March 23, 1954 G. W. BUNGAY 2,672,772

BORING MACHINE FOR CYLINDRICAL ELECTROTYPES

Filed Sept. 20, 1950

2 Sheets-Sheet 1

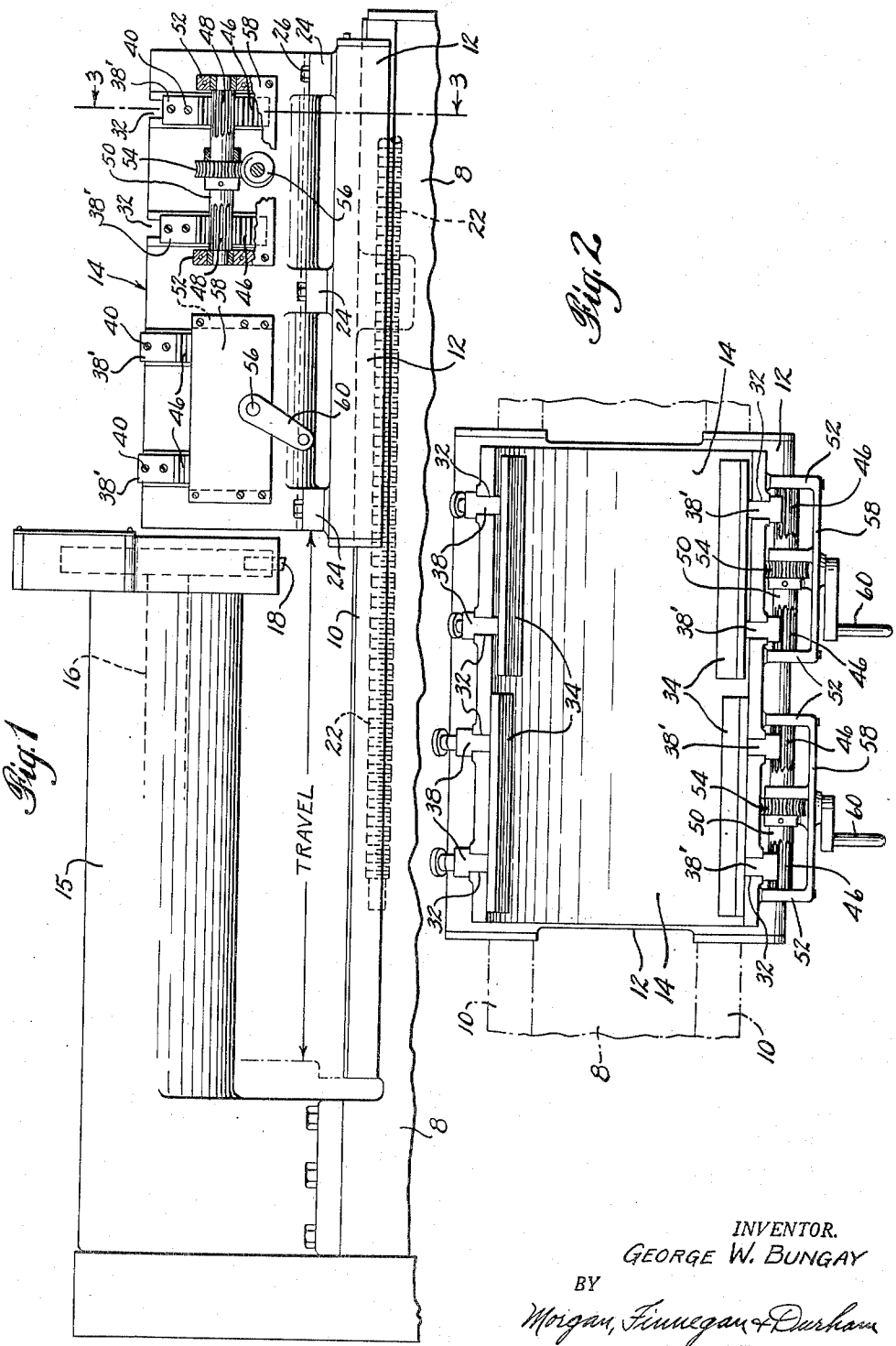


Fig. 1

Fig. 2

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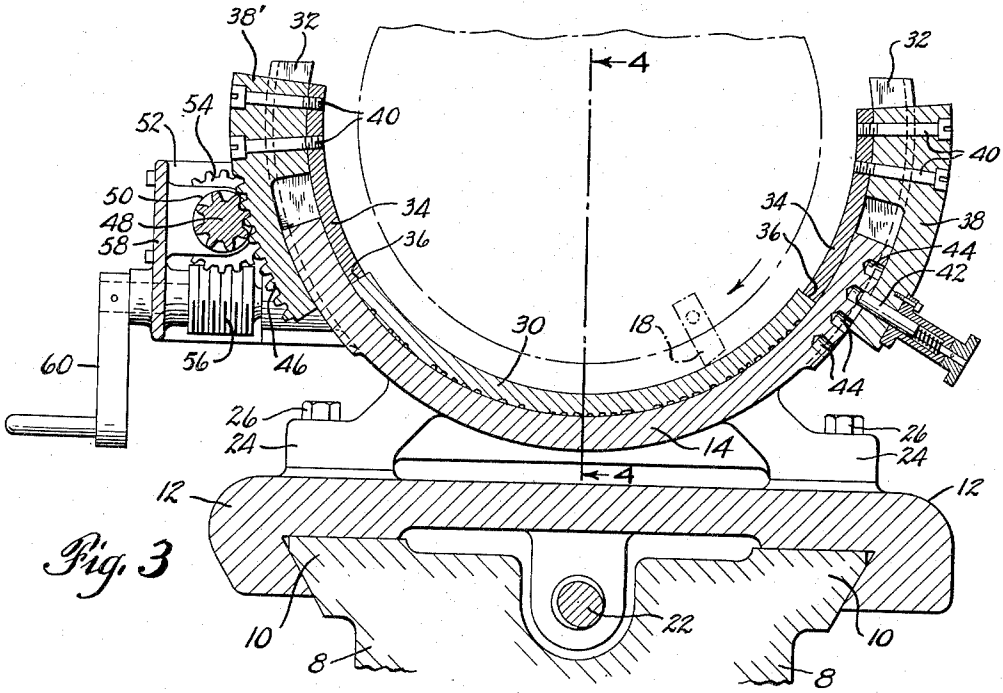


Fig. 3

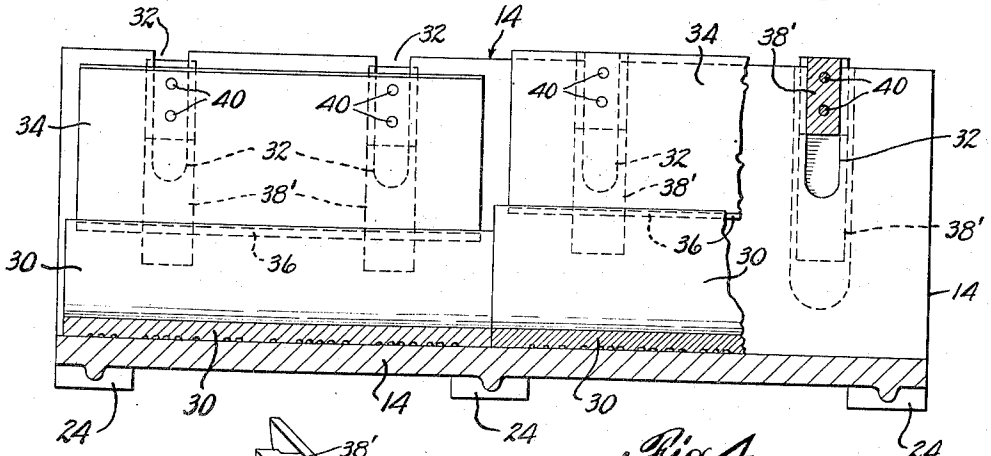


Fig. 4

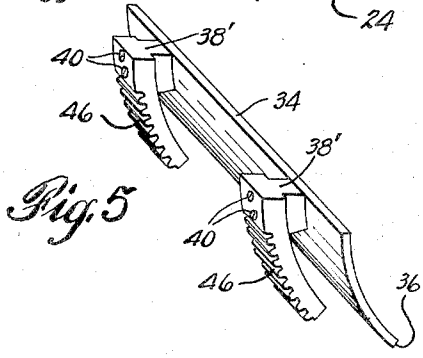


Fig. 5

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BORING MACHINE FOR CYLINDRICAL ELECTROTYPES

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1 Claim. (Cl. 77—63)

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The present invention relates to a novel and improved boring machine for interiorly finishing cylindrically curved electrotypes of varying dimensions.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a fragmentary side elevation of a typical and illustrative embodiment of a plate boring machine in accordance with the present invention;

Figure 2 is a fragmentary top plan view of a travelling cylindrical work holder forming a portion of the mechanism shown in Figure 1;

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 3; and

Figure 5 is a perspective detail showing a work holding clamp movable circumferentially of the work holder for securing an electrotype plate by one of its edges.

The present invention has for its object the provision of a novel and improved machine for boring and finishing the cylindrical interior of electrotype printing plates of various sizes after they have been backed and prior to the trimming of the edges of the plates. Still another object is the provision of an improved cylindrical electrotype boring machine which is adapted to receive and finish a single plate of varying dimensions, two plates of the same or different dimensions or a single double plate of varying dimensions. Still another object is the provision of such a machine which is adapted to be easily and rapidly loaded and unloaded and in which the plates of various sizes may be securely held, and which may be changed from one size of plate to a widely different size of plate in a minimum of time.

The boring machine of the present invention is particularly adapted for use in connection with

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the production of curved or cylindrical electrotypes such as are used in the rotary printing of high grade magazines, particularly where such plates are produced by the centrifugal casting of the backing metal onto a previously curved shell, after which the cylindrical member is cut apart to form the separate curved plates which need only to be interiorly finished and trimmed and bevelled along their four edges, and sometimes made-ready, to render them ready for printing.

In the production of such rotary printing plates, the sizes of the plates vary widely, although for any particular magazine, the plates are usually curved on the same radius. However, regardless of the size of the plate it is essential that it be held securely in the curved work holding member as the plate is bored and interiorly finished, so that the plate will be accurate in its finished thickness and can produce the high quality printing expected of it. The boring machine of the present invention is particularly advantageous in the wide ranges of sizes which can be held by it for boring, in the ease with which it can be adjusted to take these widely varying sizes and in the fact that the plates finished by it are rapidly finished with extreme accuracy such as is needed for the highest class of rotary magazine printing.

In accordance with the present invention, the boring machine comprises a relatively heavy and strong horizontal bed above which is supported on a fixed horizontal axis a rotary cutter adapted to cut the interior face of the curved plate on a constant radius so as to produce a substantially true cylindrical interior surface on the plate. Horizontally movable along the bed beneath the rotary cutter is a cylindrical work holder which moves in a path parallel to the axis of the rotary cutter and has its interior surface accurately shaped to correspond to the desired cylindrical curvature which the plate should have for printing. Work holding clamps are provided to operate within the concave portion of the work holder and these preferably comprise two pairs of arcuately movable clamps, each of relatively great axial extent, one pair being adapted to be rapidly moved manually and fixed independently in various closely spaced circumferential positions, while the other pair are of substantially equal axial extent and are adapted to be powerfully moved and locked circumferentially of the work holder by gear-reduction means independently of each other, toward and from the first pair of work holding clamps. Thereby the space

between the first pair of clamps adjacent one edge of the work holder and the second pair of clamps adjacent the other edge of the work holder may be varied to receive two plates of the same size, or of different sizes, or a double-spread plate. Pressure is applied to one edge of the plate by operation of the gear reduction means so as to force the plate circumferentially of the work holder towards the other clamp and also forcing the curved plate into firm contact with the concave face of the work holder so that as the work holder moves under the rotary cutter, metal is removed from the interior of the plate to finish the plate accurately to a fixed predetermined thickness, at the same time that its interior is rendered cylindrical.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the present preferred and illustrative embodiment of the present invention as shown in the accompanying drawings, the boring machine is shown as adapted to receive and operate on one or two single page plates of the same or different size, each of which may be as large as a semi-cylinder, a two page wide, or double-spread plate, or fractional page plates, all of the plates being of the same external diameter and to be bored to the same thickness.

The bed of the machine comprises a heavy casting **8** on the upper portion of which are formed bed-ways **10** adapted to receive and guide the slide member **12** on which is rigidly held the work holder **14**. At one end of the machine bed **8** and projecting over the bedways **10** and spaced therefrom is a spindle housing **15** in which is mounted a motor driven spindle **16** carrying at its outer end a rotary boring tool **18** mounted on a tool carrying disc driven by the spindle and positioned to cut on the desired radius as the work holder **14** moves the plate to be bored beneath the revolving boring tool **18**. Suitable motor driven feed screw means **22** cooperate with the work holder **14** so as to move the work holder and plate past the boring tool in either direction.

The work holder **14** is mounted rigidly on the slide member **12** by means of its downwardly divergent, integral feet **24** which are secured to the slide member **12** by means of the cap screws **26**, and the work holder **14** is of sufficient strength so as to form a rigid, substantially unyielding support for the curved electrotype **30** positioned in the concave portion of the work holder. The ends of the work holder are preferably open, unobstructed and chamfered so that there is no danger of the face of the electrotype being scratched or marred as it is positioned in or removed from the work holder.

Along one edge of the work holder **14**, it is provided with a plurality of, preferably four, circumferentially extending arcuate slots **32** having parallel sides which form guideways for the arcuate clamping members to engage one edge of one or two plates **30**. These clamping members preferably comprise a short arcuate steel plate **34** having its exterior face curved to conform to the concave interior of the work holder **14** and formed with a straight edge **36** which is adapted to form an abutment for one of the straight edges of the plate **30**.

For variably positioning and positively holding each of the two clamping plates **34** in the desired circumferential position of the work holder **14**, each of the clamping plates **34** is securely fastened to a pair of guide members **38** by means of the screws **40**, each of these guide members **38** being T-shaped in cross section and dimensioned and positioned to have a close fit with the arcuate slots **32** so that the straight edge **36** of each clamping plate **34** always remains parallel to the axis of the work holder **14**. The lower ends of the guide members **38** are preferably extended so as to overlie the solid portion of the work holder **14**, and each of the guide members is provided with a heavy radially movable, inwardly spring pressed locking pin **42** adapted to enter one or another of a series of uniformly spaced pin holes **44** formed in the outer side of the work holder **14** and arranged in a circumferential series, so that the work holding clamp as a whole may be variably positioned and securely locked in any desired circumferential position merely by withdrawing two of the pins **42** and sliding the plate **34** circumferentially of the work holder until the desired position has been reached. The holes **40** are preferably arranged about an inch apart so as to minimize the travel of the clamping member for the opposite edge of the plate **30**, and the holes **44** serving for one of the plates **34** are preferably accurately alined with those for the other plate **34**.

Along the other edge of the work holder **14** are provided a similar series of guideways **32**, preferably circumferentially alined with the first series, and a similar pair of clamping plates **34** which are adapted to be powerfully moved toward and away from the other parallel edge of the plate **30**, and these plates **34** are each secured to a pair of guide members **38'** which are preferably constructed similar to the guide members **38**, except that the outer end portion of the guide members **38'** is formed as an arcuate rack **46** which is adapted to mesh with and be moved by the pinion ends **48** of a shaft **50**.

Shaft **50** is journaled at its ends in bearing blocks **52** secured to the outer face of the work holder **14** and adjacent the outer sides of a pair of slots **32** and near its central portion is provided with a worm reducing gear **54** which is meshed with a self-locking worm **56**, journaled in a plate **58** which is secured to the bearing blocks **52**. Hand crank **60** fast to the worm shaft **56** serves to turn the worm and thereby provides a means for powerfully moving and automatically locking both guide members **38'** to force one of the plate clamping members **34** powerfully toward its opposite clamping members as the clamping edges **36** engage the parallel edges of the electrotype **30**.

The clamping plates **34** are preferably of less thickness than the finished thickness of the electrotype plate **30** so that there is no danger of the cutting tool **18** cutting into the clamping plates **34** as it bores the interior of the electrotype. The clamping plates **34** are arranged in two opposing pairs so that two different plates, of the same or different size, may be engaged and clamped for boring, or a single double-spread plate may be securely clamped throughout almost its entire length.

As the clamping plates **34** moved by the worm gears are forced toward the opposing clamping members **34** and are tightened against the parallel edges of the one or two electrotypes **30**, the electrotypes are forced radially outward into firm contact with the concave surface of the work holder **14** thereby accurately conforming the electrotypes to the desired curvature and insuring that the finished thickness of the electrotypes is accurately of the desired thickness. In order to

prevent damage to the printing surface of the electrotypes **30**, provision is usually made for a thickness of softer material, such as a sheet of heavy, hard paper, between the electrotype and the concave face of the work holder **14**, and by varying the thickness of this sheet of paper, deviations from a standard electrotype thickness may be easily obtained with great accuracy.

The several series of holes **44** provide for a coarse adjustment of the position of the clamping plates on one side of the work holder **14**, while the worm-gear-moved clamping plates **34** at the other side of the work holder allow for even minute dimensional differences in the arcuate length of the plates and insure that any size of plate, within the capacity of the work holder, may be accurately and securely clamped.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claim without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

In a machine for boring and interiorly finishing curved printing plates, a work holder comprising a hollow, parti-cylindrical form having a plurality of spaced parallel arcuate slots extending from each edge thereof, two pairs of spaced work engaging clamps movable circumferentially of said slots, curved to fit the inside surface of the work holder, the clamps of each pair being movable in arcuate paths towards and from each other, means for locking one of each pair of clamps in any one of several different positions to form work engaging abutments and to predetermine the position of the work, and means for powerfully moving and locking the other clamp of each pair to force and hold an arcuate printing plate against said abutments, whereby said printing plate may be securely clamped between each of said pairs of clamping members.

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