May 16, 1939. J. H. SHEA 2,158,158

APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

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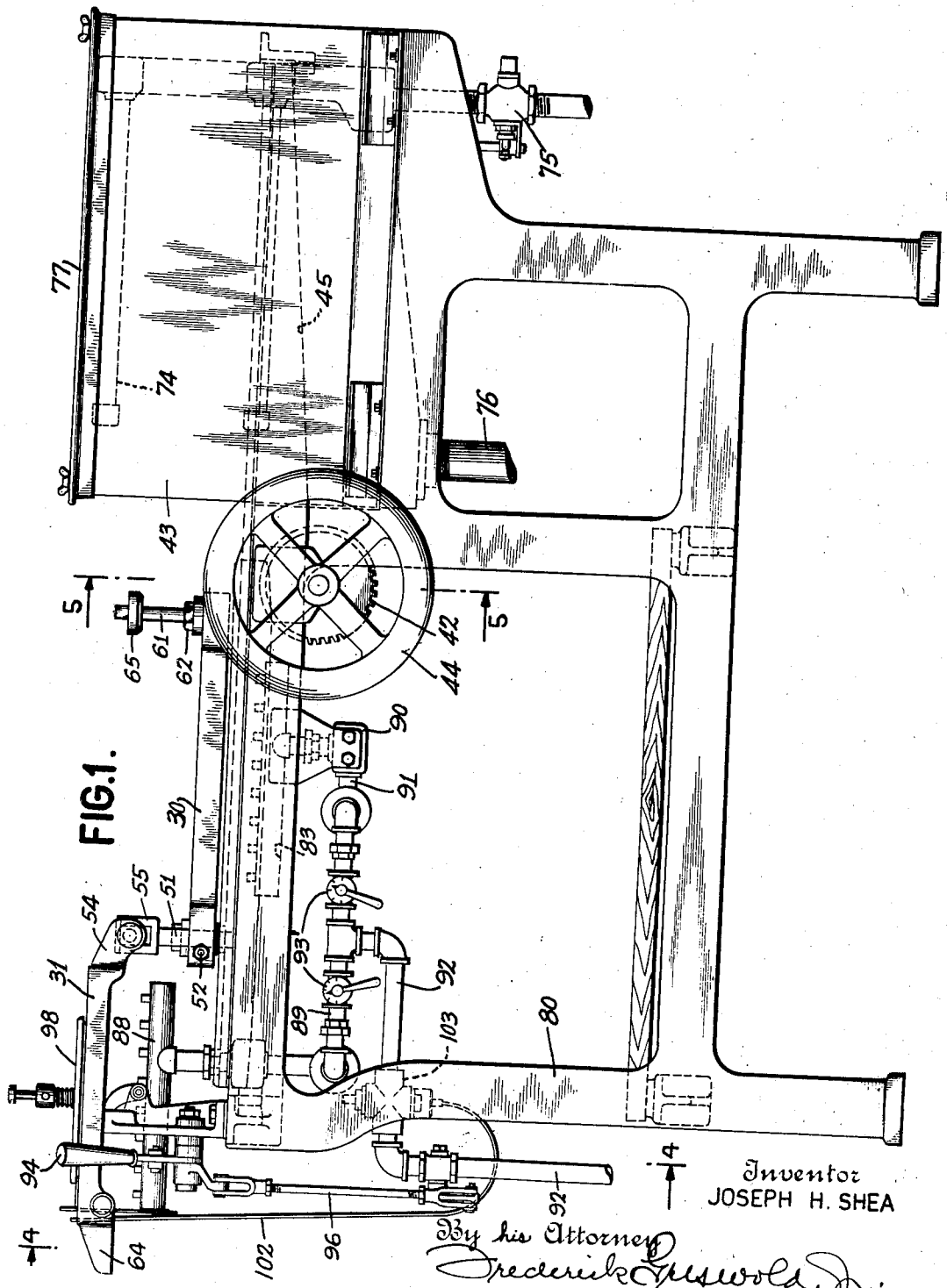


FIG.1.

Inventor
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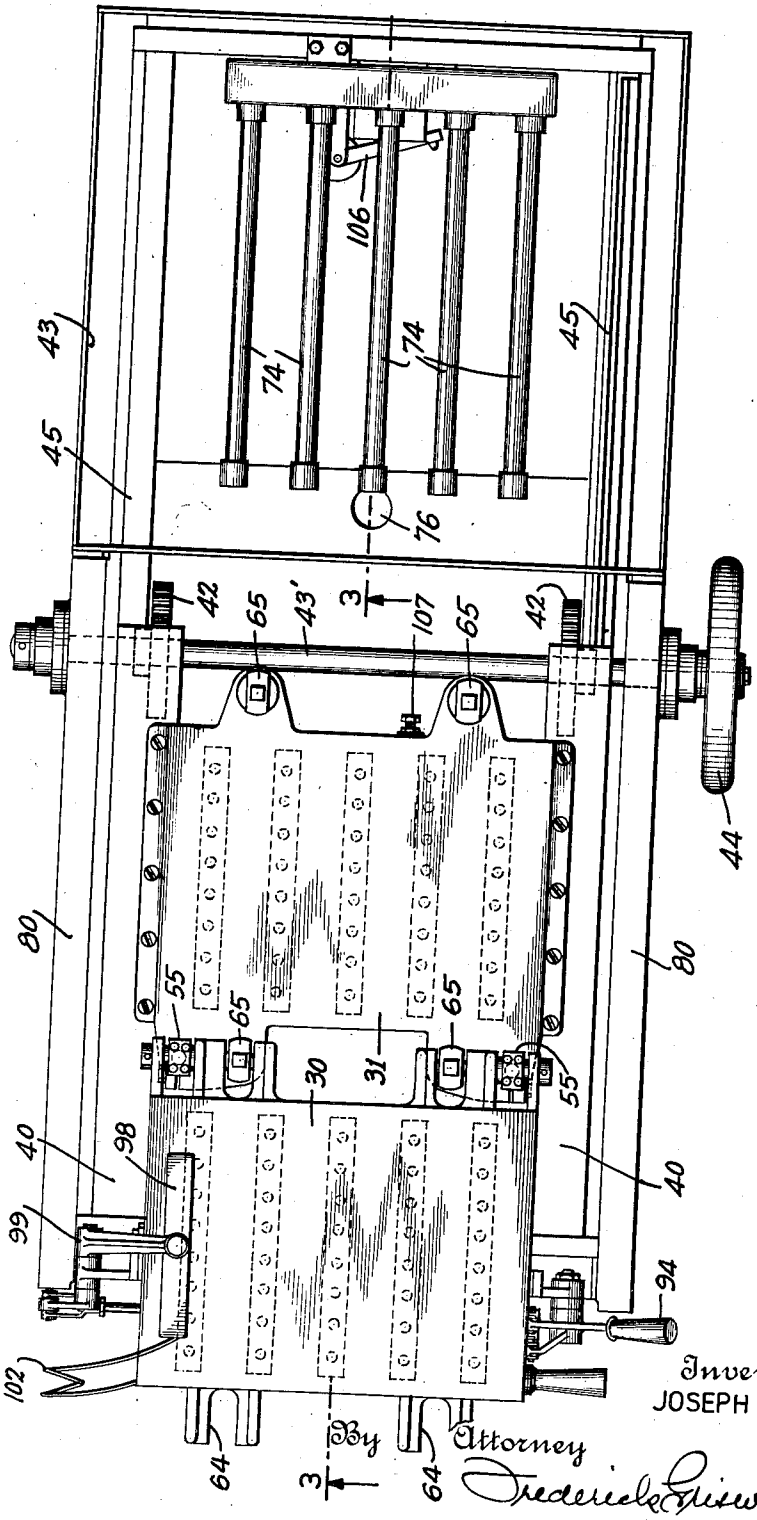
By his Attorney
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May 16, 1939. J. H. SHEA 2,158,158

APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

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FIG.2.



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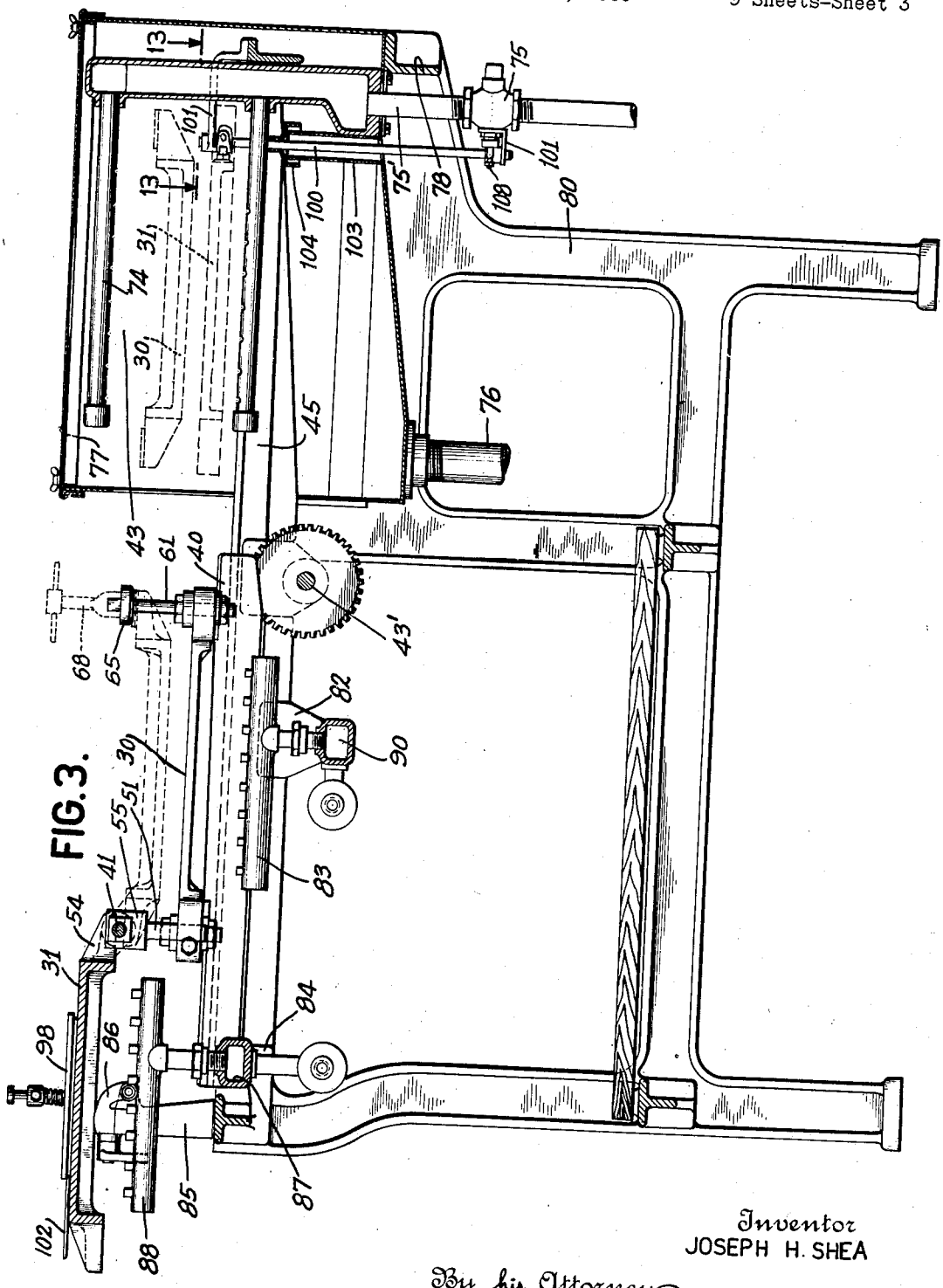


FIG. 3.

Inventor
JOSEPH H. SHEA

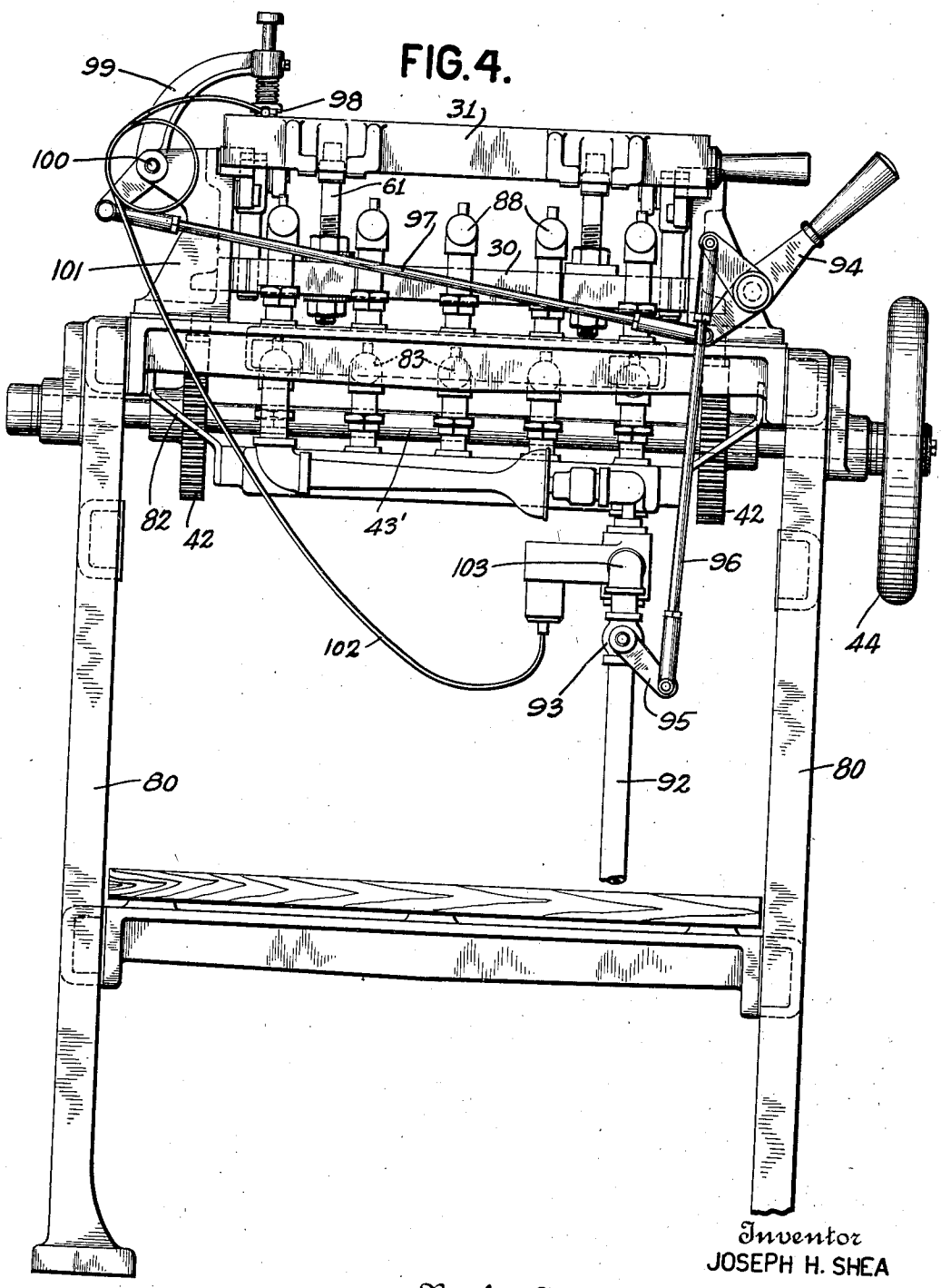
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APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

Filed April 20, 1935 9 Sheets-Sheet 4

FIG. 4.



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May 16, 1939. J. H. SHEA 2,158,158

APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

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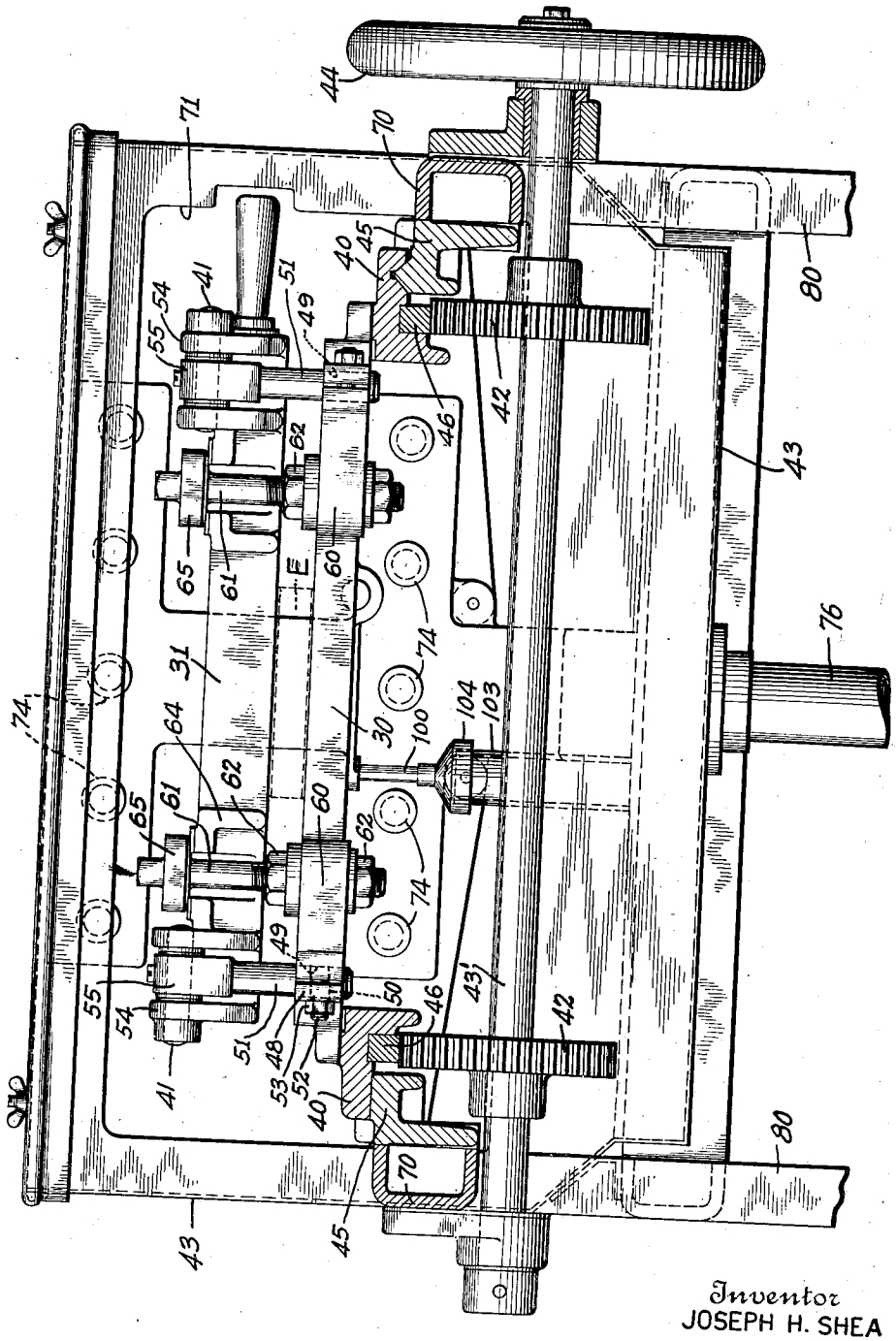


FIG.5.

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APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

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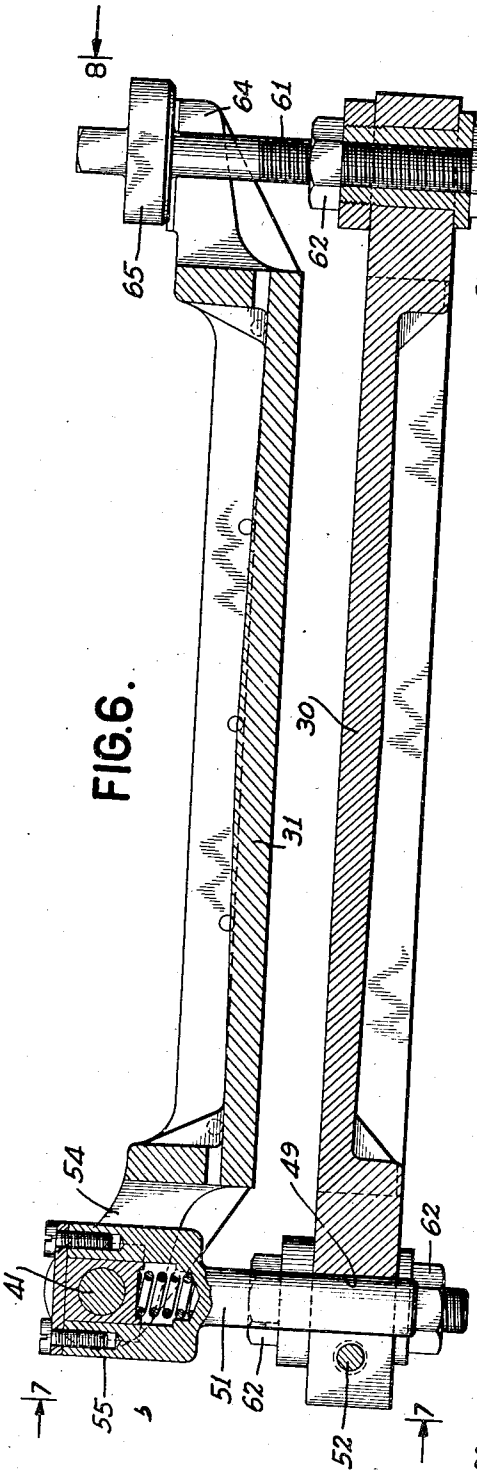


FIG. 6.

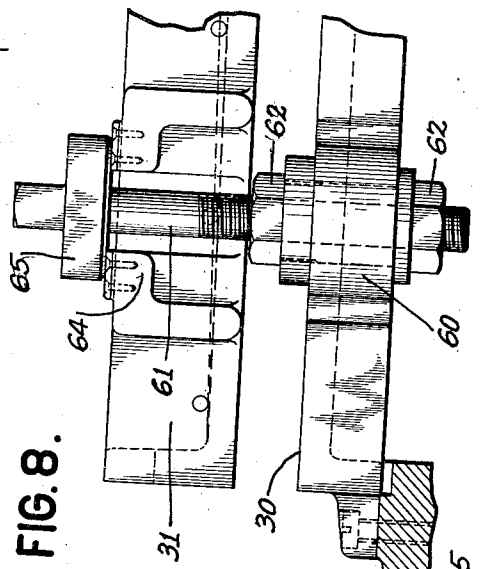


FIG. 8.

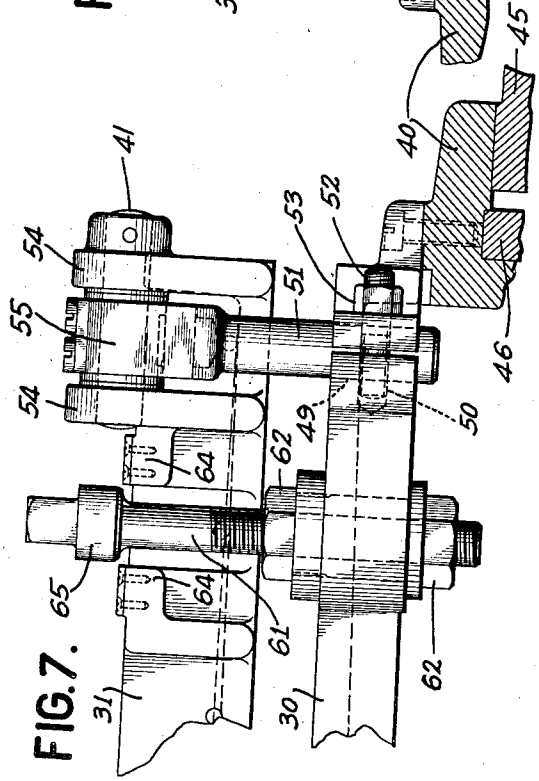


FIG. 7.

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APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

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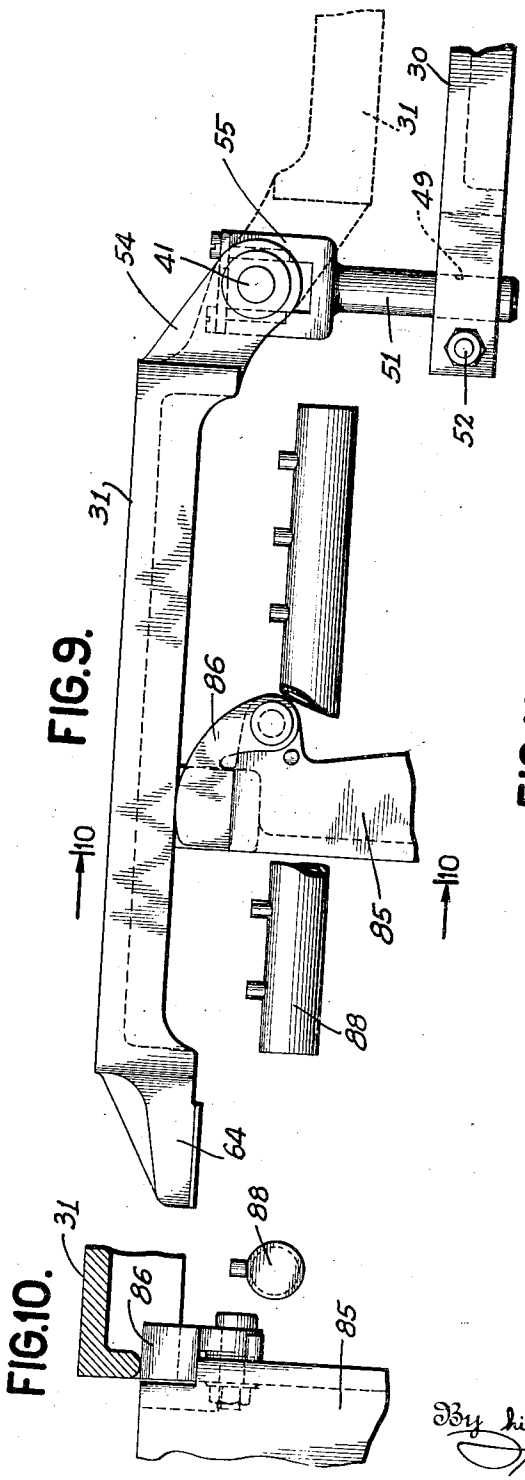


FIG.9.

FIG.10.

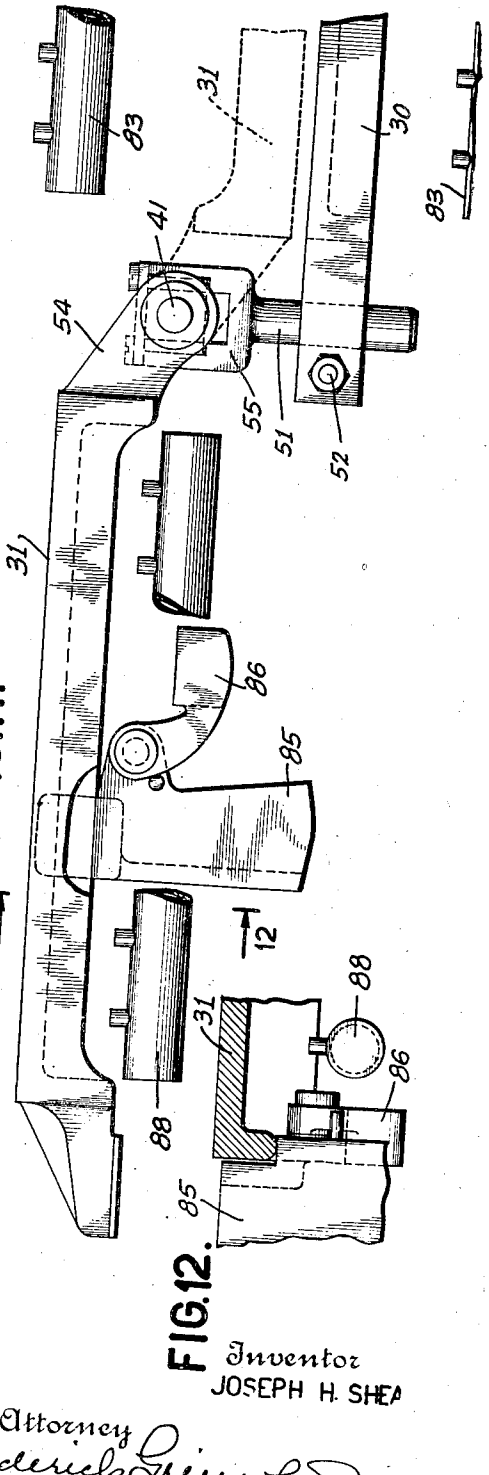


FIG.11.

FIG.12.

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May 16, 1939. J. H. SHEA 2,158,158

APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

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FIG.13.

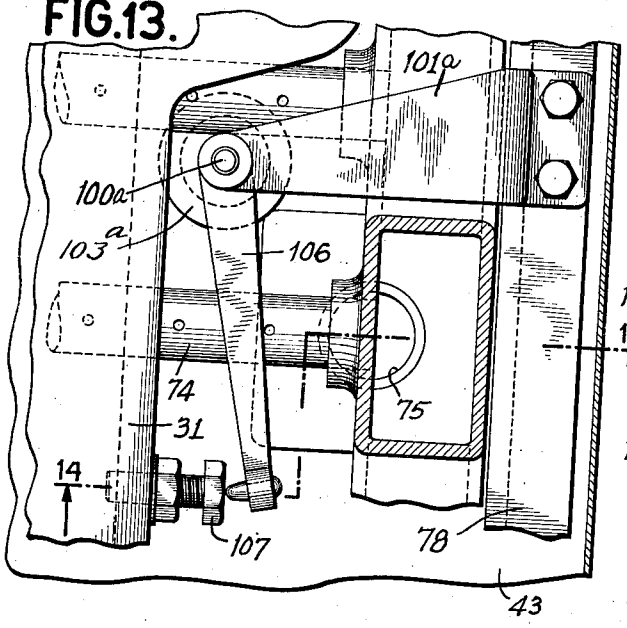


FIG.15.

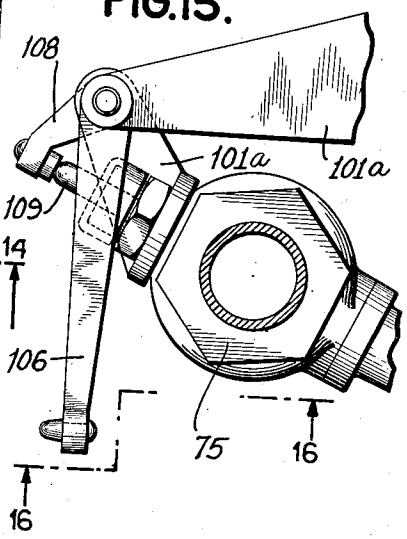


FIG.14.

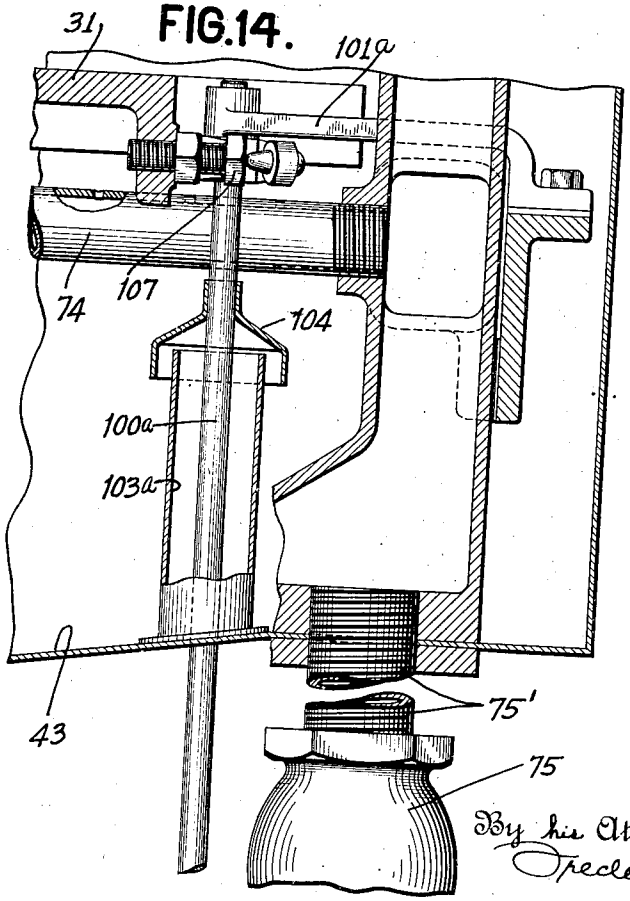
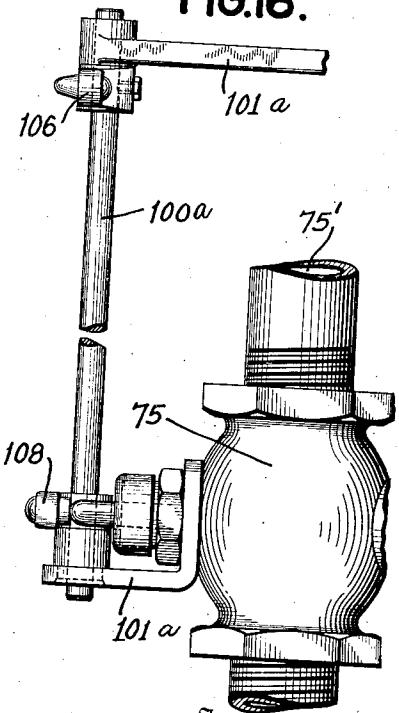


FIG.16.



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APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

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FIG.17.

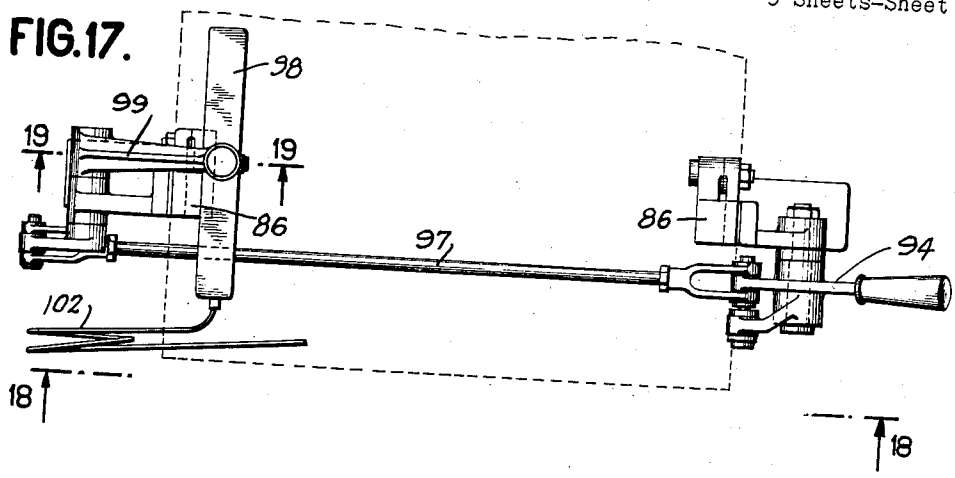


FIG.18.

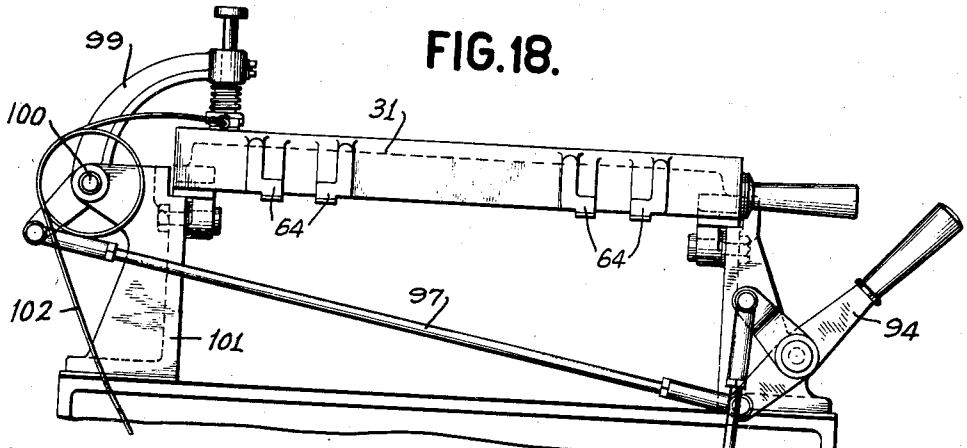
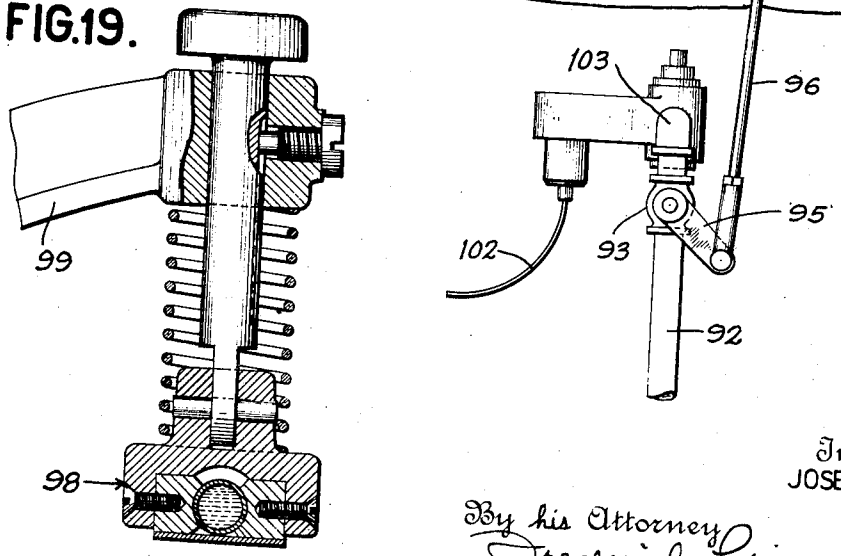


FIG.19.



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Patented May 16, 1939

2,158,158

UNITED STATES PATENT OFFICE

2,158,158

APPARATUS FOR THE MANUFACTURE OF PRINTING PLATES

Joseph Henry Shea, Baldwin, N. Y.

Application April 20, 1935, Serial No. 17,410

15 Claims. (Cl. 113—59)

This invention relates broadly to the art of printing and more particularly to a process and apparatus for backing plates or other metallic members bearing indicia by which an impression, as in printing, may be made. By the term plates or other metallic members bearing indicia by which an impression may be made, it is intended to cover any instrumentality bearing configurations such as illustrations, pictorial or otherwise, or type either in the original or in reverse, as electrotypes, halftones, originals, zinc etchings, Linotype, Monotypes, pattern plates and other indicia by which impressions may be made whether for use in the final or an intermediate step in printing, or any other impression making art.

This application is a continuation in part of my copending application Serial Number 396,989, now Patent Number 2,022,156, November 26, 1935.

Heretofore, electrotypes have been prepared for use in printing by providing the etched copper plate with a flange about its periphery and securing the plate to a wooden block by means of nails driven through the flange into the wood. In use, after many impressions have been run off from the electrotype, the nails work loose and sometimes pull part way out of the blocks so that the heads of the nails are in or above the plane of the etched face of the plate and receive ink during the inking of the plate and form blurs on the paper when subsequent impressions are made. This method of securing the electrotype to the wood block has the further disadvantage that the wooden block must be made oversize by reason of the marginal securing flange, thus forming, in printing, a blank space around the impression since the type cannot be set close to the subject matter depicted on the plate because of the flange.

It is an object of the present invention to provide apparatus by which an improved method of securing the etched plate to the wooden block may be carried out and thus avoid the requirement of a marginal flange, thereby reducing the size of the block and doing away with the blank space about the impression. In accordance with this method, there is provided a wooden block which may be of exactly the same size as the etched matter on the plate. To one face of this wooden block there is secured a sheet or plate adhesive to solder, preferably of copper, as by nails, conveniently double headed, passing through the plate into the wood. To this metal plate the etched plate is secured by an adhesive, as by solder, preferably by interposing tin foil between the etched plate and the plate secured to the wood block and subjecting the assembled plates to heat and pressure in the apparatus of this invention.

The invention also has to do with an apparatus for carrying out a method of securing inserts or patches or corrections, as they are sometimes called, is an electrotype. Heretofore, when it has been desired to correct a portion of an electrotype, that portion to be corrected has been cut out of the electrotype and a new etched plate portion bearing the subject matter to be substituted, of substantially the same shape and size as the cut-out portion, has been inserted and soldered to the original plate at points around the edges. This has usually been accomplished by laying the electrotype face downward on a suitable flat surface and applying the solder to the joints on the back side of the plate by running a stick of solder and a soldering iron over the same in the usual method of soldering. In printing, there is a certain degree of flexing of the electrotype when impressions are being made and after a number of impressions have been made, the soldered joints break, necessitating a cessation of printing while the electrotype is returned to the bench to have the joints resoldered. When one or more inserts occur in the same electrotype, a day or more may be required each time the joints must be resoldered, thus increasing the expense of printing materially. By the present apparatus there is provided an electrotype in which corrections may be inserted which will withstand the stresses and strains set up by the flexing of the electrotype during printing and in which corrections may be made with a minimum of time and effort and which, after once being made, will not work loose and require resoldering. The electrotype is backed by a sheet or plate of metal to which both plate and insert may be secured over its entire surface. Thus matter inserted in a cut-out portion is firmly secured to the backing plate and an integral corrected electrotype is formed. More particularly, the electrotype with the inserts in place, is superimposed upon a backing plate of the same size, with, say, tin foil therebetween, and the whole subjected to heat and pressure, thereby fusing the tin foil and forming a solid composite structure which will resist all strains and stresses and can be used for any number of impressions without the insert working loose.

In the manufacture of electrotypes for the printing of books, magazines and the like it is the practice to first set up the printed matter on a Linotype machine. The linotypes assembled in

consecutive order are then blocked up into chases and taken to the foundry where a wax matrix is formed by pressing the type face downward into a sheet of wax by a hydraulic molding press. After this molding operation the matrix goes to the bench for building up; that is, filling all the low spots by running a hot iron and a bar of wax over the low spots. From this bench the wax matrix is taken to another location where the wax impression is cleaned with a camel's hair brush and iron fillings dusted over it. It is then suitably connected to a source of electric current and suspended in an electrotype for approximately two hours time until a copper shell has been deposited in the depressions in the matrix in which impression it is held by means of the iron fillings. This copper shell has the same configuration as the original block of Linotype. This electroplated impression or electrotype shell is then taken to the backing-up room where tinfoil is laid over the concave surface of the shell and ladles of molten metal poured thereinto to form a backing for the copper shell. Thereafter the back is planed by a roughing machine and after that an electrotype finisher, as he is called, rubs over the face of the electrotype with a rubber roller to locate any low spots, and then hammers the plate until the front face of the type lies in the same plane so that impressions may be printed therefrom. By the apparatus of this invention, there is eliminated practically all of the steps herebefore described and there is utilized, directly, the type as it issues from a Linotype or a Monotype machine for the printing of impressions. Either Linotype or Monotype, of proper height is soldered directly to a backing sheet to form the plate taking the place of the electrotype from which impressions are made in the printing of the book or magazine pages. More particularly, the type, either Linotype or Monotype, is arranged in proper sequence in a frame upon a backing plate with tin foil or other adhesive forming material therebetween and the whole united by subjection to heat and pressure to produce the desired plate from which the impressions are made. If desired, the type face of the plate may be copper plated to withstand hard usage.

The apparatus of this invention provides a method whereby the electrotypes as heretofore described and other indicia bearing plates may be expeditiously manufactured. A heated platen may be placed upon the assembled electrotype and backing sheet, causing the tin foil to melt and, when pressure is applied, run evenly over the entire interior surfaces, after which the assembly may be quenched and the integral electrotype results. If desired, a second heated platen may be placed beneath the backing sheet in carrying out the method.

The invention seeks apparatus by which the aforesaid method may be carried out. To this end, apparatus which consists, preferably, of upper and lower platens, conveniently hinged together, are adapted to be heated, as desired, to a predetermined temperature. Upon the bottom platen is then placed, for example, the lower sheet or backing plate and upon its upper face one or more sheets of tin foil are then disposed and the electrotype placed thereupon face upwardly. The upper platen may then be closed down upon the electrotype and the two platens clamped together. After a suitable interval of time to allow for a heat transfer from the platens to the work during the pressure, the work is cooled as by quenching in a tank and upon opening the platens, the reenforced or backed electrotype will be found to be an integral structure capable of withstanding the hardest usage.

These and other objects of the invention and the means for their attainment will be more apparent from the following detailed description, taken in connection with the accompanying drawings, illustrating means by which the invention may be realized, and in which:

Figure 1 is a view in side elevation showing the apparatus whereby electrotypes or other metallic members from which impressions may be made, may be backed in accordance with the present invention;

Figure 2 is a plan view showing the machine of Figure 1 looking from above;

Figure 3 is a longitudinal sectional view taken in a vertical plane of the machine, on the line 3—3 of Figure 2, looking in the direction of the arrows;

Figure 4 is a view in end elevation of the machine of this invention taken in the plane indicated by the line 4—4 of Figure 1 looking in the direction of the arrows;

Figure 5 is a transverse sectional view taken in the plane indicated by the line 5—5 of Figure 1, looking in the direction of the arrows and showing particularly, the location of platens at the step of quenching or cooling the works;

Figure 6 is a vertical sectional view showing the platens by which the work is heated and pressed together;

Figure 7 is a fragmentary view taken in the plane indicated by the line 7—7 of Figure 6 looking in the direction of the arrows and showing the method of connecting the platens together and securing them in position;

Figure 8 is a fragmentary view in end elevation taken in the plane indicated by the line 8—8 of Figure 6, looking in the direction of the arrows;

Figure 9 is a fragmentary view on an enlarged scale of the upper left hand portion of the apparatus illustrated in Figure 1 showing the upper platen in position to be heated in a situation where the respective platens are relatively widely spaced;

Figure 10 is a fragmentary view in a transverse vertical plane taken in the plane indicated by the line 10—10 of Figure 9, looking in the direction of the arrows;

Figure 11 is a view similar to Figure 9 but showing a situation in which the platens are so mounted as to be relatively close together;

Figure 12 is a fragmentary sectional view taken in the plane indicated by the line 12—12 of Figure 11 looking in the direction of the arrows;

Figure 13 is a fragmentary view in plan of that portion of the apparatus by which a cooling fluid may be automatically applied to the platens;

Figure 14 is a fragmentary view in vertical section taken in the plane of the broken line 14—14 of Figure 13;

Figure 15 is a fragmentary view showing the valve and its actuating mechanism by which the flow of cooling fluid is controlled;

Figure 16 is a fragmentary view in side elevation taken in the planes indicated by the broken line 16—16 of Figure 15, looking in the direction of the arrows;

Figure 17 is a plan view showing the heat responsive devices by which the heating of the platens is automatically controlled;

Figure 18 is a view in side elevation showing the apparatus of Figure 17 and taken in the plane indicated by the line 18—18 of that figure; and

Figure 19 is a fragmentary view of the heat responsive element, partly in section and partly in elevation taken in the plane indicated by the line 19—19 of Figure 17.

A suitable apparatus by which the method of manufacturing the work here under consideration may be carried out is illustrated in the drawings. The top and bottom platens, 31 and 30, respectively, are shown as forming what has been termed a carriage mounted upon runners 40 and hinged together as at 41. To receive the work, the top platen 31 is folded back to the position shown in Figure 1 and either the top or bottom platen or both platens are heated as desired. After the platen or platens are heated to the desired degree, the work indicated generally at E, Figure 5, is placed upon the bottom platen 30, the top platen 31 closed down and the platens clamped together. After a predefermined period of time during which the work E is subjected to heat and pressure, the carriage may be moved quickly into the bath 43 and there cooled, whereafter it may be removed, opened and the work E removed.

The top and bottom platen 31, 30 are preferably rectangular in form, the bottom platen 30 being formed with the runners 40 which rest upon the track or ways 45. At one end at each carrier, the bottom platen 30 is formed with a split bearing boss 48, which boss 48 is provided with a vertical bore 49 and a horizontal bore 50 extending thereinto from the outside. The vertical bore 49 receives a spindle 51 which is adjustable therewithin and held in place by means of a set screw 52 threaded into the horizontal bore 50 and locked in position by means of the lock nut 53. On the top platen is mounted, in spaced relation, a pair of ears 54 forming the outside elements of the hinge and receiving the hinge pin 41. On this hinge pin 41 is pivotally mounted the other hinge member 55 formed as an ear on the spindle 51.

On the opposite ends of the platens are the clamp members by which pressure is applied to the work E. In this instance, two clamps are shown on each end. Protruding from the bottom platen 30, in spaced relation, are lugs 60 formed with vertical apertures receiving upwardly extending bolts 61 adjustably secured in the apertures by means of the nuts 62 above and below the lugs 60. The upper platen 31 is provided with spaced or slotted lugs 64, or clamp abutments which, when the platens are in closed position, extend upon opposite sides respectively of the bolts 61 and these abutments 64 are drawn downwardly on the bolts by means of elongated cross-members or bridges 65 carried with the respective bolts 61 and held in adjusted or clamping position by means of the nuts 62. The bridges 65 are turned to clamp the platens by means of any suitable wrench, such as the socket wrench 68 shown in Figure 3 of the drawings.

The two clamping platens 30, 31, hinged together, form a sort of carriage, the flanges 40 of which rest upon tracks or ways 45 one end of each of which is carried by the longitudinal frame members 80 of the machine. These tracks 45 extend in the horizontal direction to support the carriage at loading position, and then enter an opening 71, Figure 5, in one wall of the quenching tank 43 to the position above the bottom of the tank so that the carriage 30, 31 entering the tank 43 through the opening 71 travels on the tracks to the quenching position below the liquid sprays 74 in the tank. To maintain the liquid for the tank at the proper quenching temperature, it may be replenished through the valve controlled inlet 75' and evacuated by means of the outlet 76 in the bottom. To protect the operator of the machine, the tank may be provided with a cover 77 as shown, which is easily removed, when necessary. The tank may be supported on end frame brackets 78 carried with the frame members 80 all supported on vertical frame members 80. Between the vertical planes of the frame members 80 and at the end opposite to that of the tank 43, brackets 82 support the fuel burners 83 adapted to heat the bottom platen 30. Also carried with the frame is a post 85 having at the top a movable or adjustable stop 86 upon which the upper platen 31 rests when in open position.

Also carried with the runners 40 are racks 46 in mesh with pinions 42 carried on a transverse shaft 43' rotated by the handle wheel 44 whereby the carriage is moved from one end of the machine to the other by the operator.

The bracket 84 carries a manifold 87 provided with a plurality of burners 88 adapted to heat the upper platen 31 when in the position of Figure 3, which manifold communicates with the fuel feed pipe 89 connecting with pipe 91 to the manifold 90 supplying the burners 83. Each feed pipe 89, 91 is controlled by a valve 93' whereby each set of burners receives the proper fuel supply. Obviously, however, means other than fuel burners may be used to heat the platens.

The fuel control valve 93 is normally opened and closed by means of a handle 94 to which the valve arm 95 is connected by a link 96 and the handle 94 also actuates through a link 97, a rockable thermo-responsive device 98 carried on an arm 99 rockable about the pivot point 100 on a bracket 101 on the frame. Thus when the platen 31 is in the open position shown in Figure 4, the handle 94 may be manually actuated to swing the thermo-responsive device 98 into contact with the platen 31 and at the same time open the valve 93. This thermo-responsive device 98 is connected through a tube 102 with a thermostat valve 103 by which the flow of gas through the pipe 92 is controlled dependent upon the temperature of the upper platen. It is assumed that both platens 30 and 31 will become heated to the same degree during the same time interval and hence the upper platen may be used as control by which fuel may be fed to both burners in regulated amounts by the valve 103.

In operation, the carriage 30, 31 is located upon the tracks 45 outside of the tank 43, as shown in Figure 1, at what is called the loading or charging position. Both the pins 51 and bolt 61 are suitably adjusted to take care of the necessary separation between the platens by reason of the size of the work to be inserted therebetween and the top platen 31 thrown back about its hinged connection 41 to the position shown in Figure 3, where, if the platens are relatively close together as shown in Figure 11, the arm 86 is thrown back to permit the platens to rest on the top of post 85. On the other hand, if the work is of relatively great thickness so that the platens have to be spaced relatively far apart, the spindles 51 are adjusted to the desired degree, as shown in Figure 5, and the arm 86 swung over on top of the post 85 to support the platens in a horizontal position over the burners, as shown in Figure 9. The handle 94 is then actuated to open the valve 93 and at the same time swing the thermo-responsive device 98 into contact with the upper platen. After the platens 30, 31 are heated sufficiently, the work E which may have

been assembled at a remote point, is placed upon the lower platen **30** and the top platen **31** closed thereover. Preferably the top platen **31** is heated to a higher temperature than the lower platen and this may be accomplished by suitable adjustment of the valve **93'** in the two branch pipes **89**, **91**. The top platen is then swung down upon the work and the bridge member **65** turned to extend over the ears **64** and clamp the work firmly therebetween. After a lapse of sufficient time to permit the work to be thoroughly heated by a heat interchange with the platens, the carriage is moved by actuating the handle or wheel **44** into the tank **43** whereby the work is to be cooled or quenched by a spray of water from the sprays **74**. It is proposed that the valve **75** controlling the flow of cooling liquid be automatically actuated and to this end, Figures 13 to 16, a rock shaft **100***a* is mounted between brackets **101***a* carried with the frame of the machine. This shaft is disposed within the tank but fluid is prevented from leaking through the passage therefor by surrounding the shaft with a jacket or shield **103***a*, **104**. At its upper end, the shaft carries an arm **106** adapted to be engaged by an adjusting screw **107** carried on the carriage so that when the carriage strikes the arm, the shaft **100** is rocked on its vertical axis. At the lower end, the shaft carries an arm **108** adapted to engage the stem **109** of a control valve **75** normally spring pressed to closed position. Obviously, therefore, when the carriage is retracted from the bath, the valve will automatically close and the spring swings the arm **106** outwardly preparatory to the next quenching operation.

Various modifications will occur to those skilled in the art in the type of machine used to carry out the method of this invention in its broadest aspects as well as in the various applications of the machine to different purposes and no limitation is intended by the phraseology of the foregoing description or illustrations in the accompanying drawings, except as indicated in the appended claims.

What is claimed is:

1. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens, means to permit separation of the platens for insertion and removal of work, means to heat said platens when in separated relation at loading position, said carriage being adapted to travel on the track from a loading position without the tank to a quenching position within the tank.

2. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens adapted to travel on the track from a loading position without the tank to a quenching position within the tank, means to heat said platens and a means responsive to the temperature of one platen to control said heating means.

3. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens adapted to travel on the track from a loading position without the tank to a quenching position within the tank, means to selectively heat both lower and upper platens and a means to control said heating means responsive to the temperature of a platen.

4. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens adapted to travel on the track from a loading position without the tank to a quenching position within the tank, burners to heat both lower and upper platens and a valve and means to control said burners responsive to the temperature of the upper platen.

5. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens adapted to travel on the track from a loading position without the tank to a quenching position within the tank, burners to heat both lower and upper platens, valves to control said burners respectively, a valve to control the flow of fuel to the valves and therefore to said burners and a heat responsive device movable into heat exchange relationship with a platen to operate said valve.

6. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens hinged together and movable from a loading position without the tank to a quenching position within the tank, a burner adapted to heat the lower platen in loading position, a burner without the track adapted to heat the upper platen when moved about its hinged connection to open position and a valve controlling the flow of fuel to the burners and means to control the degree of opening of said valve, said means being controlled by the temperature of the upper platen in open position.

7. Apparatus for the manufacture of plates from which impressions are made comprising in combination, a lower platen, an upper platen hinged thereto to permit separation of the platens for insertion and removal of work, said platens being formed with plane parallel juxtaposed faces, said platens being of a thickness to retain imparted heat, cooperating clamping members carried with the respective platens to draw the same together and clamp the work therebetween with the application of a predetermined pressure and retain them in parallel relationship and means to selectively heat the platens when in separated relation.

8. Apparatus for the manufacture of plates from which impressions are made comprising, in combination, a lower plane heating platen, an upper plane heating platen means to adjustably hinge said platens together to permit separation for the insertion and removal of work, means to selectively heat the platens when in separated relation, and cooperating clamping members carried by the respective platens to draw the same together and so disposed as to distribute the pressure evenly on the work and comprising, respectively, a boss carried by one platen, a bolt adjustably carried in said boss, a bifurcated member carried by the other platen to receive the bolt, a bridge mounted on the bolt to overlie the bifurcated member and means to draw down the bridge on the bolt.

9. Apparatus for the manufacture of plates from which impressions are made comprising, in combination, a lower plane heating platen, an upper plane heating platen means to adjustably hinge the upper platen to the lower platen to permit separation for the insertion and removal of work, means to selectively heat the platens when in separated relation, and cooperating clamping

members carried by the respective platens to draw the same together and so disposed as to distribute the pressure evenly on the work and comprising, respectively, a boss carried by the lower platen, a bolt adjustably carried in said boss, a bifurcated member carried by the upper platen to receive the bolt, a bridge assembly mounted on the bolt to overlie the bifurcated member and a nut to secure the bridge to the bolt.

10. Apparatus of the class described comprising, in combination, a lower plane platen, an upper plane platen, a hinged connection for the platens at one end to permit separation for the insertion and removal of work comprising a pin adjustably mounted in one platen formed with a slideway, a slide therein, means limiting movement of the slide in one direction, a spring urging the slide against the limiting means, and a pivoting connection between the slide and the other platen and cooperating clamping members carried by the respective platens to draw the same together and so disposed as to distribute the pressure evenly on the work and comprising, respectively, a boss carried by the lower platen, a bolt adjustably carried in said boss, a bifurcated member carried by the upper platen to receive the bolt, a bridge assembly mounted on the bolt to overlie the bifurcated member and a nut to secure the bridge to the bolt.

11. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens, means to permit separation of the platens for insertion and removal of the work and means to heat the respective platens to predetermined degrees when in separated relation at loading position, said carriage being adapted to travel on the track from a loading position without the tank to a quenching position within the tank.

12. Apparatus for the manufacture of plates from which impressions are made comprising quenching means, upper and lower platens movable as a unit from a loading position to a quenching position, a valve adapted to control the quenching means and means actuated by the platens at quenching position to control the opening of the valve.

13. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage comprising upper and lower platens hinged together and movable from a loading position without the tank to a quenching position within the tank, means to heat the lower platen in loading position, means to heat the upper platen at loading position when moved about its hinged connection to open position, a valve controlling said heating means, a second valve controlling said heating means and therefore controlling the flow of fuel to the first valve and to the heating means, a heat responsive device controlling the second valve and means to open the first valve and move the heat responsive device into heat exchange with a platen in open position.

14. Apparatus for the manufacture of plates from which impressions are made comprising a pair of heating platens formed with plane parallel juxtaposed clamping faces between which the plate is held against distortion during heating and cooling, said platens being of a thickness sufficient to retain imparted heat, the lower platen having a box at one end formed with a vertical bore and an horizontal bore opening thereinto, a spindle slidably mounted with the vertical bore, a set screw threaded in the horizontal bore to lock the spindle in adjusted position whereby the spacing of the platens corresponds to the thickness, a hinge member carrried with the spindle, said upper platen being hingedly connected to said hinge member and cooperating clamping members carried by the respective platens in spaced relation to the hinge member to draw the platens together.

15. Apparatus for the manufacture of plates from which impressions are made comprising a quenching tank, a track entering the tank, a carriage, means comprising upper and lower platens adapted to move from a loading position without the tank to a quenching position within the tank, burners to heat both lower and upper platens, a valve and means to control said burners responsive to the temperature of the upper platen.

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