Aug. 12, 1947. I. TORNBERG ET AL 2,425,580

REGISTERING AND TRIMMING OF PRINTING PLATES

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Fig. 1.

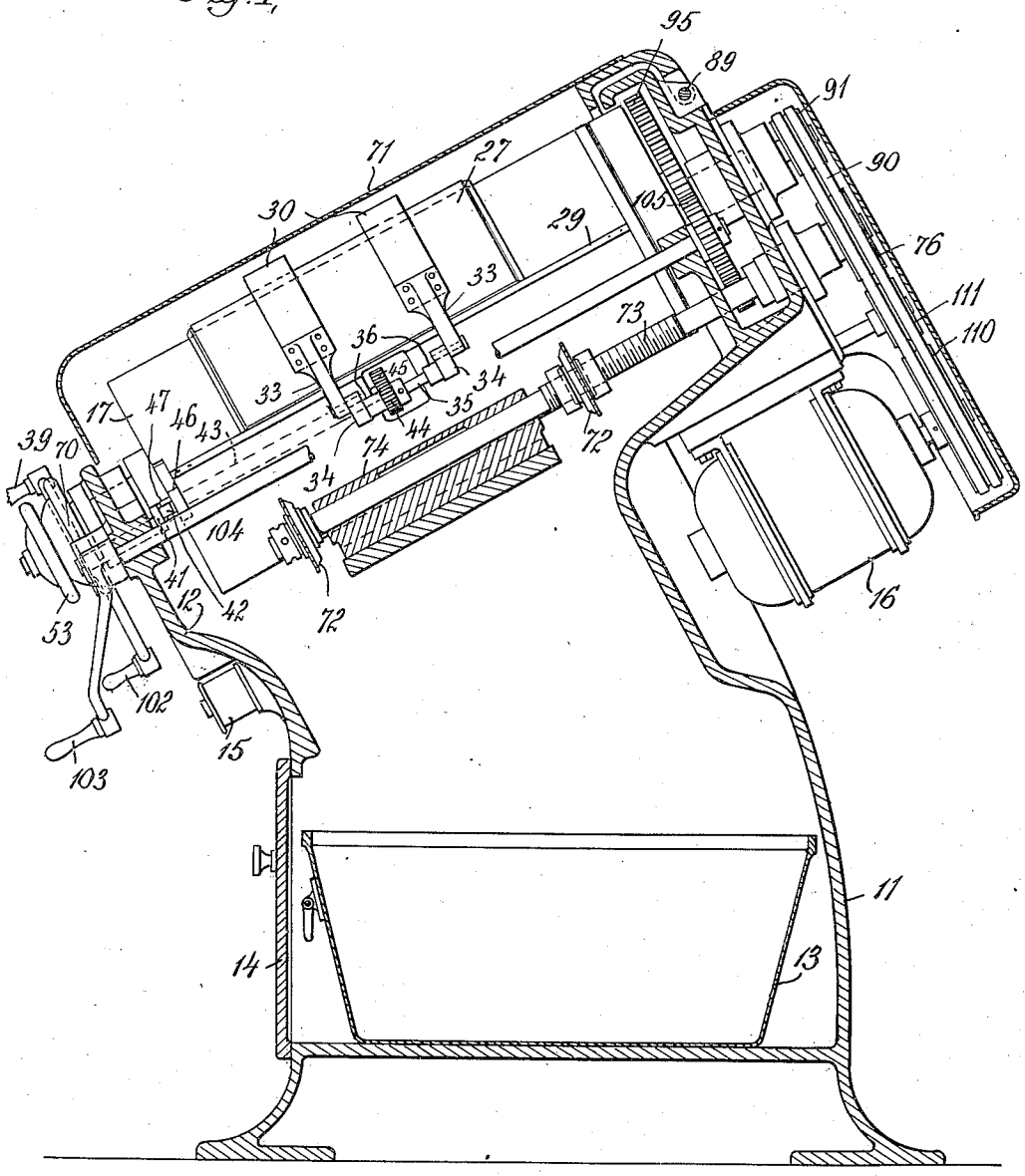

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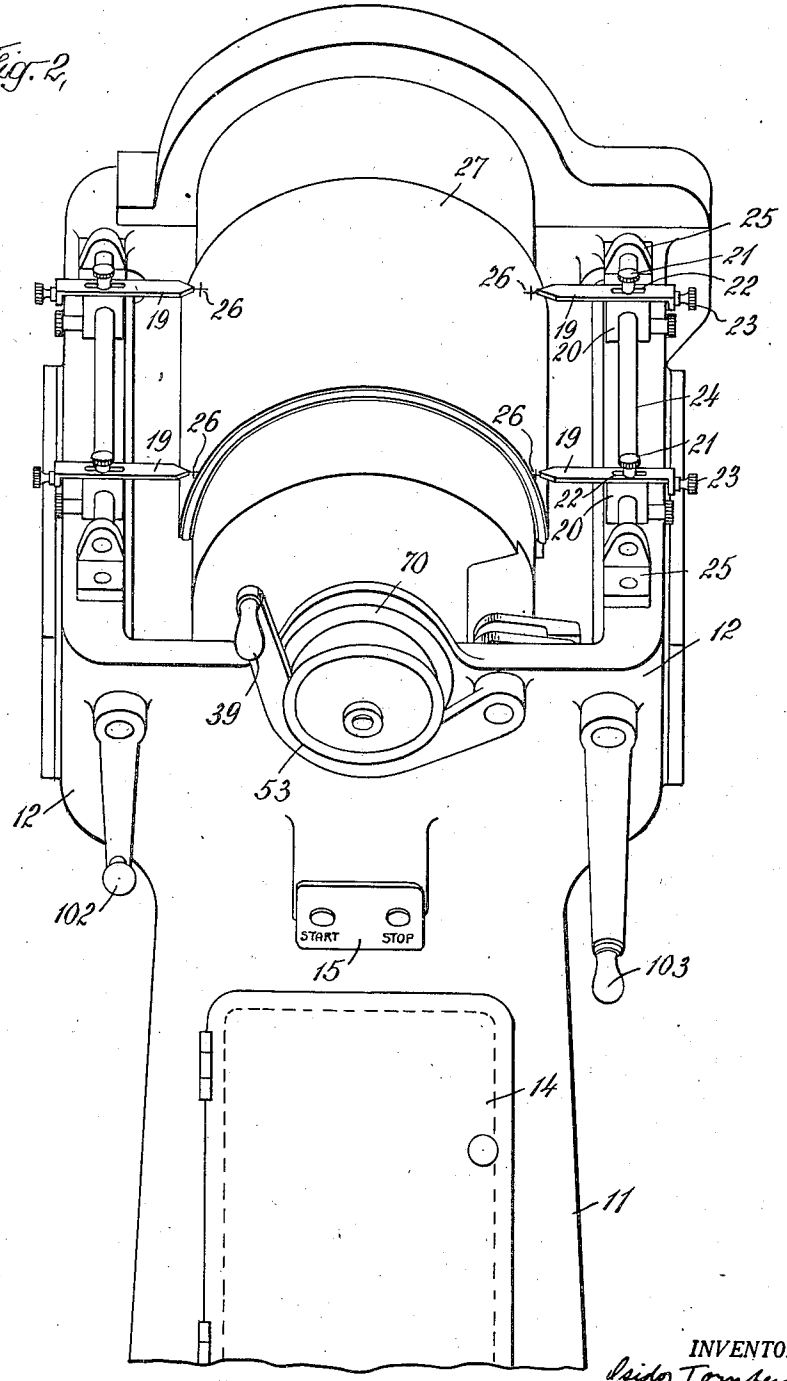
Fig. 2.



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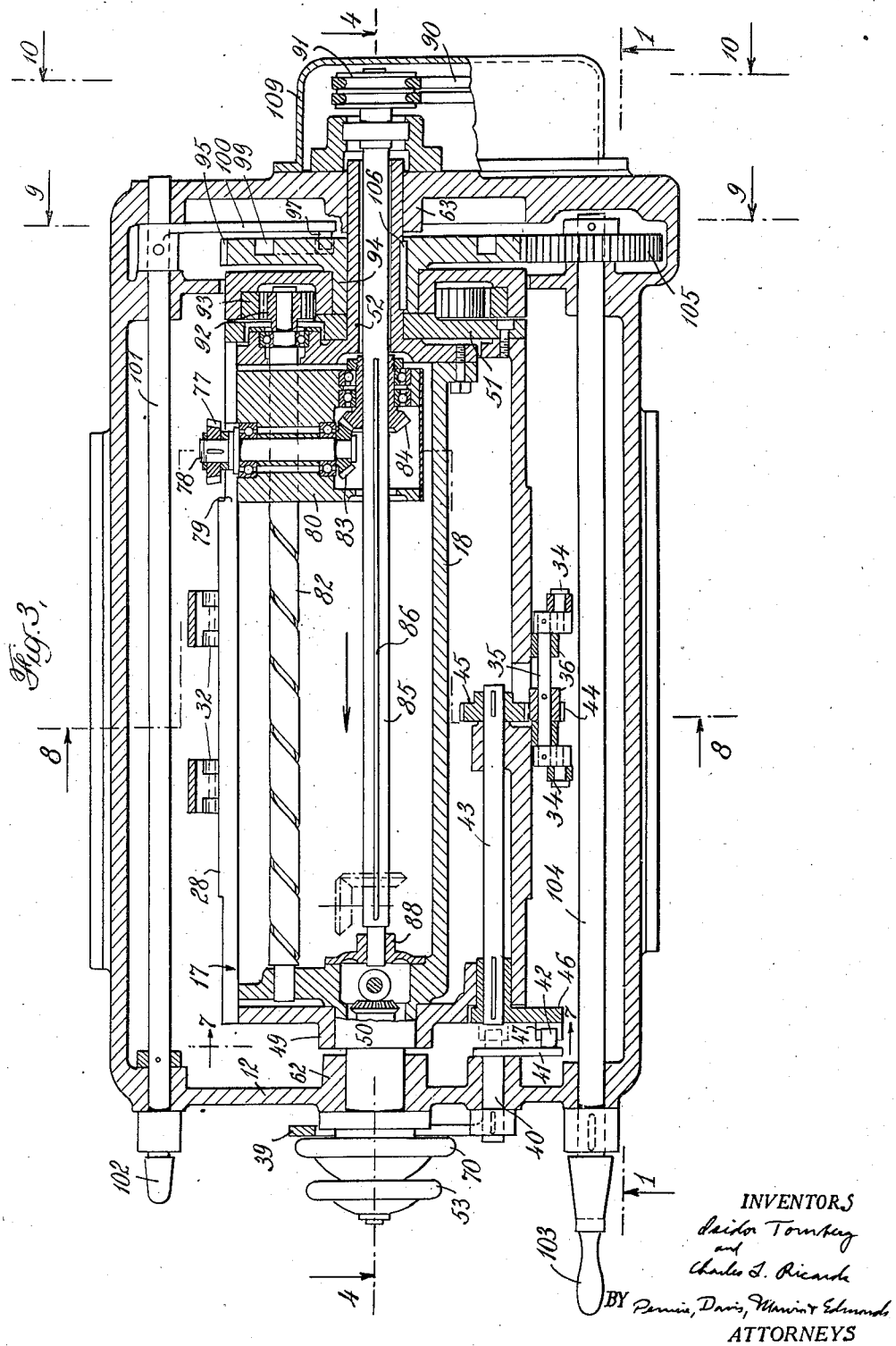

Fig. 3.

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REGISTERING AND TRIMMING OF PRINTING PLATES

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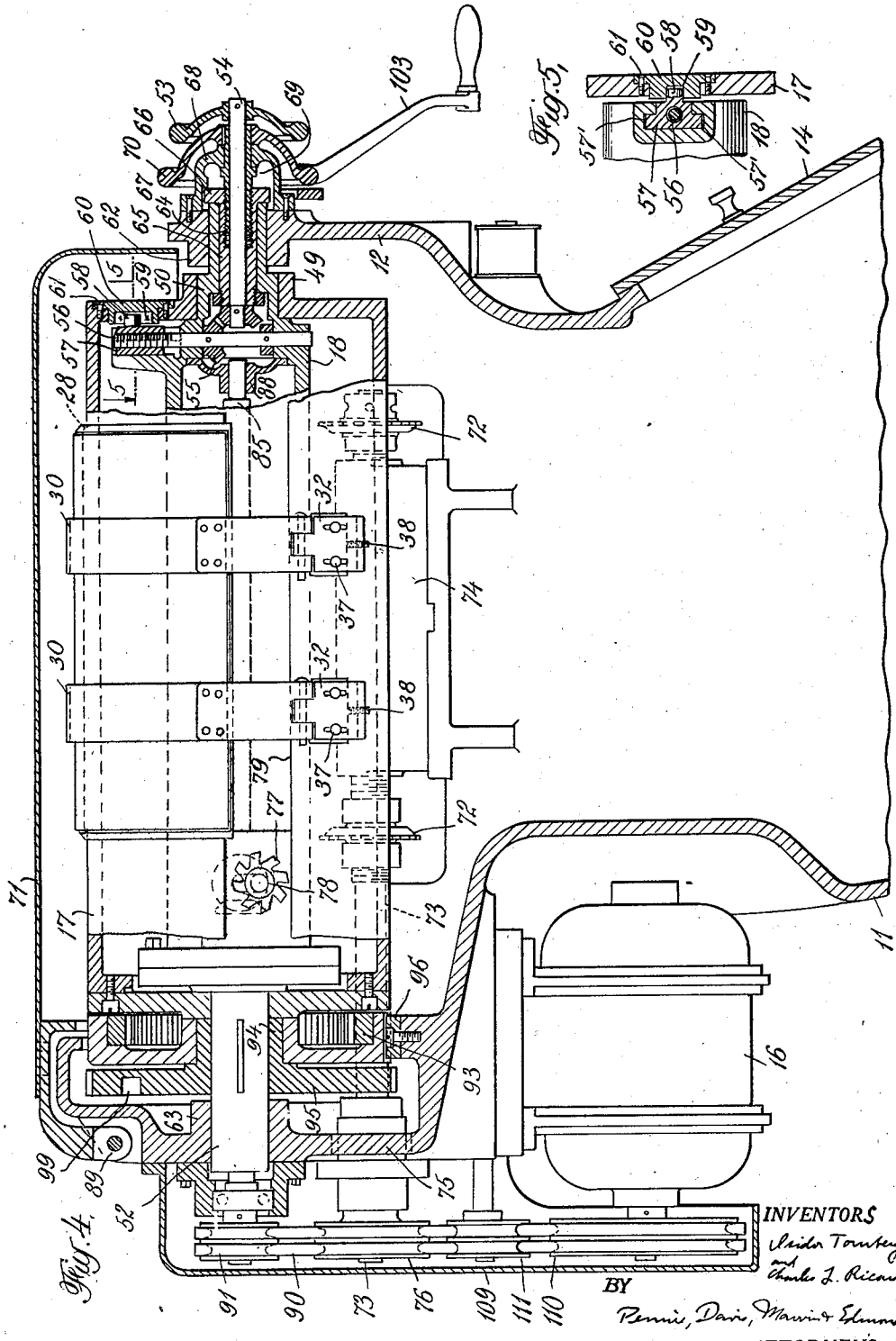

Fig. 4.

Fig. 5.

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REGISTERING AND TRIMMING OF PRINTING PLATES

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Fig. 6,

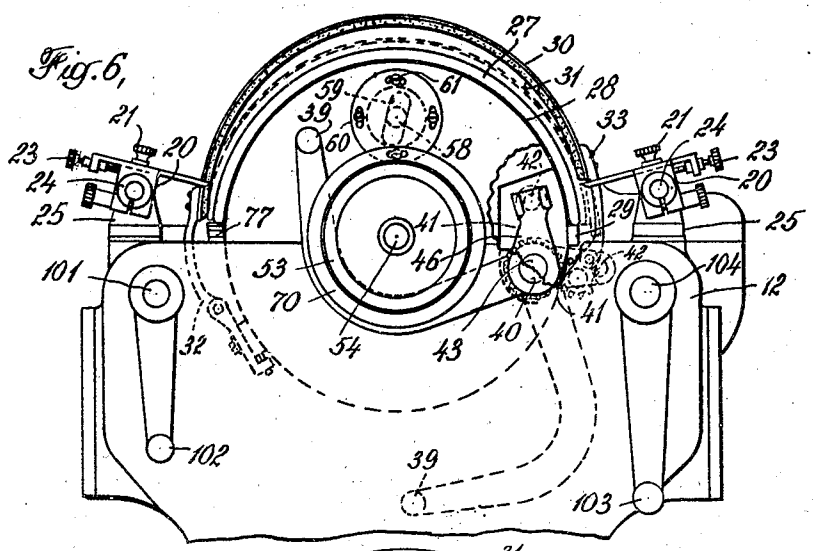

Fig. 7

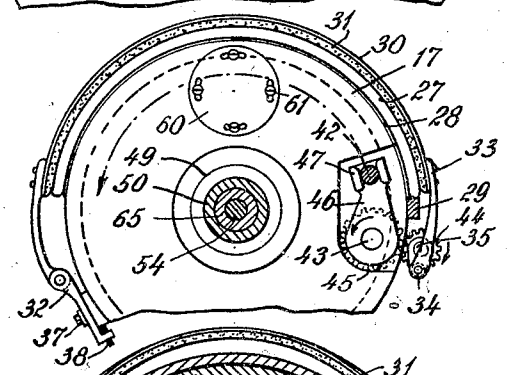

Fig. 8

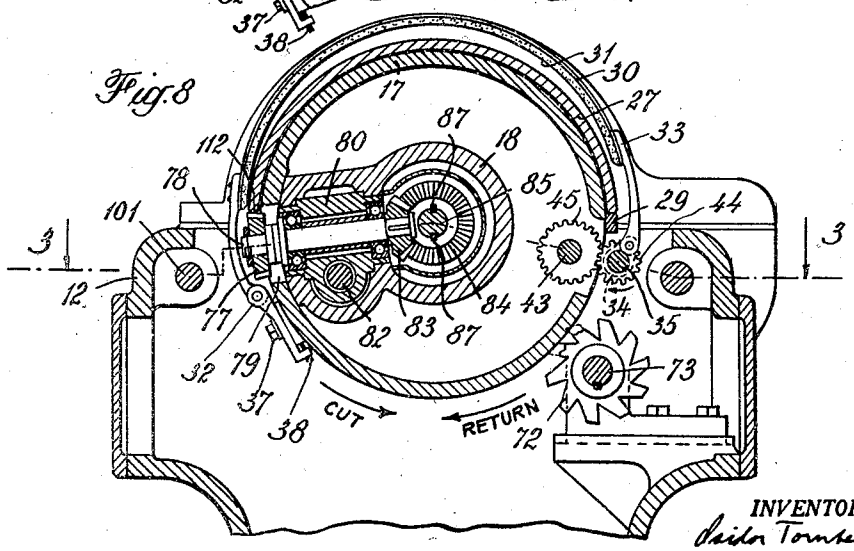

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Fig. 9

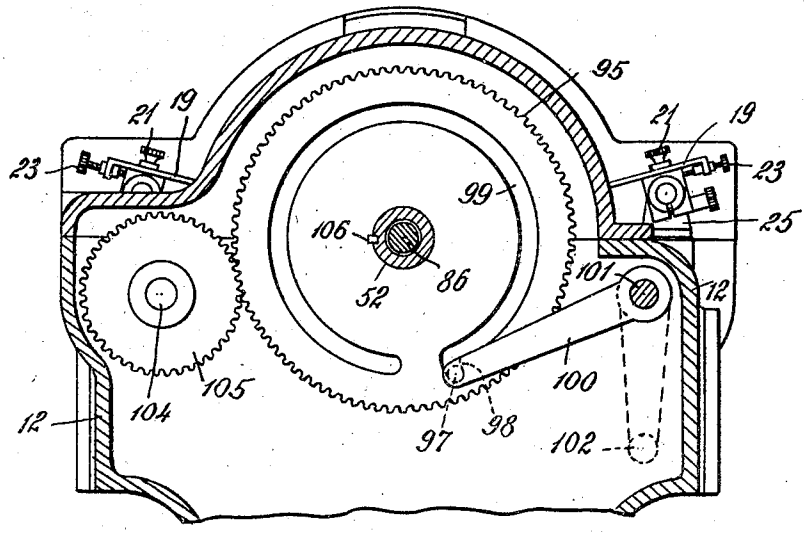
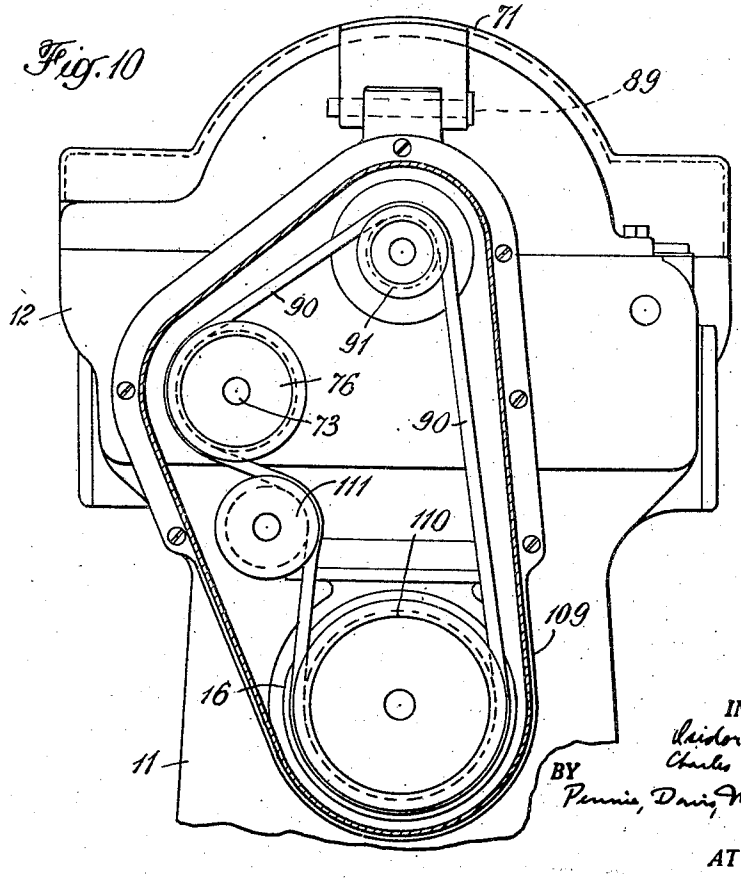


Fig. 10



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Patented Aug. 12, 1947

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UNITED STATES PATENT OFFICE

2,425,580

REGISTERING AND TRIMMING OF PRINTING PLATES

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Application November 4, 1943, Serial No. 508,914

4 Claims. (Cl. 29—21)

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This invention relates to improved apparatus for registering and trimming plates for use on printing presses.

In color printing, a plurality of plates are used to print each cut, each of several plates being inked with a different color. It is necessary that such plates be in exact registry to avoid multiple impressions, blurring and off-color in the printed reproduction. Prior to the present invention, such registry has been sought or approximated by a trial and error method in which two of the plates are placed on the impression cylinders of the press, proof is run and examined, one of the plates is re-set in an effort to correct mis-registry and the procedure is repeated with the remaining plates in turn. Color printing ordinarily requires four plates, and the time during which press equipment and personnel are tied up by this trial and error procedure is considerable. In some cases, this procedure reveals that one or more of the plates cannot be brought into registry and must be made again, after which the work of aligning or attempting to register the new plate or plates must be repeated. The previously known procedure not only consumes time and ties up equipment, but leaves much to be desired as regards the registry finally obtained.

It is an object of the present invention to provide a machine for so trimming plates for use on printing presses that they are brought into registry before being placed on the printing press cylinders. A further object of the invention is to provide a machine of this character in which both registering and trimming of each of the several plates is accomplished on a single machine or station without handling or conveying the plate between operations of registering and trimming. A further object is the provision of a machine of the type indicated employing simple and rugged trimming mechanism in conjunction with accurate and easily operated mechanism for bringing the plates into registry. Another object of the invention is the provision of a plate registering and trimming machine so constructed and arranged that all of the operations and observations essential to plate registering and trimming can be made by a single operator. Other objects and advantages of the invention will be apparent from the following description of a typical embodiment thereof.

In describing the invention in detail, reference will be made to the accompanying drawings in which a typical embodiment of our improved plate registering and trimming machine has been illustrated. In the drawings:

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Fig. 1 is a sectional side elevation of a machine embodying the invention, taken along the line 1—1 of Fig. 3 and shown on a reduced scale;

Fig. 2 is a front elevation of the machine with the cover and the plate holding straps omitted;

Fig. 3 is a horizontal sectional view of the plate trimming and registering cylinder and associated apparatus;

Fig. 4 is a vertical sectional view of the trimming and registering mechanism taken along the line 4—4 of Fig. 3;

Fig. 5 is a sectional view of a part of the mechanism for circumferentially adjusting the plate carrying cylinder, taken along the line 5—5 of Fig. 4;

Fig. 6 is a front end elevation of the mechanism shown in Fig. 3;

Figs. 7, 8 and 9 are respectively sectional views taken along the lines 7—7, 8—8 and 9—9 of Fig. 3; and

Fig. 10 is a rear end elevation of the drive mechanism taken along the line 10—10 of Fig. 3.

Referring to Figs. 1 and 2, the disclosed embodiment of the invention includes a unit box type frame 11 having an angularly disposed elongated mechanism compartment 12 at its upper end. The frame 11 is hollow and carries a chip pan 13 accessible through a door 14 adjacent its lower end. The lower end of the compartment 12 constitutes the front of the machine where the operator stands, and a switch 15 for controlling the machine driving motor 16 may be conveniently disposed on the frame 11 just beneath the front end of the mechanism compartment 12.

In general, the frame compartment 12 contains a printing plate carrying cylinder 17 disposed over and supported by a carrier 18 (Fig. 4) together with mechanism for adjusting the cylinder circumferentially relative to the carrier and axially with the carrier, and mechanism for trimming both of the end edges and one side edge of the printing plate 27 carried by the cylinder. The cylinder 17 and carrier 18 are disposed with their common axis at about 30° to the horizontal, as shown in Fig. 1. This permits the operator when standing in front of the machine to view the entire upper surface of the plate 27 without walking around the machine or materially changing his position.

The mechanism compartment 12 encloses approximately half of the cylinder 17 and a cover 71, hingedly secured to the compartment at 89, may be lowered to cover the upper half of the cylinder 17 during the trimming operation.

Four registering pointers 19 are adjustably sup-

ported on the upper edge of the compartment 12. Two of these pointers are disposed on one side of the cylinder 17 and the other two on the other side, as shown in Fig. 2. Each pointer 19 is clamped to a block 20 by a set screw 21 passing through a slot 22 in the pointer, and an adjustable screw 23 is provided in an angular offset end of the pointer to permit fine adjustment. Each block 20 is clamped to and adjustable along a rod 24 fixed to the machine frame by brackets 25. The arrangement is such that each pointer 19 may be adjusted to lie closely adjacent a register point 26 near one of the corners of the printing plate 27. The register points may comprise marks such as crossed lines formed on the plate when it is cast or if no such marks are provided, particular recognizable points in the cut on the printing surface itself may be used for this purpose. It should be understood that each of the several printing plates used to print a given cut are cast from similar matrices and that the register points 26 formed on the several plates are disposed in the same positions relative to the printed matter thereon.

The cylinder 17 is mounted co-axially on the carrier 18 and is provided with a raised portion 28 on its upper surface, as shown in Fig. 4. A bar 29 is fixed to the surface of the cylinder 17 parallel to its axis and serves as a stop for engagement by one edge of the plate 27, as shown in Figs. 1, 6, 7 and 8. The plate may be conveniently positioned on the cylinder 18 by moving one side edge thereof into engagement with the bar 29, and moving the plate longitudinally of the cylinder until its end edges overlap the edges of the raised portion 28 by approximately equal amounts. When so positioned, the plate may be adjusted to exact register within the range of the adjusting mechanism hereinafter described.

The plate is releasably held onto the surface of the cylinder 17 by a pair of straps 30. The straps 30 are preferably somewhat flexible and are lined with a suitable soft material such as the felt pads 31 to avoid injury to the plate. One end of each strap 30 is pivotally secured to a hinge member 32 fixed to the cylinder 17 at one side thereof and adjustable by means of the bolts 37 and 38 (Fig. 7). The other end of each strap 30 carries an arm 33 journaled to a crank 34 carried by a shaft 35 rotatably carried in journals 36 fixed to the cylinder 17 (Figs. 3, 6, 7 and 8). By turning the shaft 35 clockwise, as shown in Figs. 6, 7 and 8, the cranks 34 are carried past the center of the shaft axis to a locked position in which the straps 30 firmly clamp the plate 27 down onto the surface of the cylinder 17.

The described plate clamping mechanism is operated by a hand crank 39 on the front end of the machine. As shown in Fig. 3, this crank is fixed to a shaft 40 journaled in the wall of the compartment 12 and a crank 41 with a pin 42 at its end is fixed to the shaft 40 within the compartment. A shaft 43, suitably journaled within the cylinder 17, is connected to the shaft 35 through the pinions 44 and 45. A crank 46 fixed to the end of the shaft 43 at the front of the cylinder 17 carries a pair of spaced lugs 47 which receive the pin 42 therebetween when the cylinder is in its starting position, as shown in Figs. 6, 7 and 8. In this position, the shaft 43 is aligned with the shaft 40. With the pin 42 thus engaged between the lugs 47, the hand crank 39 may be moved upward, rotating the

shaft 35 counter-clockwise and so opening the straps 30, as shown in full lines in Fig. 6. Downward movement of the hand crank 39 to the position shown in broken lines in Fig. 6 rotates the shaft 35 clockwise and closes the straps 30 to lock the plate 27 in place, as shown in broken lines in Fig. 6 and in full lines in Fig. 7. With the mechanism in the locked position as shown in Fig. 7, rotation of the cylinder 17 moves the lugs 47 out of engagement with the pin 42. With this construction, the cylinder 17 cannot be moved from the starting position unless the plate is locked down onto it, and the straps 30 can be opened to release the plate 27 only when the cylinder 17 is in the starting position.

The cylinder 17 has a hub 49 journaled on a hub 50 to the carrier 18 adjacent the front end of the mechanism compartment, as shown in Figs. 3 and 4. The head 51 at the opposite end of the cylinder 17 is journaled on hub 52 of the carrier 18 as shown in the same figures. The carrier hubs 50 and 52 are journaled respectively in suitable bearings 62 and 63 at the ends of the mechanism compartment 12.

The cylinder 17 is rotatably adjustable relative to the carrier 18 by mechanism best shown in Figs. 4, 5 and 6. A hand wheel 53 is fixed to a central shaft 54 and connected through a pair of miter gears 55 to drive a threaded shaft 56 and so move a nut 57 along a radial way 57' at the front end of the carrier 18 (Figs. 4 and 5). Lug 58 on the nut 57 travels in a slot 59 in a circular plate 60 which is fixed to and rotatably adjustable in the front end of the cylinder 17. By disposing the slot 59 at an angle to the radial path of the lug 58, as shown in Fig. 6, movement of the lug causes rotation between the carrier 18 and the cylinder 17. The amount of such adjustable movement can be regulated by turning the plate 60 to various angular positions, thus varying the angle between the slot 59 and the path of the lug 58. Set screws 61 are provided to secure the plate 60 in its adjusted position.

Axial adjustment of the plate carrying cylinder 17 is secured by moving both the carrier 18 and the cylinder 17 axially in the compartment 12. This is accomplished by rotation of an externally threaded sleeve 64 in an internally threaded member 65 rotatably journaled within the hub 50 of the carrier 18. The member 65 is fixed against axial movement with regard to the carrier hub 50 by end collars as shown in Fig. 4 and the outer collar 66 is held against rotation by a key 67 on a frame 68 secured to the mechanism compartment 12. The threaded sleeve 64 is journaled in the frame 68 and fixed against axial movement by a collar 69 within the frame and the hand wheel 70 outside of the frame. Rotation of the wheel 70 turns the sleeve 64 relative to the member 65 and so moves the carrier 18 and the cylinder mounted thereon axially in the compartment 12.

The ends of the printing plate 27 carried on the cylinder 17 are trimmed by rotary cutters 72 adjustably fixed to a shaft 73 which is journaled in bearings 74 fixed within the compartment 12 (Figs. 1, 4 and 8). The shaft 73 extends through a journal 75 in the rear wall of the compartment 12 and carries a driving pulley 76.

The longitudinal side edge of the plate 27 is trimmed by a rotary cutter 77 arranged to both rotate and move longitudinally of the plate as the cylinder 17 is turned about its axis. As shown in Fig. 8, the cutter 77 is carried by a shaft 78 extending through a longitudinal slot 79 in

the cylinder 17. The shaft 78 is journaled in a traveler 80 that is slidably mounted in suitable longitudinally extending guide grooves in the carrier 18. A long pitch screw 82 threadedly engages the traveler 80 and moves it longitudinally as hereinafter explained. The cutter shaft 77 is driven through the miter gears 83 and 84 from a center shaft 85 (Figs. 3 and 8). Slots 86 in the shaft 85 are slidably engaged by keys 87 in the miter gear 84 as shown in Fig. 8. The shaft 85 is journaled within the hub 52 of the carrier 18 and in a hub 88 adjacent the front end of the carrier as shown in Figs. 3 and 8. The shaft 85 is driven by the motor 16 through the belts 90 and pulley 91.

The screw 82 is driven by a pinion 92 fixed to one end thereof and engaging an internal gear 93 which is journaled on the hub 94 of a gear 95 and is held against rotation by a slitting key 96 fixed to the wall of the compartment 12 as shown in Fig. 4. With this arrangement, rotation of the cylinder 17 by the carrier 18 causes rotation of the long pitch screw 82 and thus moves the cutter 77 longitudinally along the edge 112 of the plate 27.

The cylinder 17 and carrier 18 are normally held in the starting position shown by engagement of a lug 97 in a radial extension 98 of a circumferential groove 99 in the gear 95 (Figs. 3 and 9). The lug 97 is carried by an arm 100 fixed to a shaft 101 which passes through to the front of the mechanism compartment 12 and is there provided with an operating handle 102. The cylinder 17 and carrier 18 may be rotated through an arc somewhat greater than a half revolution by a hand crank 103 connected through a shaft 104 and a gear 105 to the gear 95. As shown in Fig. 3, the gear 95 is keyed to the hub 52 of the carrier 18 by a key 106. Rotation of the carrier 18 rotates the cylinder 17 carried thereby.

A guard or cover 109 encloses the drive pulley 110 of the motor 16 as well as the belts 90 and the pulleys 76 and 91 which drive the cutter shafts as explained above. An idler pulley 111 may be provided for maintaining proper tension on the belts 90.

In operating the described embodiment of the registering and trimming machine, a printing plate 27, which serves as the key plate and which may comprise any one of the several plates of a set, is secured to the cylinder 17 on the raised portion 28 thereof with one side edge of the plate in contact with the bar 29 as shown in Fig. 7. The four pointers 19 are then adjusted until each is in register with the corresponding point 26 on the plate 27. The operator then unlocks the mechanism by moving the handle 102 to the right as shown in Fig. 2, which lifts the lug 97 from the radial extension 98 of the groove 99 in the drive gear 95. The operator then starts the motor 16 and rotates the crank 103 in a clockwise direction which turns the cylinder 17 counter-clockwise as shown in Fig. 8. During this rotation of the cylinder, the rotating cutter 77 moves along and trims the longitudinal side edge 112 of the plate 27 and the rotating cutters 72 trim the two end edges of the plate. When this trimming operation is completed, the operator turns the crank 103 counter-clockwise and so returns the mechanism to the starting position where it is stopped and locked by the lug 97 which falls by gravity into the radial groove extension 98.

The plate 27 is then removed from the machine, and one of the other plates of the set is placed on the cylinder 17 and locked in place by operation of the handle 39 as above described. The operator then shifts the new plate circumferentially by manipulation of the hand wheel 53 and axially by manipulation of the hand wheel 70 until the four register points of the new plate are in registry with the four pointers 19, whereupon the new plate is trimmed in the manner described in connection with the first or key plate 27. This registering and trimming operation is then repeated with each of the remaining plates in turn, with the result that a complete set of plates, trimmed to exact register, is quickly and easily produced without any trial on the press and so without tying up press equipment or personnel. It should be noted that the construction and arrangement of the machine permits the operator to observe all of the register points of the plate while standing at the operating position in front of the machine with all of the controls within easy reach.

We claim:

1. In a curved stereotype plate supporting mechanism, the combination with a carrier mounted to rotate about an axis, a plate carrying cylinder mounted on said carrier concentric with said axis, means for removably securing a curved stereotype plate to the surface of said cylinder, means for adjustably moving said cylinder circumferentially with respect to said carrier, a plurality of fixed register pointers adjustably mounted adjacent the surface of said cylinder, and means for rotating said cylinder.

2. In a curved stereotype plate supporting mechanism, the combination of a fixed frame, a carrier mounted on said frame to rotate about an axis, a cylinder on said carrier concentric with said axis, means for removably securing a stereotype plate to the surface of said cylinder, means for adjusting said cylinder circumferentially relative to said carrier and axially relative to said frame with said carrier, a plurality of register pointers adjustably mounted on said frame adjacent spaced points on said cylinder, and means for simultaneous rotating said cylinder and said carrier.

3. In a curved stereotype plate supporting mechanism, the combination of a fixed frame, a carrier mounted on said frame to rotate about an axis, a cylinder on said carrier concentric with said axis, means for rotating said carrier and said cylinder about said axis from a starting position, means on said cylinder for removably securing a curved stereotpye plate to the surface thereof, means on said frame for operating said securing means when said cylinder is stationary in the starting position, means for adjustably moving said cylinder circumferentially relative to said carrier, and a plurality of register pointers adjustably mounted on said frame adjacent spaced points on the surface of said cylinder.

4. In a curved stereotype plate supporting mechanism, the combination of a fixed frame, a carrier mounted on said frame to rotate about an axis, a cylinder on said carrier concentric with said axis, means for rotating said carrier and said cylinder about said axis from a starting position, means on said cylinder for removably securing a curved stereotype plate to the surface thereof, means on said frame for operating said securing means when said cylinder is in the starting position, means for adjustably moving said cylinder circumferentially relative to said carrier, means for adjustably moving said carrier

axially relative to said frame, and a plurality of register pointers adjustably mounted on said frame adjacent spaced points on the surface of said cylinder.

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