H. F. BECHMAN.

STEREOTYPE PLATE FINISHING APPARATUS.

APPLICATION FILED JULY 12, 1915.

1,255,279.

Patented Feb. 5, 1918.

5 SHEETS—SHEET 1.

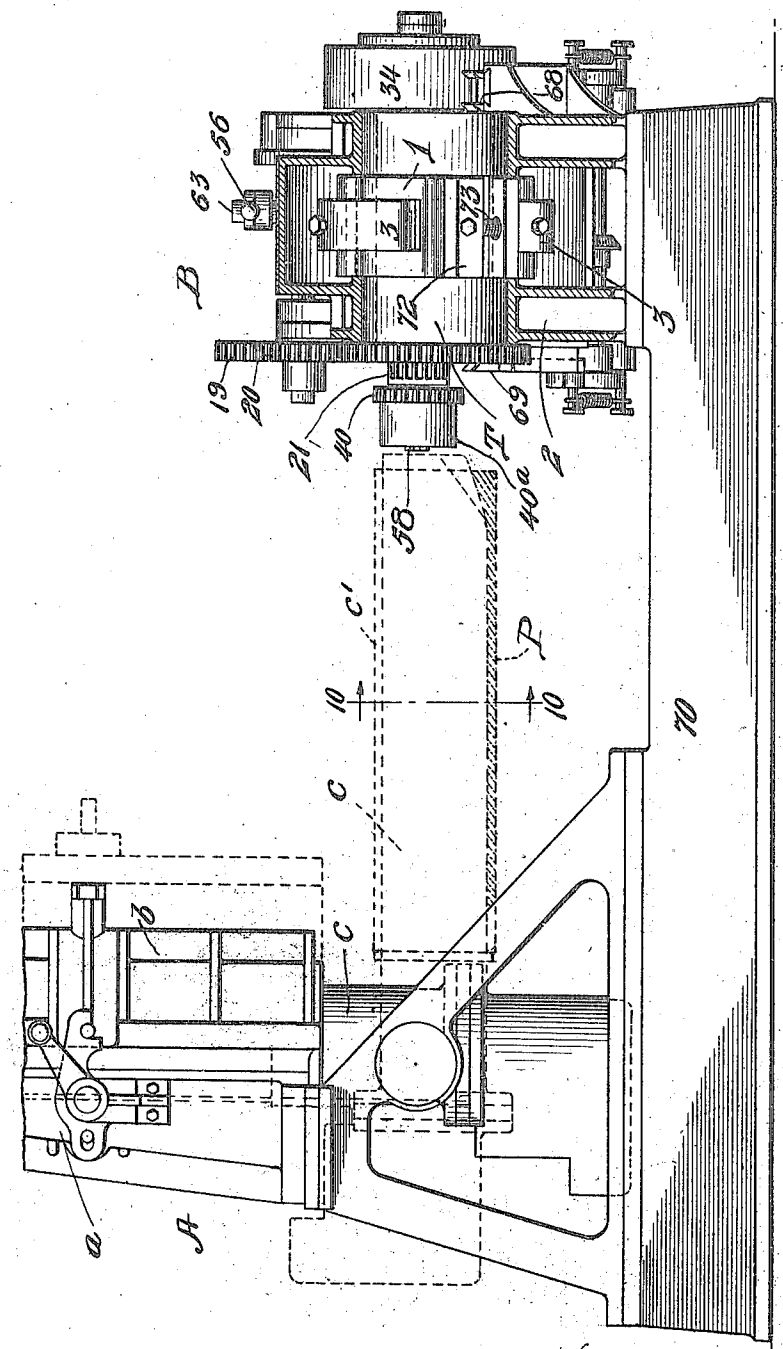


Fig. 1.

Witnesses

B. M. Offutt, Jr.

W. Wallace Nairn Jr.

Inventor

Henry F. Bechman

By Fowell & Fowell

Attorneys

H. F. BECHMAN.

STEREOTYPE PLATE FINISHING APPARATUS.

APPLICATION FILED JULY 12, 1915.

1,255,279. Patented Feb. 5, 1918.

5 SHEETS—SHEET 2.

Fig. 2.

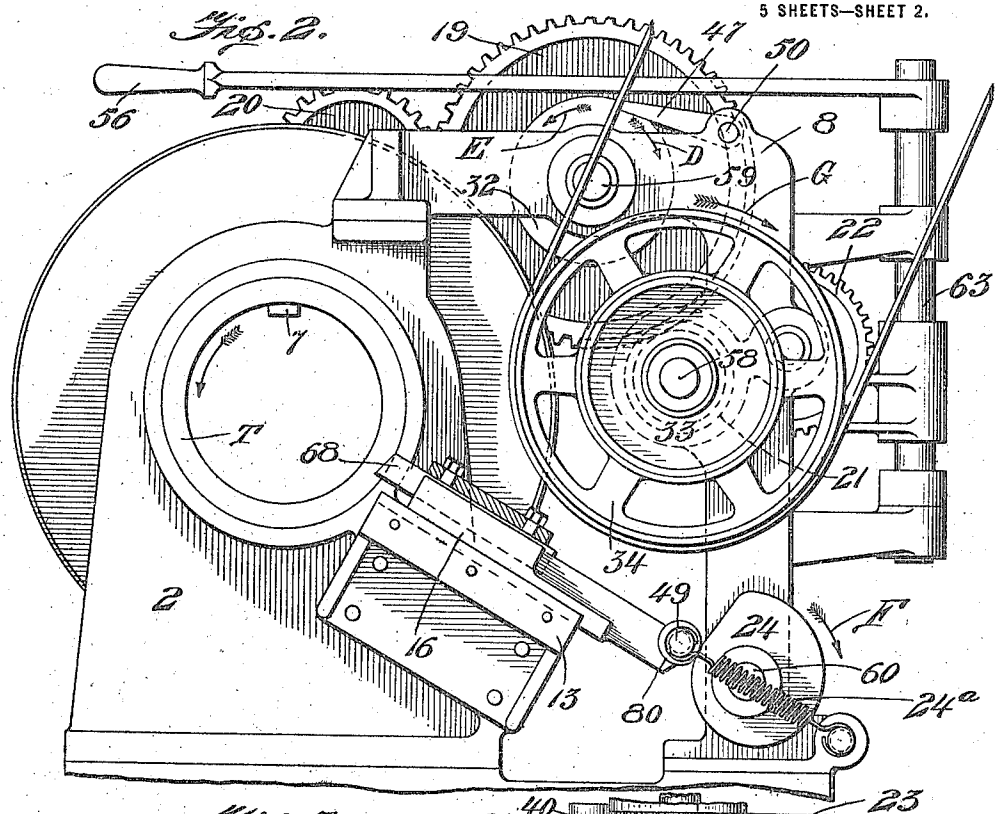
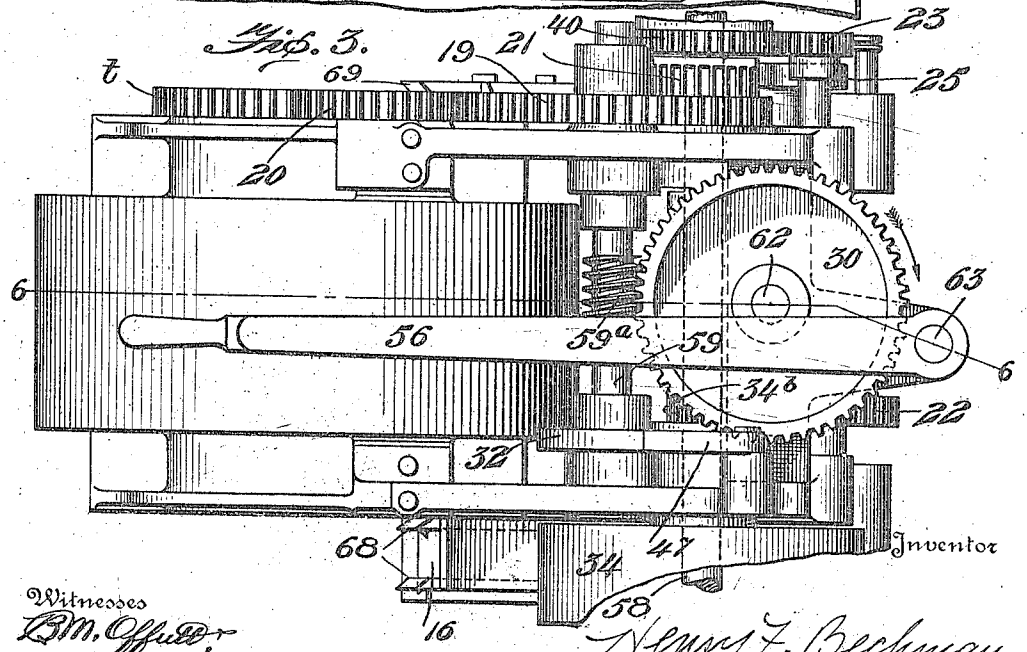


Fig. 3.



Witnesses

W. Wallace Nairn Jr

Inventor

Henry F. Bechman

By Fowell & Fowell

Attorneys

H. F. BECHMAN.

STEREOTYPE PLATE FINISHING APPARATUS.

APPLICATION FILED JULY 12, 1915.

1,255,279. Patented Feb. 5, 1918.

5 SHEETS—SHEET 3.

Fig. 4.

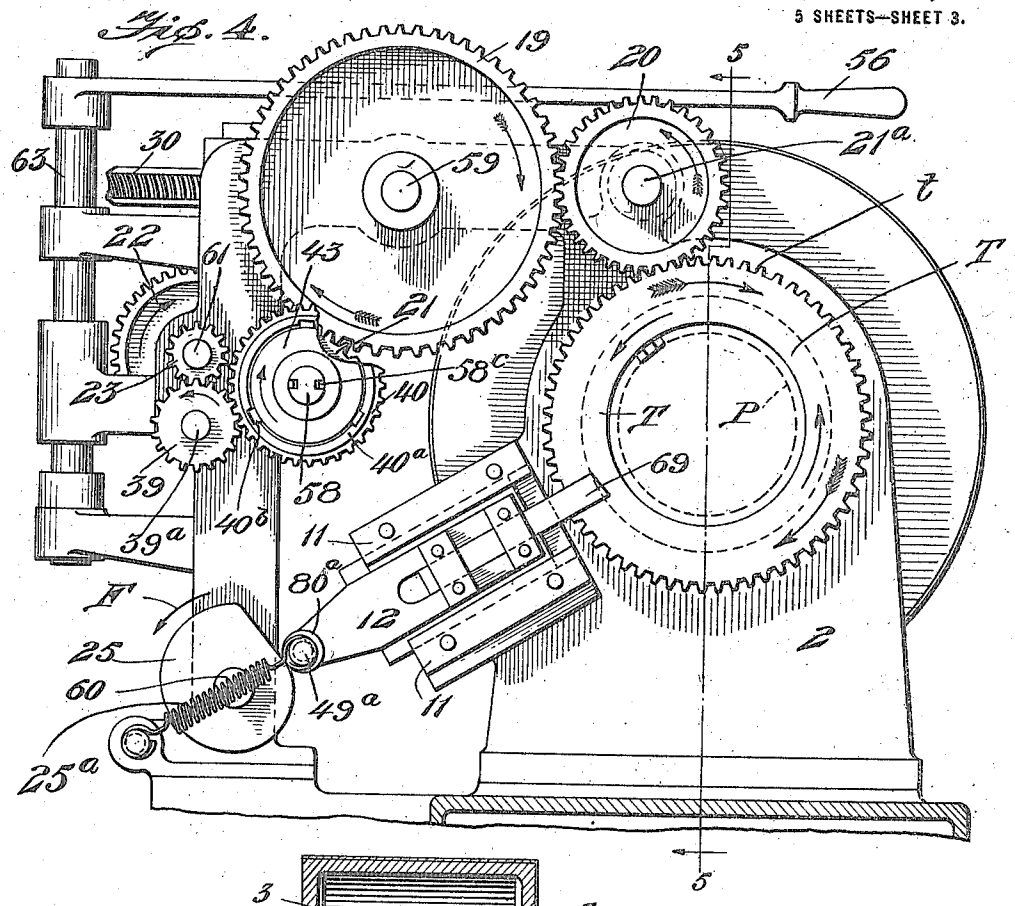
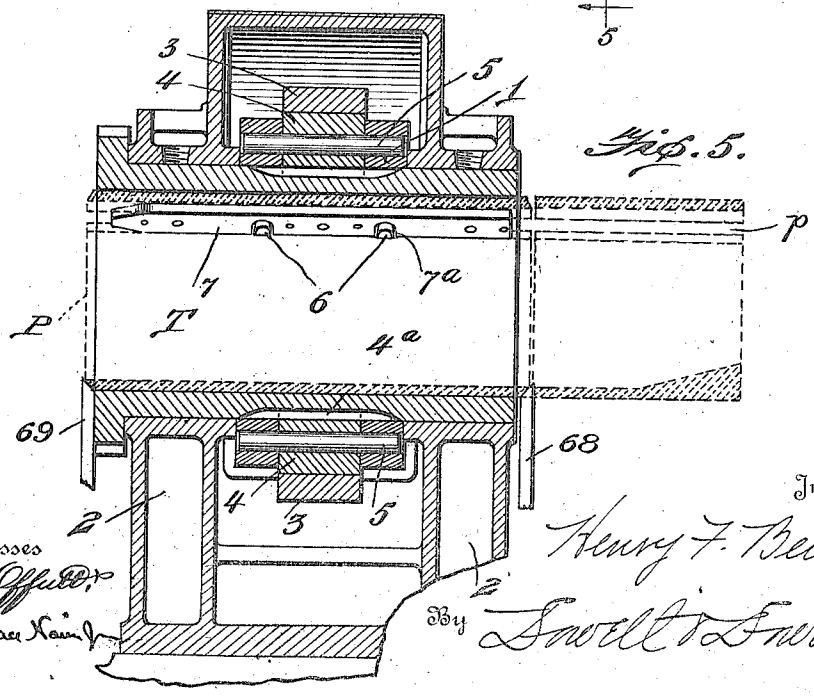


Fig. 5.



Witnesses

B.M. Offutt.

W. Wallace Kain Jr.

Inventor

Henry F. Bechman

By Dwell & Dwell

Attorneys

H. F. BECHMAN.

STEREOTYPE PLATE FINISHING APPARATUS.

APPLICATION FILED JULY 12, 1915.

1,255,279. Patented Feb. 5, 1918.

5 SHEETS—SHEET 4.

Fig. 6.

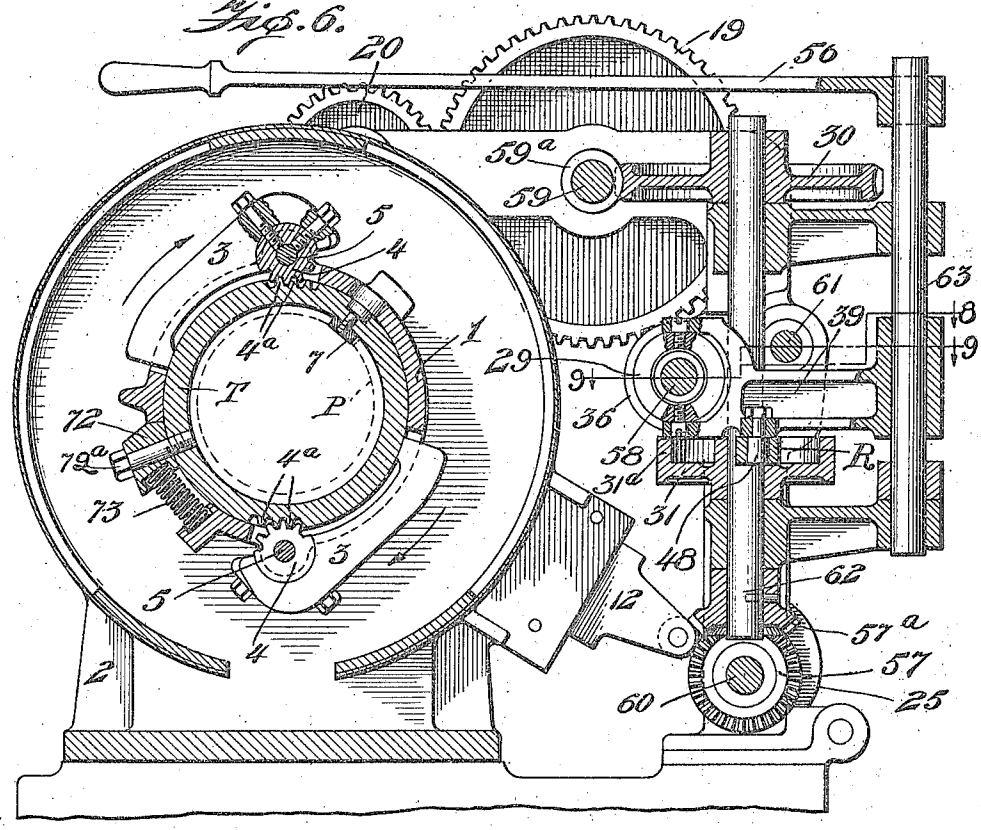


Fig. 7.

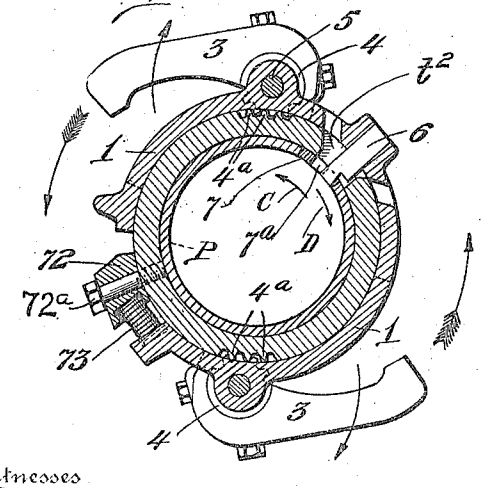
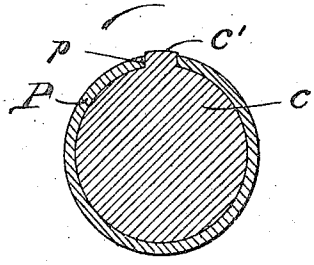


Fig. 10.



Witnesses

B. M. Offutt

W. Wallace Nairn Jr.

Inventor

Henry F. Bechman

By Lowell & Lowell

Attorneys

H. F. BECHMAN.

STEREOTYPE PLATE FINISHING APPARATUS.

APPLICATION FILED JULY 12, 1915.

1,255,279.

Patented Feb. 5, 1918.

5 SHEETS—SHEET 5.

Fig. 8.

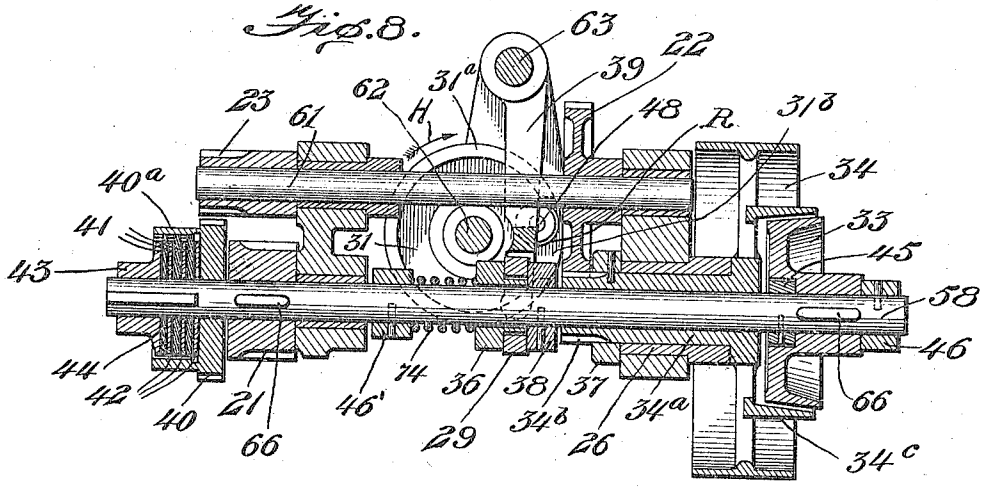
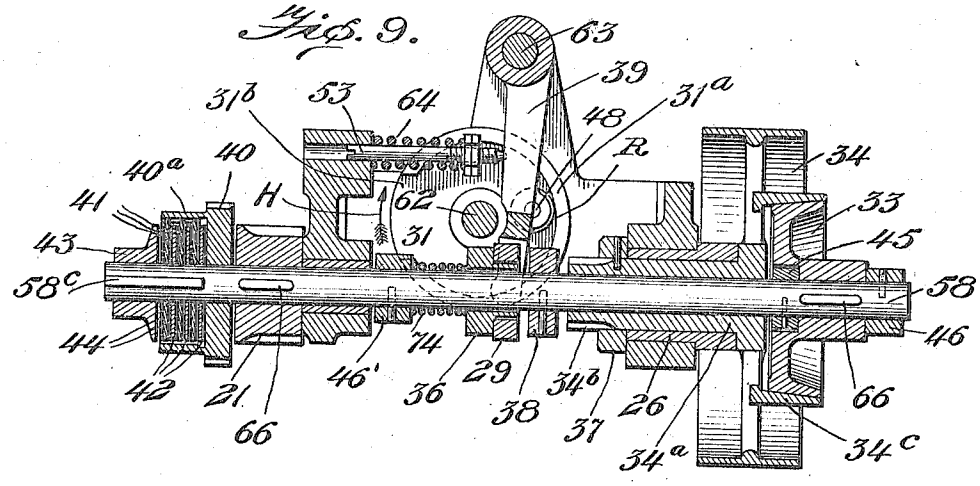


Fig. 9.



Witnesses

W. Wallace Nairn Jr

Inventor

Henry F. Bechman

By Dowell & Dowell

Attorneys

UNITED STATES PATENT OFFICE.

HENRY F. BECHMAN, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO DUPLEX PRINTING PRESS COMPANY, OF BATTLE CREEK, MICHIGAN, A CORPORATION OF MICHIGAN.

STEREOTYPE-PLATE-FINISHING APPARATUS.

1,255,279. Specification of Letters Patent. Patented Feb. 5, 1918.

Application filed July 12, 1915. Serial No. 39,449.

To all whom it may concern:

Be it known that I, HENRY F. BECHMAN, a citizen of the United States, residing at Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Stereotype-Plate-Finishing Apparatus; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel machine for finishing stereotype plates such as are used on printing presses, and particularly tubular stereotype plates of the type shown in my Patent No. 867,230 dated October 1, 1907.

The object of the present invention is to enable such tubular plates to be trimmed ready for use on the press with the minimum of manual handling. For this purpose the finishing machine is preferably arranged adjacent the casting apparatus so that after the plate is cast the core of the casting box is lowered to present the plate thereon to the trimming mechanism so that as the plate is removed from the core it enters the plate trimming mechanism, and when withdrawn therefrom it is ready for placing upon the plate cylinder of a press, no boring of such plates being required because they are cast of the proper diameter and uniform thickness.

In this arrangement the core of the casting box is utilized as a guide and support for carrying and directing the cast plate from the casting box into the plate trimming mechanism, and when the plate enters the plate holder of such mechanism the operator, by simply shifting a controlling lever, starts the trimming mechanism into operation, whereupon the plate is automatically expanded within the holder, then the trimmers are automatically advanced to cut off the sprue and bevel both ends of the plate, and at the end of the trimming operation the plate-holder is automatically stopped and backed up until it is in position to receive a newly cast plate from the core, and the finished plate is released and may be removed from the holder; and can be ejected therefrom by the insertion of a newly cast plate thereinto.

The invention includes novel elemental means for automatically expanding and holding a tubular plate securely in the plate-holder during the trimming operation and releasing the plate when the trimming operation is completed; also novel means for automatically operating the trimming tools; also novel means for returning the plate-holder to initial position. The invention further includes other novel combinations of parts and details of construction which will be hereinafter set forth.

I will explain the invention in connection with the accompanying drawings which illustrate one practical apparatus for casting and trimming tubular stereotype plates, but the invention is not restricted to the particular construction of parts shown in said drawings, and I therefore refer to the claims for epitomes of the invention and novel combinations therein and features thereof for which protection is desired.

In said drawings:—

Figure 1 is a sectional side elevation of one complete apparatus embodying the invention, and showing in dotted lines the core of the casting box lowered into position to direct a plate into the trimming mechanism.

Fig. 2 is an enlarged end elevation of the trimming mechanism, partly in section.

Fig. 3 is a top plan view of Fig. 2.

Fig. 4 is an end elevation of the trimming mechanism; opposite to that shown in Fig. 2.

Fig. 5 is a vertical section on line 5—5 Fig. 4.

Fig. 6 is a cross section on the line 6—6 Fig. 3.

Fig. 7 is a detail sectional view of the plate holder showing the plate clamping devices.

Fig. 8 is a horizontal sectional view on the line 9—8 Fig. 6; and

Fig. 9 is a similar section on line 9—9 Fig. 6; said figures showing the different positions of the parts when the respective clutches are engaged and disengaged.

Fig. 10 is an enlarged detail section of the core and plate on line 10—10 Fig. 1.

Referring to said drawings, A designates the casting box and B designates the trimming mechanism; the box in the example shown being mounted upon the same base as the trimming mechanism.

The casting box A may be of the general type and construction illustrated in my Patent 995.655 of June 20, 1911, and as such has a drag *a*, a cope *b* and a tiltable core *c*; such boxes are adapted to produce tubular

stereotype plates with a longitudinal slot such as described in my Patent No. 867,230 aforesaid. The core *c* is inclosed between the cope and drag during the operation of casting a plate, and when the plate is cast it surrounds said core; after the box is opened the core may be tilted to a horizontal position to permit the plate to be withdrawn therefrom.

In the example shown the core can be tilted to horizontal position, as indicated in dotted lines in Fig. 1, and in that position said core lies in exact axial alinement with the rotatable tubular plate-holder T of the trimming mechanism so that the cast plate, indicated at P, may be slid directly off the core *c* into such holder T, as more fully hereinafter explained.

The trimming mechanism comprises a rotatable plate-holder T mounted in suitable bearings 2 on a base 70. This holder is provided with a gear *t* which meshes with a gear 20 on a stud 21^a that in turn meshes with gear 19 on a shaft 59 journaled in bearings in the trimmer frame and lying parallel with the holder. The gear 19 meshes with a gear 21 keyed on a shaft 58 journaled in bearings in the framing parallel with shaft 59, (Figs. 2, 3, 8 and 9). The holder T should turn in the direction of the feathered arrows (Figs. 2, 4 and 6) while a plate is being trimmed. Gear 19 has the same number of teeth as the gear *t* on plate-holder T, therefore the shaft 59 will make one revolution for each one of the plate-holder.

Shaft 58 is adapted to be driven in opposite directions by means of suitable clutch mechanism and gearing as follows:—

The shaft 58 is journaled in one of its bearings within a sleeve 34^a mounted in a bushing 26 within the bearing, said sleeve forms an extension of the hub of a driving pulley 34, longitudinal movement of the sleeve in the bushing being prevented by collar 37, (Figs. 8 and 9). The pulley 34 may be driven by belting from any suitable driver. This pulley 34 is provided with a clutch member 34^c which is adapted to be engaged by a clutch member 33 fixed on the shaft 58 by the key 66 and confined in longitudinal position on the shaft between collars 45 and 46, (see Figs. 8 and 9).

When the clutch 33 is in engagement with member 34^c as indicated in Fig. 9, shaft 58 will be turned in a direction to rotate the holder T in a forward direction, indicated by the tailed arrows in Figs. 2 and 4. Said clutch is engaged and disengaged as hereinafter explained.

The shaft 58 may be caused to revolve in the opposite direction by means of a pinion 34^b which may be cut on or attached to the inner end of the sleeve 34^a, (see Figs. 8 and 9) and gear 34^b meshes with a gear 22 on the counter shaft 61 journaled in the framing beside and parallel with shaft 58 (Figs. 6 and 8); said shaft 61 carrying a gear 23 (Figs. 4 and 8) meshing with a gear 39 on a stud 39^a; and gear 39 meshes with a gear 40 loose on shaft 58 but adapted to be engaged therewith by a suitable clutch, preferably a multiple friction disk clutch as illustrated in the drawings, the construction of which is hereinafter more fully explained (Figs. 8 and 9). The gear 40 can be locked to shaft 58 by a suitable clutch—I prefer to use a friction clutch; and this may be constructed as follows:—

The gear 40 has a circular flange 40^a having on its inner surface longitudinal slots 40^b, (Fig. 4). A series of disks 41 are placed within flange 40^a, said disks having projecting lugs on their circumferences which engage the slots in the flange 40^a, so that the disks turn with said gear. Between the disks 41 are disks 42 (Fig. 8) fitting loosely on the shaft 58 but having inwardly projecting lugs engaging keyways 58^c in the shaft (Fig. 4). Secured to the end of the shaft 58 is a collar 43 having its inner end bearing against the outermost disk. Between the collars, disks and gears may be placed disks 44 of felt or of other material to increase the friction between the driving and driven surfaces. These friction surfaces are normally held in contact by the action of a spring 64 (Fig. 9) hereinafter referred to.

The engaging and disengaging of the aforesaid clutches is accomplished by moving the shaft 58 endwise. To do this a collar 38 is secured to shaft 58 and adjacent the collar 38 is a second loose collar 36 which is normally pressed toward collar 38 by means of a spring 74 interposed between collar 36 and a fixed collar 46′ on shaft 58 (Figs. 8 and 9); and between collars 36 and 38 is a collar 29 pivotally connected to the forked end of a shifting lever 39 (Figs. 6, 8 and 9) which is mounted on a vertically disposed shaft 63 suitably supported in the main frame and carrying a hand lever 56, which latter is the controlling or starting lever of the trimming mechanism.

It will be seen that when the cone 33 is engaged to drive the plate-holder in a forward direction (Fig. 9), the multiple disk or friction clutch is disengaged; and also when the friction clutch is engaged to drive the plate-holder backward (Fig. 8), the cone clutch is disengaged. When the one toothed ratchet 32 is engaged with the pawl 47 no farther backward movement can take place, and the members of the friction clutch will slide on each other.

The lever 39 may be normally pressed to move shaft 58 in a direction to disengage clutch 33 and engage the friction clutch, by suitable springs. As shown in Fig. 9 a slid-

able rod 53 is pressed against lever 39 by a spring 64 said rod being guided in a suitable opening in an adjacent part of the frame.

The lever 39 also carries a stud 48 on which is a cam roller R (Figs. 6, 8 and 9) which is adapted to engage a ring cam 31^a on a wheeled disk 31 secured to a vertical shaft 62 journaled in the main frame. The ring cam 31^a has a gap or notch 31^b in its periphery for a purpose hereinafter explained. Shaft 62 is driven from the shaft 59 by means of a worm gear 30 on shaft 62, engaging a worm 59^a on shaft 59 (Figs. 3 and 6). On the shaft 59 is secured a one-toothed ratchet 32, which is free to revolve in the direction of the arrow E (Fig. 2). But when turned in the opposite direction indicated by the arrow D (Fig. 2) it can move only until its ratchet tooth comes into contact with the pawl 47 pivoted on the pin 50 attached to part 8 of the frame.

When a tubular plate is inserted in the holder T it is automatically clamped therein during the trimming operation by the following devices:—

Rotatably mounted upon the exterior of the plate holder (Figs. 1, 5, 6, 7), is an annular ring 1 which is normally pressed in one direction by a spring 73 interposed between one end of said ring and a stop 72 attached to the outer side of the plate-holder by bolts 72^a. This ring is provided with diametrically opposite slots, and mounted on the ring adjacent said slots are levers 3, which are pivoted on pins 5 journaled in lugs on said ring at opposite sides of the slots therein, as shown in Figs. 5 and 6. The pivoted ends of the levers are provided with segments 4 which are adapted to engage with rack-teeth 4^a on the outer side of the holder T. Attached to this ring 1 are radially projecting pins 6 which extend through radial slots t^2 in the holder and normally lie within notches 7^a in the side of a stop bar 7 arranged longitudinally of and within the holder T as shown in the drawings. The bar 7 is slightly narrower than the lengthwise slot p in the tubular plate P. When the holder in stopped spring 73 shifts the ring 1 circumferentially on the holder T, so that levers 3 are folded against the plate holder (Figs. 5 and 6), and the pins 6 lie within the notches 7^a and will not interfere with the free sliding movements of a plate within and longitudinally of the holder; and bar 7 being slightly narrower than the slot p in the plate permits such plate to be slid endwise into or out of the holder.

After a plate has been inserted in the holder (Figs. 6 and 7), and the machine is started and the holder rotated in the direction indicated by the feathered arrows, the weighted free ends of levers 3 are thrown outward by centrifugal force and the segments 4 engaging racks 4^a cause the ring 1 to turn on the holder, and in so doing to move the pins 6 forwardly out of the notches 7^a, and such pins engaging one edge of the slot p in the plate tend to turn the plate in the holder and expand and clamp the plate tightly in the holder because the other side of the slot in the plate is arrested by the stop bar 7. The plate is thus automatically expanded within the holder T and against the inner surface thereof when the holder is rotated in the proper direction and the plate is thus securely locked in said holder while being trimmed. When the holder T is stopped the levers 3 are returned to normal position by the action of the spring 73 which shifts the ring 1 back to normal position, see Fig. 6, causing pins 6 to disengage the edge of the plate which may then be easily removed endwise from the holder.

When the trimmer has completed a cycle of operations, the roller R will enter the gap 31^b in the cam flange 31^a on the disk 31, see Fig. 8;—(the roller being caused to enter said gap by the action of the spring 64 which forces lever 39, Figs. 8 and 9 to the right)—thus moving shaft 58 to the right and disengaging the clutch 33 and simultaneously engaging the clutch 44. Such parts remain in this condition until the ratchet disk 32 engages the pawl 47, and the backward rotation of the shaft 59 and of the plate-holder is arrested. The parts can remain in this position while the shaft 58 continues to be revolved by the driving means through the friction clutch controlled gearing until the holder is stopped with the bar 7 in position to aline with the slot in the cast plate on the core when the latter is lowered.

When it is desired to start the plate-holder in operation the operator grasps lever 56 and shifts lever 39 to the left against the action of spring 64 disengaging the clutch 44 and engaging clutch 33 and immediately the roller R enters within the cam flange 31^a and the parts are held in the position indicated in Fig. 9 until the disk 31 has turned almost one complete revolution or sufficiently to permit the roller R to again enter the gap 31^b. While a plate is being trimmed the roller R engages the inner side of the cam flange 31^a and holds the cone clutch in engagement and the friction clutch disengaged. When the clutch 33 is being engaged the collar 38 moves but a short distance to the left while the collars 29 and 36 move a much greater distance. The pressure necessary to keep the cone clutch 33 in engagement is transmitted through the spring 74. The spring 74 and movable collar 36 are provided to compensate for any wear of clutch 33 and make extreme accuracy of the parts unnecessary. Considerable inaccuracy may exist, for instance, in the inner cam surface of the disk 31, but the spring 74

will nevertheless hold the clutch in contact with practically uniform pressure.

When the ratchet 32 is in the position shown in Fig. 2 the plate-holder is stopped in such position that the bar 7 will be in direct line with the rib c' on the core c, which rib forms the slot p in the cast plate. Therefore when the core c is lowered to the position shown in dotted lines in Fig. 1 the slot in the plate will be directly in line with bar 7 and the plate can be slid endwise directly off the core into the plate-holder, the slot in the plate accommodating the bar 7.

As shown, when the core is lowered the cast plate comes, slot uppermost, directly in line with the bar 7 in the cylinder, and it is only necessary to move the plate horizontally off the core into the plate-holder. The trimmer is always stopped automatically with the bar 7 in the plate-holder in line with the slot in the plate on the core.

Adjacent each end of the plate-holder are plate trimming or cutting tools 68 and 69 which are respectively attached to the slides 16 and 12, which slides are free to move in inclined guides 13 and 11 bolted to the parts 2 of the frame. The lower ends of the slides 16 and 12 are respectively provided with studs 49, 49^a on which are cam rollers 80 and 80^a respectively bearing against cams 24 and 25 on a shaft 60. The rollers are preferably held in engagement with their cams and the slides retracted by suitably arranged springs 24^a and 25^a.

The shaft 60 is revolved in the direction of the arrows F (Figs. 2 and 4) while a plate is being trimmed. On the shaft 60 (Fig. 6) is a miter gear 57 which meshes with another miter gear 57^a secured to the lower end of the worm gear shaft 62. By means of this gearing when and while the disk 31 makes one revolution the cams 24 and 25 also make one revolution; shaft 62 revolving much more slowly than the shaft 59, disk 32 and the plate-holder T. The trimming tools are slowly advanced to their work by means of the long spiral development of the cam surfaces of the cams 24 and 25, but recede rapidly as the rollers 80, 80^a move down the abrupt inclines of said cams.

Operation.

The core c is in vertical position when the plate is being cast, but is lowered to horizontal position, as shown in dotted lines Fig. 1 after the plate is cast. The trimmer parts are then in the positions indicated in Fig. 2. The drive belt and pulley 34 are shown as revolving in the direction of the arrow G. The one-toothed ratchet 32 and holder T have a tendency to revolve in the direction of the arrow D but are prevented from so doing by the pawl 47 engaged with the ratchet after the bar 7 is in position to aline with the slot in the cast plate on the core. The holder is therefore normally held in a position in which bar 7 is in exact alinement with the slot cast lengthwise in the plate P as it lies on the horizontal core c. At this time, when the plate-holder is stopped, the shaft 58 would be in such position that clutch 33 is disengaged, and the friction clutch engaged, (Fig. 8) but slipping.

After a plate has been cast and sufficiently cooled, the casting box is opened and the core tipped to a horizontal position (Fig. 1) and the tubular plate is then slid sprue first, from the core into the plate-holder T, the sprue projecting out of the outer end of the cylinder, as indicated in Fig. 5.

The operator then moves the starting lever 56 so as to disengage clutch 44 and engage clutch 33 and holds the lever until roller R enters the cam ring 31^a and takes control of and holds the parts in this condition until shaft 62 has completed one revolution. The gearing causes the holder T to revolve rapidly, and as it revolves the free ends of the weighted lever 3 are moved outward by centrifugal force (Fig. 7) and the plate is securely locked in place in the holder as described while it is being trimmed.

The cams 24 and 25 are meanwhile revolved and first move the trimming tools 68, 69 slowly up to their work, and after it is performed they allow the tools to rapidly recede to their original positions (Figs. 2, 4).

The disk 31 is also revolved slowly in the direction of the arrows H (Figs. 8—9) as long as roller R is engaged with the cam ring 31^a and the cone clutch 33 is thereby held in engagement (Fig. 9) relieving the operator from further attention to the machine until the plate is trimmed and ready for removal.

While one plate is being thus trimmed the core c may be returned to position in the box and a new plate cast.

When the plate has been trimmed and the tools 68, 69 have returned to their normal positions, determined by the low parts of the cams 24 and 25, the cam roller R again enters the gap 31^b in the ring 31^a, and the spring 64 causes lever 39 to shift shaft 58 endwise and disengage clutch 33 and engage the friction clutch 44. The momentum of the heavy loaded revolving plate-holder T may cause it to make several forward revolutions after the friction clutch is engaged before the holder comes to a full stop, but ultimately the friction clutch being engaged causes the related gearing to turn the plate-holder backward until it is stopped by ratchet 32 engaging pawl 47. The trimmed plate can then be removed from the holder, and a new plate inserted therein and the foregoing operations repeated.

What I claim is:

1. Stereotype plate trimming mechanism comprising a rotatable plate-holder adapt-

ed to receive a stereotype plate, means controlled by centrifugal force for automatically locking the plate in the holder when the latter rotates in the proper direction, and means for trimming the plate while so locked and rotated.

2. Plate trimming mechanism comprising a rotatable plate-holder adapted to receive a plate, means controlled by centrifugal force for automatically locking the plate in the holder when the latter rotates in the proper direction, means for trimming the plate while so locked and rotated, and means for automatically returning the holder to initial position after the plate has been trimmed.

3. Stereotype plate trimming mechanism comprising a rotary plate-holder adapted to receive a tubular stereotype plate, means for automatically expanding and locking the tubular plate in the holder when the latter rotates in the proper direction, and means for trimming the plate while so locked and rotated.

4. Plate trimming mechanism comprising a rotary plate-holder adapted to receive a tubular stereotype plate, means for automatically expanding and locking the plate in the holder when the latter rotates in the proper direction, means for trimming the plate while so locked and rotated, and means for automatically stopping the holder after the plate has been trimmed.

5. Mechanism for trimming stereotype plates comprising a rotary plate-holder adapted to receive a tubular stereotype plate, means controlled by centrifugal force for automatically expanding and locking the plate within the holder when the latter rotates in the proper direction, means for rotating said holder during the trimming operation, and means for trimming the plate while so locked and rotated.

6. Plate trimming mechanism comprising a rotary plate-holder adapted to receive a tubular stereotype plate, means controlled by centrifugal force for automatically expanding and locking the plate in the holder when the latter rotates in the proper direction, means for trimming the plate while so locked and rotated, and means for automatically returning the holder to initial position after the plate has been trimmed.

7. Plate trimming mechanism comprising a rotary plate-holder, means adapted to trim the plate while in the holder, means for clamping the plate in the holder when the latter is rotated in one direction, means for rotating the plate-holder in said direction, means for retracting the trimming means after the trimming operation, and means for thereafter reversing the rotation of the holder and returning it to initial position.

8. Plate trimming mechanism comprising a rotatable holder adapted to hold a stereotype plate and means for trimming a plate when in said holder; with a driving member, two sets of gearing between said driving member and said plate-holder whereby the latter can be driven in either direction, means for throwing either set of gearing into operative relation with the driving member, and means whereby when one set is engaged the other is automatically disengaged.

9. Plate trimming mechanism comprising a rotary holder adapted to receive a tubular plate, cutters adapted to trim the plate while in the holder, means for automatically expanding and clamping the plate in the holder when the latter is rotated in one direction, means for rotating the plate-holder in said direction, means for retracting the cutters after they have trimmed the plate, means for thereafter stopping the rotation of the holder, and means for reversely rotating the holder until it reaches initial position.

10. In a plate trimming mechanism, a rotatable plate-holder, a driving member, two sets of gearing between said driving member and said holder whereby the latter can be driven in opposite directions, clutches for throwing either set of gearing into operative relation with the driving member, means whereby when one clutch is engaged the other is automatically disengaged, manually operated means for engaging one clutch to start the trimming operation, and means for automatically engaging the other clutch upon the completion of the trimming operation.

11. In a trimming mechanism a rotatable plate-holder, a driving member, two sets of gearing between said driving member and said holder whereby the latter can be driven in opposite directions, clutches for throwing either set of gears into operative relation with the driving member, means whereby when one clutch is engaged the other is automatically disengaged, manually operated means for engaging the clutch to start the trimming operation, tools adapted to trim the plate while held by the holder, means for operating said tools when the holder rotates in one direction to cause them to trim a plate, and means for automatically disengaging the last mentioned clutch and engaging the other clutch upon the completion of the trimming operation so as to stop the forward rotation of the holder and return it to initial position.

12. Plate trimming mechanism comprising a rotary plate-holder adapted to contain a stereotype plate, and means for trimming a plate while in the holder; with a driving member, a longitudinal movable shaft, a clutch for engaging said shaft with said driving member, gearing between said shaft and the plate holder for rotating the lat-

ter, a gear loosely mounted on said shaft, a second clutch for engaging said gear with the shaft, and gearing for driving said loose gear from the driving member; with means for shifting said shaft longitudinally to alternately engage and disengage said clutches, whereby the holder may be rotated in either direction from the continuously rotating driving member.

13. Plate trimming mechanism comprising a rotatable plate-holder adapted to hold a stereotype plate, a driving member, a longitudinally movable shaft, gearing between said shaft and the holder, a clutch for connecting said shaft with the driving member, a loose gear on said shaft, gearing between the driving member and the loose gear, and a clutch for locking said loose gear to said shaft; said shaft being longitudinally movable to simultaneously engage one clutch and disengage the other and means for trimming a plate while in the holder; with manually operable means for shifting the shaft in one direction, pressure means for throwing the shaft in the opposite direction; and means whereby when the proper clutch is engaged to drive the holder during the trimming operation such clutch is held in engagement until the completion of the trimming operation.

14. Plate trimming mechanism comprising a rotary plate-holder, means for clamping a plate in said holder, tools adapted to trim the edge of the plate while being rotated with the holder, a driving member, a longitudinally movable shaft, a clutch for engaging said shaft with said driving member, gearing between said shaft and the holder for rotating the latter, a gear loosely mounted on said shaft, a second clutch for engaging said gear with the shaft, and gearing for driving said loose gear from the driving member; with means for shifting said shaft longitudinally to alternately engage and disengage said clutches whereby the holder may be rotated in either direction from the continually rotating driving member.

15. Plate trimming mechanism comprising a rotatable plate-holder, a driving member, a longitudinally movable shaft, gearing between said shaft and the plate-holder, a clutch for connecting said shaft with the driving member, a loose gear on said shaft, gearing between the driving member and the loose gear, and a clutch for locking said loose gear to said shaft, said shaft being longitudinally movable to simultaneously engage one clutch and disengage the other; with manually operable means for shifting the shaft in one direction, spring actuated means for throwing the shaft in the opposite direction, tools for trimming the plate, cams and gearing for operating said tools, and cam controlled means whereby when the clutch is engaged to drive the holder during the trimming operation the clutch is held in engagement until the completion of the trimming operation.

16. Plate trimming mechanism comprising a rotatable holder, a shaft, gearing between said shaft and the plate-holder, a driving pulley, a clutch on said shaft for locking the same to the driving pulley, a loose gear on the shaft, a clutch on said shaft for locking the loose gear thereto, gearing between the driving pulley and the said loose gear, a lever and connections for engaging either clutch and simultaneously disengaging the other, and means adapted to engage and hold said lever in one position during the trimming of a plate and to release said lever at the end of the trimming operation.

17. Plate trimming mechanism comprising a rotatable holder, a shaft, gearing between said shaft, and the plate-holder, a driving pulley, a clutch on said shaft for locking the same to the driving pulley, a loose gear on the shaft, a clutch on said shaft for locking the loose gear thereto, gearing between the driving pulley and the said loose gear, a lever and connections for engaging either clutch and simultaneously disengaging the other, a rotatable ring cam adapted to engage and hold said lever in one position during the trimming of a plate and to release said lever at the end of the trimming operation, and manually operable means for throwing said lever into position to start the trimming operation.

18. Plate trimming mechanism comprising a rotatable holder, a shaft, gearing between said shaft, and the plate-holder, a driving pulley, a clutch on said shaft for locking the same to the driving pulley, a loose gear on the shaft, a clutch on said shaft for locking the loose gear thereto, gearing between the driving pulley and the said loose gear, a lever for shifting said shaft to engage either clutch and simultaneously disengage the other, a cam adapted to engage and hold said lever in one position during the trimming of a plate and to release said lever at the end of the trimming operation, and means for throwing said lever and shaft into position to start the trimming operation; with tools adjacent the holder adapted to trim a plate therein, and means for advancing and retracting the trimming tools during the rotation of the holder, substantially as described.

19. In a trimming mechanism a rotatable plate-holder, a driving member, two sets of gearing between said driving member and said holder whereby the latter can be driven in opposite directions, clutches for throwing either set of gears into operative relation with the driving member, means whereby when one clutch is engaged the other is au-

tomatically disengaged, manually operated means for engaging one clutch to start the trimming operation, tools adapted to trim the plate while held by the holder, means for operating said tools when the holder rotates in one direction to cause them to trim a plate, and means for automatically engaging the other clutch after the completion of the trimming operation so as to stop the forward rotation of the holder and return it to initial position; with means whereby the holder is arrested in initial or plate receiving position when it is being turned in the reverse direction after the plate has been trimmed.

20. Plate trimming mechanism comprising a rotary plate-holder, a driving member, two sets of gearing between said driving member and said holder, a clutch for throwing one set of gearing into operation and driving the holder while the plate is being trimmed, a frictional clutch for putting the other set of gearing into operation to drive the holder in a reverse direction after the plate has been trimmed, means for simultaneously operating said clutches so that one will be disengaged when the other is engaged, and means for positively stopping the backward rotation of the holder when it reaches initial position without disengaging the friction clutch.

21. Plate trimming mechanism comprising a rotary plate-holder, a driving member, two sets of gearing between said driving member and said holder, a clutch for throwing one set of gearing into operation and driving the holder while the plate is being trimmed, a frictional clutch for putting the other set of gearing into operation to drive the holder in a reverse direction after the plate has been trimmed, means for simultaneously operating said clutches so that one will be disengaged when the other is engaged, tools adapted to trim the plate while in the holder, cams for operating said tools, and gearing operated from the driving member for actuating said cams; with means for positively stopping the backward rotation of the holder when it reaches initial position without disengaging the friction clutch.

22. Plate trimming mechanism comprising a rotary holder adapted to receive a tubular plate, means adapted to trim a plate while in the holder, means for automatically expanding and clamping the plate in the holder when the latter is rotated in one direction, clutch controlled means for rotating the plate holder in the proper direction, and clutch controlled means for rotating the holder in the opposite direction upon completion of the trimming operation, and means for positively arresting the backward rotation of the holder when it has reached its initial position.

23. Plate trimming mechanism comprising a rotary holder adapted to receive a tubular plate, means adapted to trim a plate while in the holder, means for automatically expanding and clamping the plate in the holder when the latter is rotated in one direction, clutch controlled means for rotating the plate-holder in one direction, and frictional clutch controlled means for rotating the holder in the opposite direction upon completion of the trimming operation, and means for positively arresting the backward rotation of the holder when it has reached its initial position while the frictional clutch remains in engagement.

24. In combination, a rotatable plate-holder adapted to receive a plate, means in the holder adapted to engage one edge of the plate, and means attached to said holder adapted to engage the other edge of the plate and clamp the latter in the holder when said means are separated by centrifugal force as the holder is rotated in the proper direction.

25. In combination, a rotatable plate-holder adapated to receive a plate, means in the holder adapted to engage one edge of the plate, means attached to said holder adapted to engage the other edge of the plate and clamp the latter in the holder when said means are separated by centrifugal force as the holder is rotated in the proper direction, and a spring for returning the clamping means to initial position to release the plate when the holder stops.

26. In combination, a rotatable plate-holder adapted to receive a plate, a stop in the holder adapted to engage one edge of the plate, devices projecting into the holder and adapted to engage the other edge of the plate, a slidable member attached to the holder and connected with said devices, and means connected with said member and adapted to move the latter by centrifugal force to cause said devices to separate and clamp the plate in the holder between said edge-engaging members when the holder is rotated in the proper direction.

27. In combination, a rotatable plate-holder adapted to receive a plate and having an internal stop to engage one edge thereof, a member rotatably mounted on the holder, devices attached to said member and projecting into the holder adapted to engage the other edge of the plate, and levers pivotally connected with said member and adapted to shift the same in one direction by centrifugal force to clamp the plate in the holder when the holder rotates in one direction.

28. In combination, a rotatable plate-holder adapted to receive a plate, a stop in the holder adapted to engage one edge of the plate, devices projecting into the holder and adapted to engage the other edge of the plate, a slidable member attached to the

holder and connected with said devices, a weighted lever attached to said holder and connected with said member and adapted to move the latter by centrifugal force to cause said devices to engage the plate and clamp the latter in the holder when the holder is rotated in the proper direction; and means for returning the slidable member to initial position to release the plate when the holder stops.

29. In combination, a rotatable plate-holder adapted to receive a tubular slotted plate and having an internal stop to engage one edge of the slot in the plate, a ring rotatably mounted on the holder, pins attached to said ring and projecting into the holder adapted to engage the other edge of the slot in the plate, levers pivotally connected with said ring and adapted to shift the same by centrifugal force when the holder rotates in one direction, and means for returning the ring to normal position to release the plate when the holder stops.

30. In a plate trimming mechanism, a rotatable plate-holder adapted to contain a plate, a stop bar within the holder adapted to engage one edge of the plate, a member rotatably mounted upon the exterior of the holder, devices attached to said member and projecting into the holder and adapted to engage the opposite edge of the slot in the plate, and a weighted lever pivotally mounted on said ring and having a toothed segment adapted to engage opposing teeth on the holder, whereby when the holder is rotated in one direction said lever under the action of centrifugal force causes rotatorial displacement of the member relative to the holder.

31. In a plate trimming mechanism, a rotatable plate-holder adapted to contain a tubular plate, a stop within the holder adapted to engage one edge of the plate, a ring rotatably mounted upon the exterior of the holder, studs attached to said ring and projecting into the holder and adapted to engage the opposite edge of the plate, segmental levers pivotally mounted on said ring and having toothed segments adapted to engage opposed teeth on the holder, whereby when the holder is rotated in one direction said levers under the action of centrifugal force cause relative rotatorial displacement of the ring relative to the holder, and means for returning the ring and levers to normal position when the holder is stopped.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

HENRY F. BECHMAN.

Witnesses:
CHARLES A. GRAMES,
IRVING K. STONE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."