Oct. 27, 1959 G. W. BUNGAY 2,909,818

BACKING ELECTROTYPES

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Fig. 2.

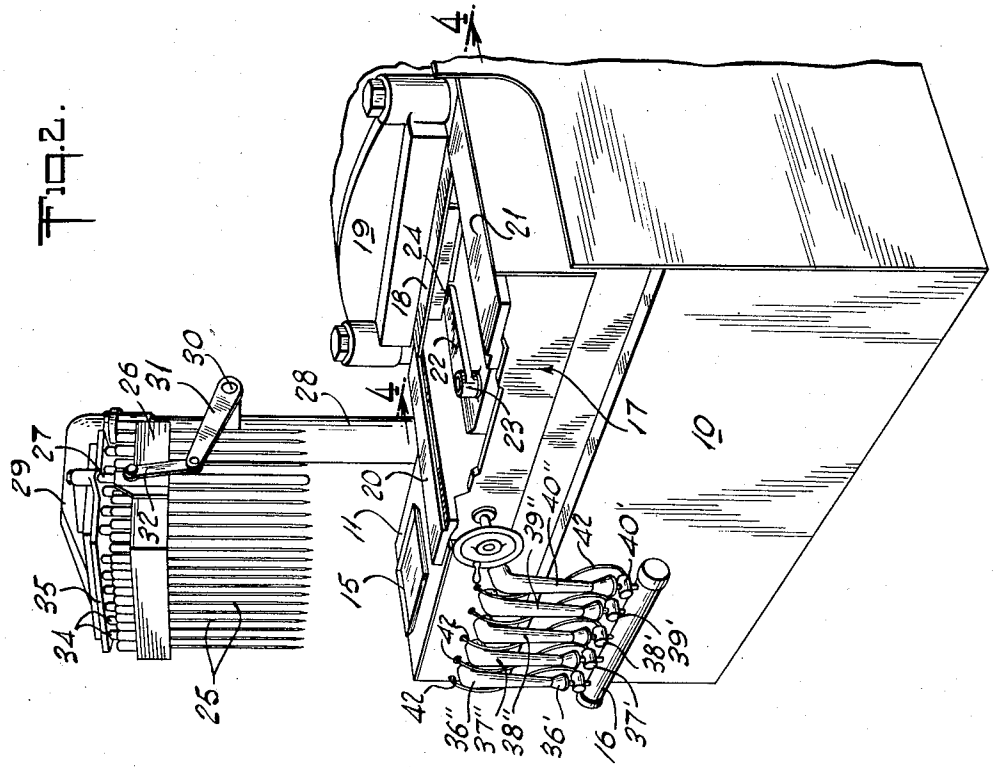
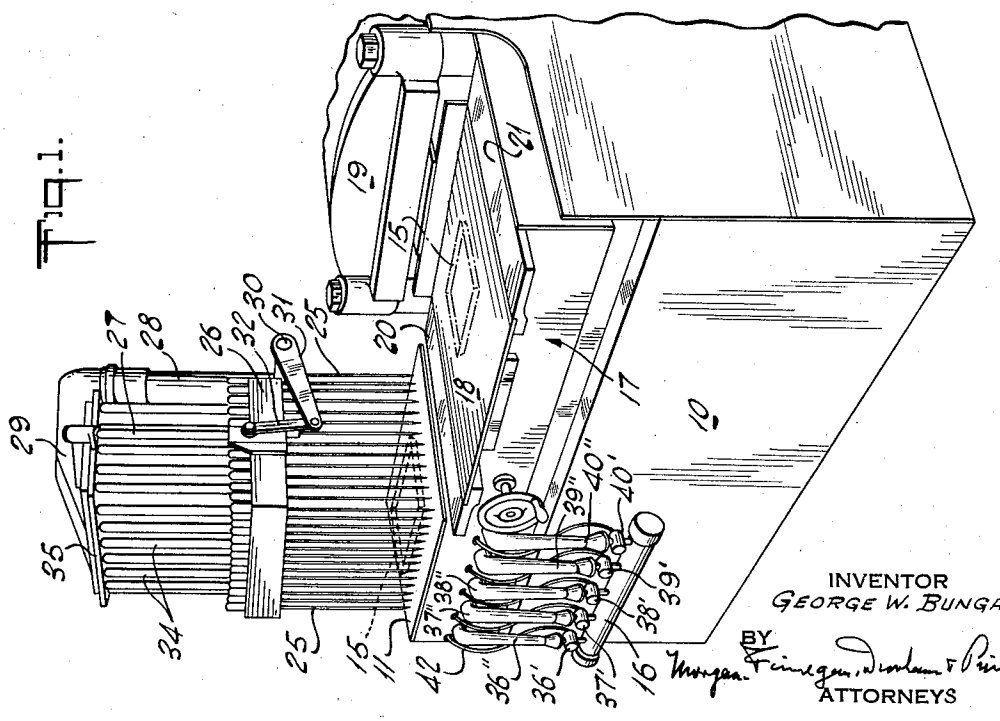


Fig. 1.



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Fig. 3.

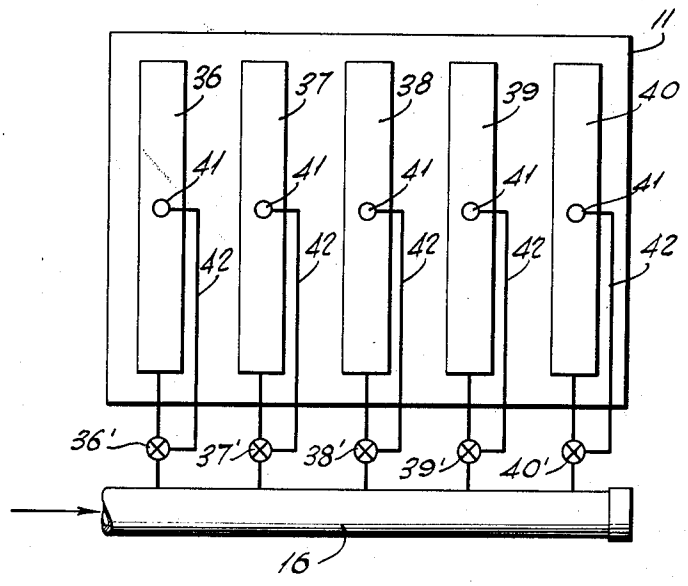


Fig. 4.

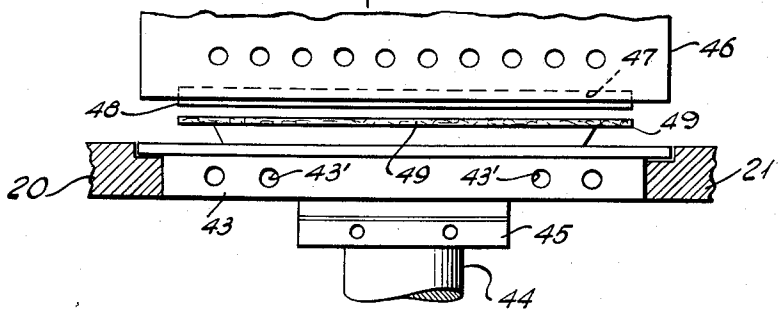
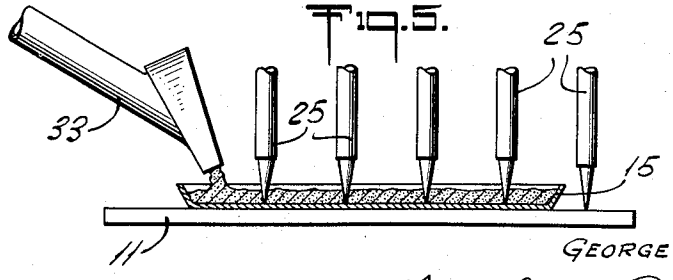


Fig. 5.



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BACKING ELECTROTYPES

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Application March 25, 1957, Serial No. 648,175

2 Claims. (Cl. 22—58)

This invention relates to a novel and improved method and apparatus for "backing up" electrotype shells for letterpress printing and constitutes a continuation in part of my co-pending application filed December 3, 1953, Serial No. 395,995, now Patent No. 2,849,768, granted September 2, 1958, entitled "Method and Apparatus for Backing up Electrotype Shells."

The above mentioned co-pending application pertains to improvements in "backing up" procedures and equipment to avoid many of the difficulties previously encountered in producing flat printing plates. This invention concerns further improvements in the "backing up" process to reduce working and shrinkage sumps during the cooling processes and insure the attainment of a flat cast. It has been found, for instance that through an improved arrangement of elements for handling and heating the electrotype shells during the pouring procedure and by carefully controlling the rate of cooling of the filled shell that a superior printing plate can be produced requiring minimum finishing time before it is ready for installation in the press.

Accordingly, one object of the invention resides in the provision of a novel and improved method and apparatus for backing up electrotype shells whereby temperature gradients in the cast throughout the filling and cooling operations are substantially avoided with the result that substantially perfectly flat plates of more uniform thickness can be obtained.

Another object of the invention resides in an improved method and apparatus for heating an electroplate shell prior to and during the pouring process so that the filled shell will be maintained at substantially uniform temperature throughout its area.

Still another object of the invention resides in a novel and improved method and apparatus for cooling a filled electrotype shell to prevent warping or other damage to the shell and thus require little if any additional work to make the shell ready for installation on a press.

A still further object of the invention resides in a novel and improved structure for cooling filled electrotype shells.

The above and other objects of the invention will become more apparent from the following description and accompanying drawings forming part of this application.

In the drawings:

Figure 1 is a perspective view of apparatus in accordance with one embodiment of the invention;

Figure 2 is a perspective view of the apparatus of Figure 1 illustrating another step in the process in accordance with the invention;

Figure 3 is a diagrammatic view of electrotype shell heating means in accordance with the invention;

Figure 4 is a cross sectional view of a fragmentary portion of the apparatus shown in Figures 1 and 2 and taken along the line 4—4 thereof to show the arrangement of elements for cooling a filled electrotype shell; and

Figure 5 is a cross sectional view of a fragmentary part of the apparatus shown in Figures 1 and 2 illustrating the

manner in which an electrotype shell is held during the filling process in accordance with the invention.

It has been found that relatively small temperature variations in electrotype shells during the filling operation and subsequent thereto will produce variations in solidification and resultant warping of the finished plate and further that these difficulties can be overcome through proper handling and cooling of the plate during the "backing-up" process.

Referring to the drawings and more specifically to Figures 1 and 2 thereof, the illustrated embodiment of the invention includes a base member **10** having a supporting surface **11** on one end thereof for supporting and holding an electrotype shell **15** shown in dotted outline in Figure 1 and in full lines in Figure 2. Beneath the supporting surface **11** there is provided a plurality of independent heating means which in the illustrated embodiment of the invention constitute gas heaters supplied by a common manifold **16** though it is understood that the heating may be accomplished either by gas, electricity or other suitable means. Immediately adjacent the supporting surface or hot plate **11** and at substantially the same level there is provided a variable pressure hydraulic press generally denoted by the numeral **17** and having a platen or supporting plate **18**. In Figure 1 the sliding platen **18** is shown in its forward position and the actual press is to the rear of the platen and denoted by the numeral **19**. The sliding platen **18**, of relatively thin section, is slidably supported by side guides **20** and **21** and is movable into and out of the press by a lever **22** fixed to a rotatable drive shaft **23**, the lever having its outer end **24** slidably engaging the underside of the sliding platen **18** so that as it is moved through an arc of about 180° in one direction and then the other, the platen will be moved into and out of the press **19**.

Immediately above the surface or hot plate **11** which supports an electrotype shell **15** during the filling process, as shown and described in the aforementioned co-pending application, there are a plurality of independently slidable fingers **25** carried by a frame member **26**. The frame member is in turn slideably mounted on side guides **27** supported above the hot plate **11** by a column **28** and a hollow housing member **29** carried by the column. Movement of the frame **26** and the fingers **25** is accomplished by a mechanical system including a drive shaft **30** and a linkage including levers **31** and **32** connecting the drive shaft with the frame **26**. In this way rotation of the shaft **30** will move the frame and finger assembly **25—26** upwardly or downwardly as the case may be. As described in the aforesaid application an electrotype shell **15** to be filled is placed on the hot plate **11** and the fingers **25** are then lowered to contact the shell **15** and hold it firmly in position on the hot plate. This position of the fingers **25** is shown in Figure 5 of the drawings. It will be observed that the fingers have pointed end portions and rest on the inside of the shell **15** to hold all portions in firm engagement with the hot plate **11** to prevent warpage during the filling process.

The electrotype metal with which the plate is filled is introduced into the shell through a suitable nozzle or other filling mechanism generally denoted by the numeral **33** in Figure 5. By reason of the careful control of temperatures and method of cooling the amount of electrotype metal introduced into the shell can be controled to avoid spilling or overflowing of the metal and at the same time a finished flat plate of uniform thickness will be produced.

The electrotype metal is introduced into the shell at a molten temperature so that it will flow uniformly throughout the shell **15**. While it has been the practice to heat the hot plate **11** to insure the free flow of metal it has been found that in so doing the introduction of

molten material at one end of the electrotype shell 15 as shown in Figure 5 will cause the temperature of the material and the shell at the point of metal introduction to attain a temperature nearly equal to the pouring temperature of the material, while at the far end of the shell the temperature of the molten material at the completion of the filling process will be at a substantially lower temperature. This results in uneven cooling of the electrotype metal and will produce a poor cast. When an electrotype shell 15 is completely filled with electrotype metal and while the fingers 25 are in contact with the shell as shown in Figures 1 and 5 initial cooling of the metal is accomplished by means of a plurality of air blast tubes 34 that extend downwardly from the frame member 29 and communicate with an air manifold 35. Since the air blast tubes 34 cool the entire surface of the electrotype metal, the end of the platen 15 farthest from the point of introduction of molten metal will cool much more rapidly than the end portion in which the molten metal was introduced. This uneven cooling can be observed in prior processes by the progressive setting of the surface of the molten metal as evidenced by the formation of a so-called sandy condition on the surface of the metal at which time the ripple of the molten metal disappears.

According to this invention heat is applied to the shell 15 during the filling operation so that the filled electrotype shell 15 will be maintained at a substantially uniform temperature throughout its area so that the sandy condition of the material upon cooling will take place uniformly over the entire surface. This end has been attained by an improved arrangement of the heating means below the hot plate 11 that compensates for the temperature differentials produced in the filling operation. It has been found if the supporting surface 11 for the shell 15 is heated so that the temperature of the shell beneath the filling nozzle 33 is well below the melting point of the metal and if the temperature of the shell is gradually increased so that the far end of the shell is slightly below the melting point of the metal, then upon filling of the shell the sandy condition on the molten metal will appear substantially simultaneously throughout its entire area. In the actual process of filling the shells, each filled shell remains on the hot plate 11 until the sandy condition appears at which time it is then removed and placed in the press 17 for cooling straightening and correcting in the manner to be described.

While the heating of the hot plate or supporting surface 11 may be accomplished in any desired manner the illustrated embodiment of the invention includes five elongated gas burners 36 through 40 inclusive as shown in Figure 3. These burners are individually fed from a common gas manifold 16 through control valves 36' through 40' and air aspirating and mixing devices 36'' through 40''. Each of the burners 36 through 40 includes an individual thermostat 41 connected by means of a tube 42 to its associated valve 36' through 40'. With this arrangement and by properly adjusting the thermostats 41 the surface temperatures of the hot plate 11 can be controlled to provide any desired gradient. With the use of electrotype metal having a melting point of about 600° F. and a pouring temperature of about 620°–650° F. it is preferable to adjust the burner 37 at 490° F., the burner 38 at 500° F., the burner 39 at 510° F. and burner 40 at about 520° F. While this has been found to be satisfactory for electrotype metal, it may be desirable to modify this range for other types of metals or with changes in the temperature at which the metal may be fed to the shell 15.

After a shell 15 has been filled while being held in place by the fingers 25, air is discharged onto the filled shell until the electrotype metal reaches the so-called sandy state and is in a plastic condition. After the shell has been filled and before the surface of the metal attains the sandy condition the fingers 25 are elevated. However, it is preferable to delay movement of the filled shell onto the surface or sliding platen 18 for insertion into the press 19 until the sandy state condition has been obtained.

In order to insure a controlled even rate of cooling of the filled shell 15 to avoid distortion of the finished plate, the sliding platen 18 is temperature controlled by the steam heated movable platen 43 having a plurality of openings 43' for the passage of steam at about 300° F. The platen 43 is carried by the reciprocable ram 44 as illustrated. The utilization of a thin sliding platen 18 coupled with a heated platen 43 insures substantially uniform control of the temperature of the sliding platen throughout its area while in the press.

The press 19, shown more clearly in Figure 4, further includes an upper water cooled press head 46, having a recess 47 therein for receiving and holding a pad 48 of resilient material such as rubber or the like.

Just prior to insertion of the filled shell 15 into the press 19 as shown in Figure 4 the shell may be covered by an insulating blanket 49 of felt or other suitable material to protect the pad 48.

With the foregoing arrangement the cast shell 15 when first placed upon the sliding platen 18 is guarded against sudden cold shock by sliding platen 18 which has retained its heat from heated press platen 21 which maintains the platen 18 well above room temperature but below the final setting or congealing temperature of the electrotype metal. Good results will be obtained by maintaining a temperature differential of about 200° F. between the sliding platen and the temperature to which the backing metal is cooled by the air blast. Upon insertion of the filled shell in the press, the resilient pad 48 forces the printing surface of the sandy cast electrotype shell against sliding platen to correct errors and hold it in a flat condition while the metal solidifies. In addition this procedure corrects sumps and other errors in the cast.

After the electrotype metal has taken a permanent set which occurs normally in less than one minute, the finished plate may be removed from the press and is ready for shaving and finishing operations.

From the above it is evident that throughout the entire process including filling of the shell 15 to its final cooling the shell temperature is maintained substantially uniformly and evenly throughout its area thus avoiding spot or uneven cooling and insuring the production of a flat plate of uniform thickness.

While only one embodiment of the invention has been illustrated and described, it is apparent that modifications, alterations and changes may be made without departing from the true scope and spirit thereof.

What is claimed is:

1. The method of "backing up" an electrotype shell with an electrotype metal comprising the steps of filling the shell with molten electrotype metal while maintaining a temperature gradation over the area of the shell with the lowest temperature in the vicinity of introduction of the metal and below the melting point of the metal, preliminarily cooling the surface of the metal to a sandy state, transferring said filled and partly cooled shell to a supporting surface of a press platen and heating said surface to a substantially uniform temperature throughout its area with said temperature being below the congealing temperature of the metal, and then subjecting the cast shell to pressure of a press head moving towards the press platen and at the same time cooling the metal to a solid rigid state.

2. The method according to claim 1 wherein the temperature of press platen is heated to approximately 300° F. and the press head is approximately at room temperature.

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