CASTING-*Where the Slug Is Made*

Pump stop safety works on upstroke motion of justification lever on Intertype, which is much more dependable than the fragile parts of early Linotype quadders and microswitches in jaws on later models. Early loose line safety on Linotype worked by movement of right hand vise jaw and did not give trouble when properly adjusted.

Original pot plunger spring on Linotype Model I was positioned directly above plunger lever to exert a straight downward action. Intertype continued this method as the patent must have run out by 1912. The Intertype spring pressure is released by simply unscrewing a rod straight up. Linotype "improved" their machine by a system of levers to put this spring inside the column. This worked until a stronger spring was necessary to cast larger slugs and improve faces for reproduction proofs. I remember a time in Santa Rosa, California, when it was a three-man job to put that heavy spring back in place on a Model 8 Linotype.

Intertype has one piece gibs along side first elevator and the right hand side is dowled for a constant reference for elevator alignment. Linotype uses two gibs on each side without dowels.

Intertype provides for adjustment of the first elevator head to make it parallel with mold recesses where toes of mats fit. Linotype alignment has to be done by peening and filing an alignment key and this gets to be a tedious procedure.

First elevator connecting link adjustment is different on the two machines.

Linotype molds are clamped against mold disk on bottom by the three top screws. When mold disk expands it pushes molds out so that trim changes on smooth side of slug. That is why it is necessary to cast at least five slugs in rapid succession, and let the last one cool before you measure them for thickness. Intertype molds hang on ends in pockets to minimize this change in slug trim. For this reason, the mold disks are different, as are the liners for changing mold thickness and length of slugs.

Mold driving pinion shaft friction clamp or brake to help position mold disk for alignment with locking studs is much larger and under spring tension and more free from oil contamination on the Intertype.

Ejector blade measure changing mechanism is very different on the two machines, except for early models where they were the same. Linotype has system of mostly two-pica segments that are added or subtracted by adjusting a vertical piece behind them. Intertype has arrangement of solid blades for each setting that are adjustable sideways to position the proper length ejector blade.

Knife wipers were changed several times over years. Parts suppliers made several improvements. Downstroke operation proved best in late versions.

Mold disk hubs are different. Early Linotypes had shaft with bearing in mold slide casting. Intertype con~ tinned using that method, but had a special nut on back so that thin layers could be peeled off to compensate for end play wear. Linotype changed to a brass hub which fit into mold slide cavity. It could be replaced when worn, but its main purpose was to water-cool the disk by running water through the hub. Water leaks were a problem. Blowing air past

the casting mold proved much more effective in solving the hot mold problem.

Knife blocks are different. Linotype has advantage in that there is individual adjustment for each point size of slug. Intertype does not have this feature and depends on more exact machining to get accurate slug thickness.

Intertype uses a weight to start the second elevator down stroke instead of spring as Linotype does.

Mold disk floating locking stud blocks are different.

Slug stacker lever has been improved several times by both companies.

Intertype molds can be cleaned by removing the cap by loosening two nuts on swivel bolts. On Linotypes the whole mold has to be removed which disturbs the way mold seats in disk pocket, so be careful when putting mold back that you seat it properly in the pocket.

To compete with Ludlow, Intertype marketed a stick attachment. First elevator head was hinged and by using a special stick and spacebands, and composing mats by hand from cabinet similar to ones used by Ludlow, sizes from 5 to 48 point could be cast. Intertype mold caps can be changed without removing bottom part so this system provided larger type from a simple machine.

Lockup pressure just before slug is cast is greater on Intertype-about 1200 pounds. Linotype standard was 800 pounds, but these pressures depend on pot lever spring and the way it is adjusted.

Mouthpieces are different on pots. Originally both companies had wedge style mouthpieces, although they were

different. Getting either one of them off after they had been on for 20 years was work. I have had to saw horizontally through both kinds to get them off. Newer parts are screwed on and those screws become problem when they have not been removed for several years. Drilling out broken screws without enlarging the hole or drilling too far into crucible is not easy. Best way is to soak rag with Ludlow Lubriclean plunger oil and place it on hot mouthpiece and let it soak, longer is better, but keep oil from drying out. Then use special punch that fits screw head and whack each screw with a three-pound hammer. Then use screwdriver that fits tightly in screw slot so slot is not mangled, then exert gradual pressure to remove each screw.

Linotype developed the first usable quadder which was a complicated arrangement below the vise jaws. The pump stop safety was not very dependable. A squirt took lots of time to clean out. However, if the quadder parts are removed, the right hand vise jaw can be made to actuate the pump stop safety as on early Linotypes.

Intertype developed a mechanical quadder which was more successful. It took almost daily care to keep it clean and lubricated. One disadvantage is that the jaws slap together hard enough to damage mats over time. The adjustable cushioning is not sensitive enough

Star Parts developed and sold a reliable quadder with latest version using hydraulic principles. It works with proper maintenance. In fact the last Intertypes sold in this country were made in England, but Star Parts quadders were installed for use in America.

Linotype produced an outboard quadder that attached to left end of vise cap. It had problems.

However, the Linotype Hydroquadder was best one made, but eventually requires maintenance.

METAL HEATING-*Major Problem*

Electric metal pot heating replaced gas, gasoline and kerosene for that purpose in 1915. Pot heat was controlled by a coiled flat liquid expansion system which changed contacts off and on to operate a large "clapper switch" relay box about a cubic foot in size. Mouthpiece heat was controlled by variable resistance rheostat in this system and for years to come.

Electric and gas heat controls, along with metal pot heating elements are crucial to operation of any typecasting machine. Replacement units are getting hard to come by, but as long as the elements continue to heat there are ways to control or adjust metal temperatures. Star Parts made a Microstat unit in which a bimetalic rod expanded enough to operate a microswitch. It was my favorite replacement part when the original units refused to work or had too wide a temperature range. Most controls used an expansion bellows controlled from probe in sensor area. Partlow perfected this system with indicating pointers to show operating temperatures.

Mouthpiece electric heat controls were another problem, with most of them in early machines controlled by a rheostat which inserted resistance in series with heating element. Rheostat reduced voltage by turning excess into heat. A solid state electronic device called a triac has made possible a control which chops off part of each AC cycle enough to set voltage to the proper point without wasting power in heat, as the rheostats did. That was my answer to mouthpiece heat control. I beefed up a light dimmer

circuit for this application which has been used since the middle 1970's without any problems.

Electric pots are different. To remove mouthpiece and throat heating elements on older Linotypes it is necessary to remove pot cover and crucible from pot jacket to replace them, although Elektrons, Comets, and late Blue Streak machines made provisions to make changes without removing crucible. Linotype pot elements are immersed in metal around plunger. Dross collects around these making them hard to remove. I have had problem where dross was so imbedded around elements that they could not be removed even using acetylene torch by a professional welder.

Intertype mouthpiece heater is one unit under throat and can be removed by sliding it up and out from under mouthpiece. Intertype metal pot elements are outside crucible, so can be changed without big problems even when pot is cold.

In 1931 Linotype developed a mechanical thermostat using different expansion and contraction rates of two unlike metals to operate a fulcrum system which multiplied this motion by which a switch mechanism was turned on and off. This pulled in the large relay to carry current to heating elements.

Temperature control of metal in pot is possible within plus or minus one degree Fahrenheit with solid state computer module with a thermocouple sensor in same place as former probe. This was only replacement available in 1997 when had heat control problem on Model 31 Linotype.

Much improved circuit boards from England can replace originals in Elektrons. Octal relays, *varistor* probe

and thyratron tube are gone.

DISTRIBUTION-*The Circulating Matrix*

Original Linotype distributor screw clutch and stopping mechanism and flexible channel entrance partitions were kept by Intertype, but Linotype changed to spiral automatic stop when two-pitch distributor screws were introduced in 1917 to increase speed of matrix distribution. At the same time Linotype made channel entrance partitions rigid.

Linotype channel entrance partitions were spaced all one width, probably to accommodate languages other than English. Intertype channel entrances were changed to match character width so that less trouble occurred when larger faces came into use. Linotype did not adopt this spacing until the 72-channel magazine machine Model 20-came on market in 1918. This was first display machine and also first time split magazines were used holding 10 matrices. Model 21 was like Model 8 but with three 72-channel magazines and it was first marketed in 1921. Display molds for up to 36 point were first used in 1909.

Two-in-one machines with swinging distributor bars and gates are best left alone unless your mechanical inclinations can keep the parts seating properly on changeovers. Positioning of distributor bar when changing from 90 to 72 channels and back again is critical to prevent mat damage.

Intertype started making wide-tooth combinations on matrices about 1935. Linotype did the same shortly after. Combinations were fragile on early mats.

Second elevator bar on Intertype does not have stop on right end as Linotype does. On Intertype the stop is built into

transfer channels.

Distributor boxes are similar on regular machines, but the mechanisms on mixers are very different.

MAGAZINES-*Where Fonts Are Stored*

Early Linotypes had verge systems attached to each magazine. About 1906 on Model 5 Linotypes, verges were built into brass castings that have been attached to magazine cradles. Intertype magazines have simple one-piece verge built into magazine. This eliminates all the magazine locking parts which give trouble over the years. Intertype magazines have top cover that is closed by springs as magazine is removed. Linotype cover has to be manually turned to cover top of magazine.

Intertype magazines are stored top down. Linotype stored them bottom down and unless magazine racks provided means to roll them, there was wear on bottom end when they had to slide into storage.

Many differences in magazine changing and removing were made along the way. Early models of both machines took them off from the rear, which required more floor space. Later models change from front. Linotype versions after Model 8 have crank driven mechanisms which lift and lower magazine cradles in straight up and down action. Intertype developed a different way to seat them in operating position, but they protrude farther forward than do Linotype multi-magazine products. Intertype channel entrances are self aligning on top of the magazines, except on mixers. On Linotypes gates have to be adjusted.

COLOPHON-*How Printing Was Done*

Composition for this treatise was done on a Model 21 Linotype of 1925 vintage. Type faces used are De Roos roman and italic designed in Amsterdam, Holland, for Typefoundry Amsterdam by Sjoerd H. De Roos. Matrices for linecasting composition were made by Intertype Corporation American Type Founders cast the foundry series to American standards, which is used in display sizes. Presswork was done on 1895 Golding Pearl 7 x I I platen at Gladsome Press, private press of Leonard and Alnora Spencer in May of 2000 for distribution at the biennial meeting of American Typecasting Fellowship in Rindge, New Hampshire, June 13-16.