

L. BAUROTH.  
MACHINERY FOR FORMING BARRELS.

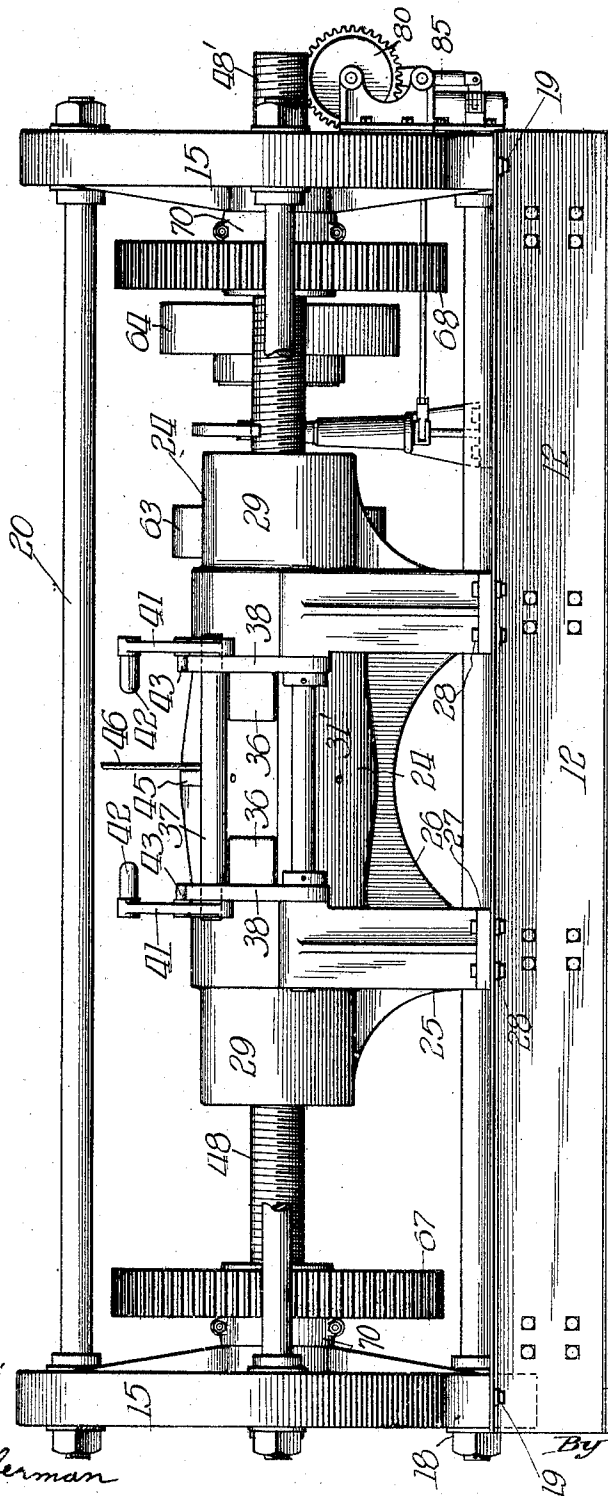
APPLICATION FILED SEPT. 16, 1910. RENEWED JAN. 6, 1912.

1,039,887.

Patented Oct. 1, 1912.

5 SHEETS—SHEET 1.

Fig. 1.



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His Atty.

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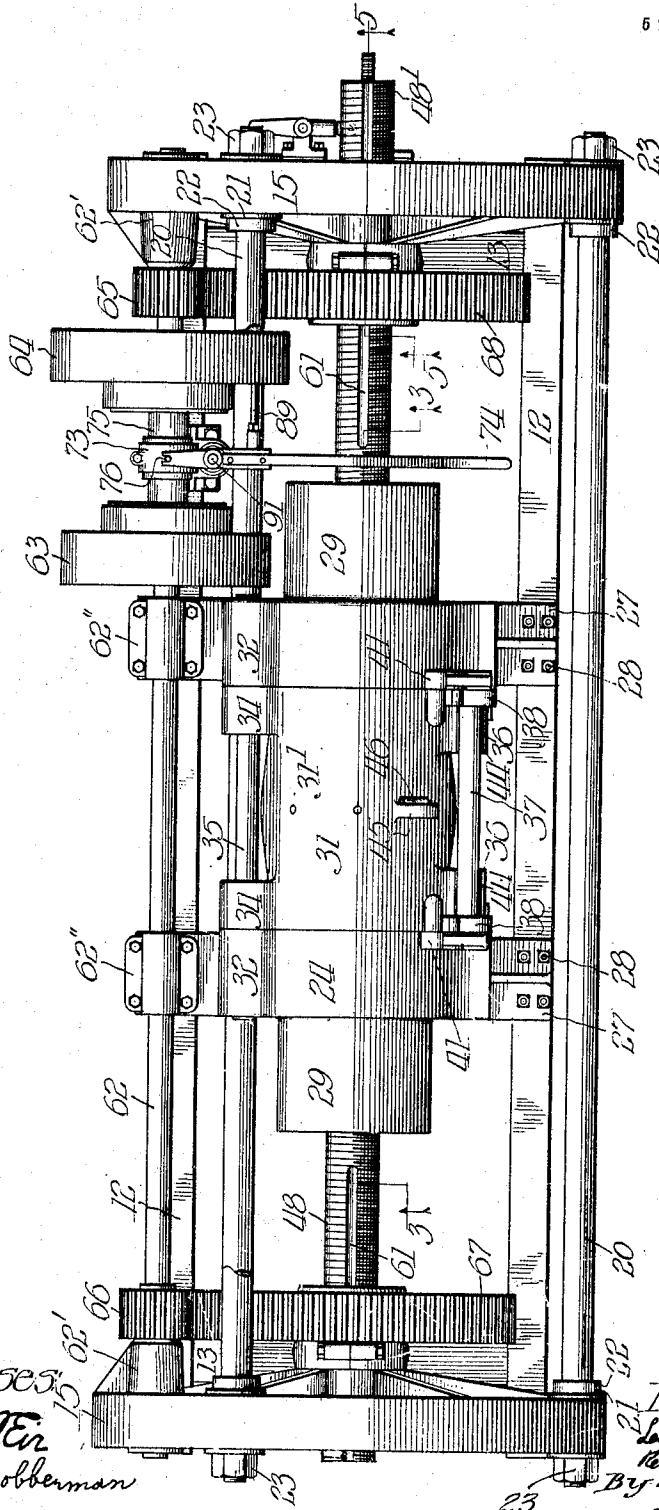
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5 SHEETS—SHEET 2.

*Fig. 2.*



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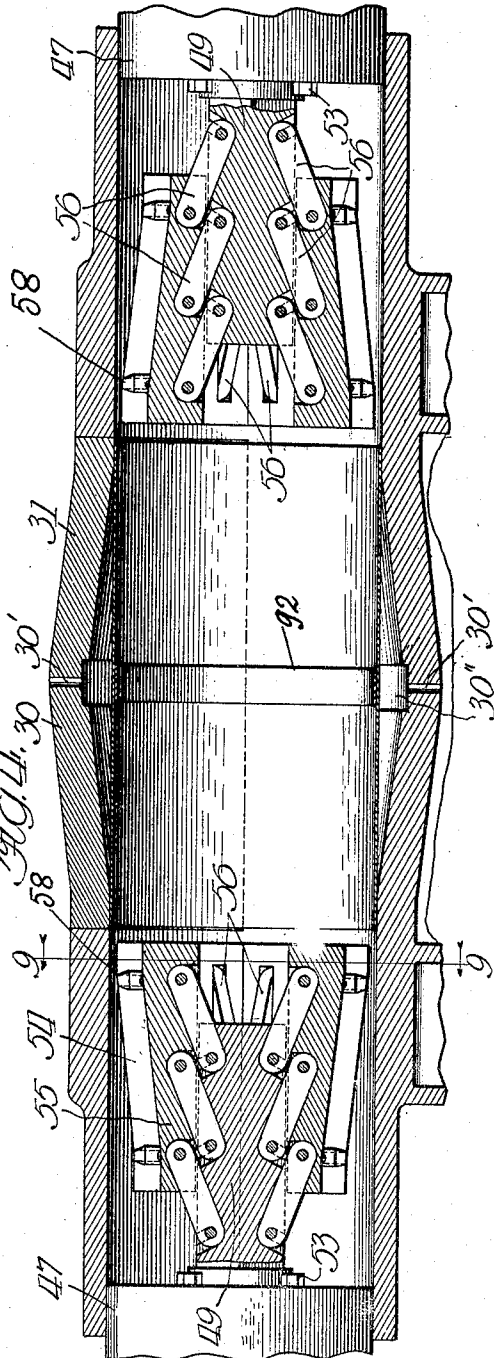
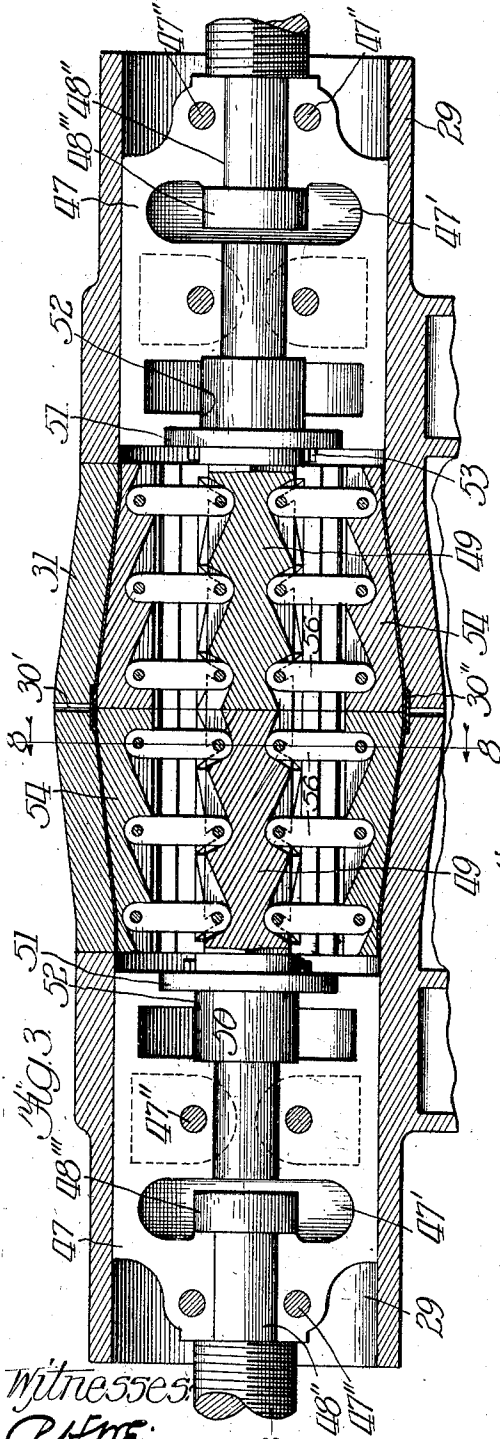
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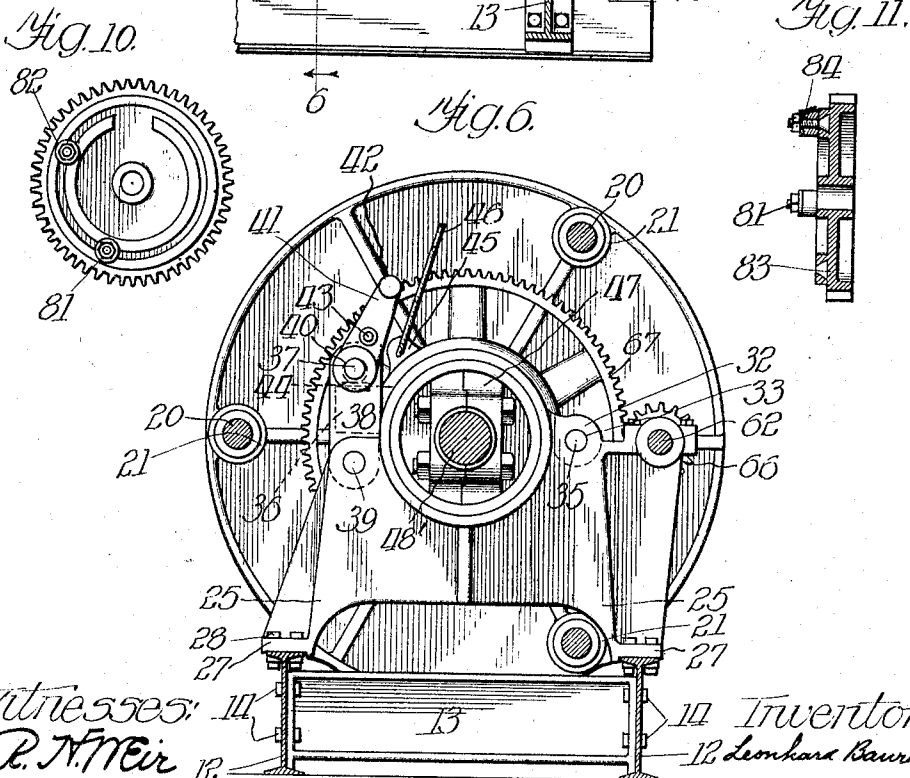
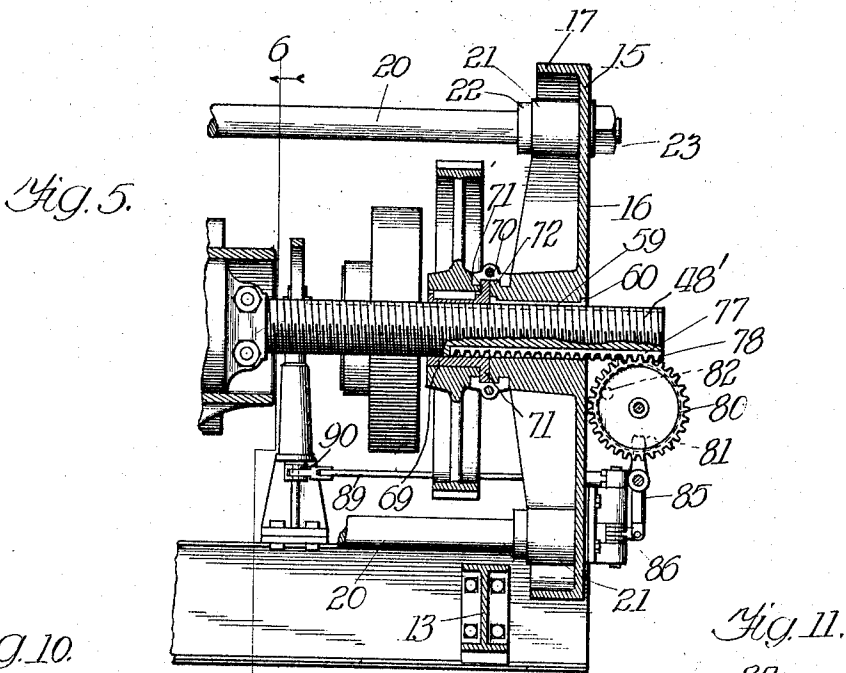
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5 SHEETS—SHEET 4.



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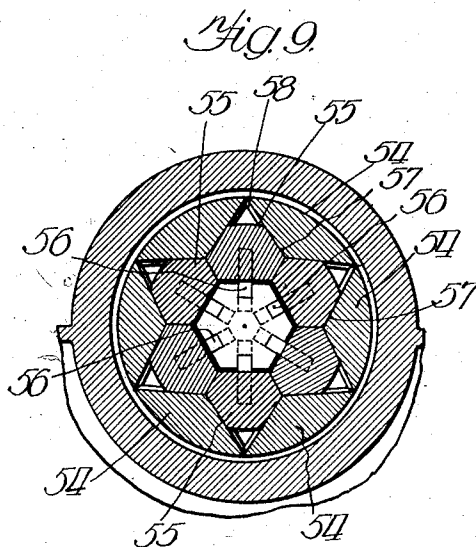
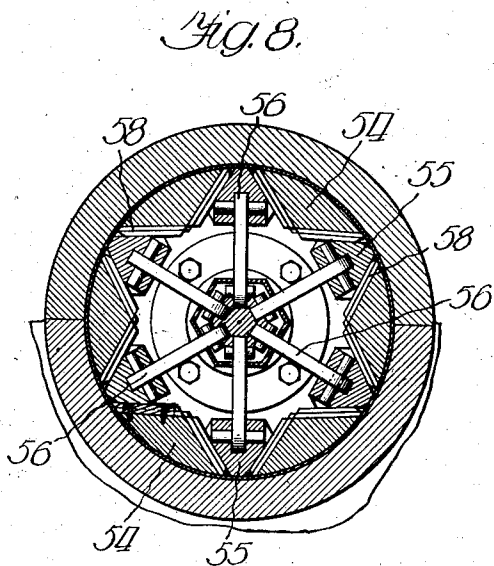
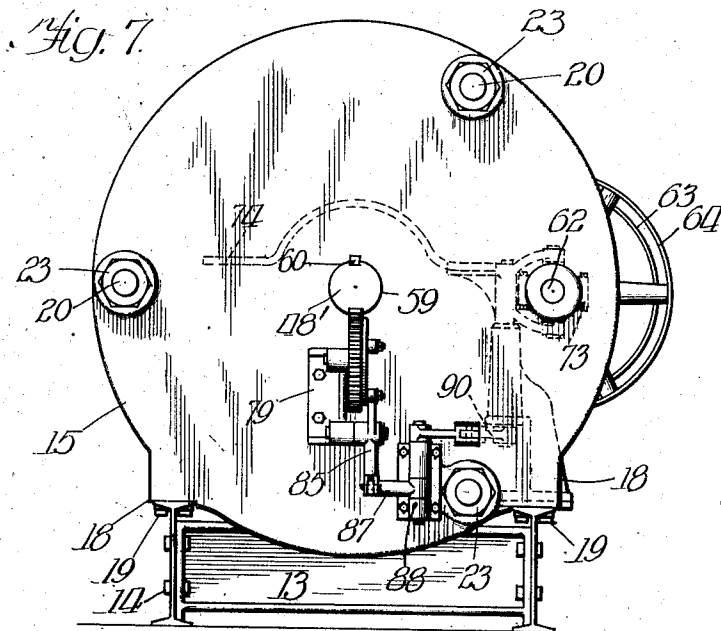
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5 SHEETS—SHEET 5.



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# UNITED STATES PATENT OFFICE.

LEONHARD BAUROT, OF TOLEDO, OHIO, ASSIGNOR TO CHARLES H. WACKER, OF CHICAGO, ILLINOIS.

## MACHINERY FOR FORMING BARRELS.

1,039,887.

Specification of Letters Patent.

Patented Oct. 1, 1912.

Application filed September 16, 1910, Serial No. 582,331. Renewed January 6, 1912. Serial No. 669,884.

### *To all whom it may concern:*

Be it known that I, LEONHARD BAUROT, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Machinery for Forming Barrels, of which the following is a specification.

My invention relates to the art of making metallic barrels of that class in which the annular portion including the bilge is formed from a cylindrical tubular blank to which the heads or ends are subsequently attached and it consists in a machine for treating such tubular blanks to expand them to barrel form.

In the accompanying drawings forming a part of this application a preferred embodiment of my invention is shown but it will be apparent from the detailed description that modifications may be made in a number of respects without departing from the scope thereof.

Of the various views included in the illustration Figure 1 is a side elevation of my complete machine; Fig. 2 is a plan view; Fig. 3 is a central section through a part of the machine on the line 3—3 of Fig. 2, showing certain parts in elevation; Fig. 4 is a similar view of the parts in a different position; Fig. 5 is a central vertical section of the right hand end of the machine on the line 5—5 of Fig. 2 showing certain parts in elevation; Fig. 6 is a vertical section on the line 6—6 of Fig. 5; Fig. 7 is a view in end elevation; Figs. 8 and 9 are vertical sectional views on the lines 8—8 and 9—9 of Figs. 3 and 4 respectively, and Figs. 10 and 11 are details.

Referring more particularly to Figs. 1 and 2 the base of the machine is seen to consist of longitudinal extending I-beams 12, 12 which are connected by a series of cross beams 13 flanged at their ends and connected to the longitudinal beams by bolts 14. At each end of the base is mounted a standard 15 consisting of a cast iron web 16 surrounded by a strengthening flange 17. The standards are circular in form but provided with rectangular offsets 18 forming feet which rest upon and are secured to the base plate in any suitable manner as by bolts 19, see Fig. 7. Between the end standards extend cross braces or rods 20 which are received in perforated bosses 21 formed

on the webs 16 of the end standards and provided with collars 22 and nuts 23 between which the bosses 21 are clamped. I have found the frame thus far described a desirable one for the purpose but obviously other constructions might be adopted so long as they provided the requisite strength and rigidity. The hollow die in which the cylindrical sections are expanded consists of a casting 24 provided with feet or standards 25 and strengthening webs 26, the feet being flanged as at 27 to rest upon the upper surface of the longitudinal beams 12 to which they are bolted at 28. The die casting has a longitudinal bore which is cylindrical at each end 29, see Figs. 3 and 4, and barrel shaped in the intermediate section as at 30. The intermediate section is provided with a suitable number of air holes 31' to permit the escape of air trapped between the cylindrical blank and the bulge of the die and the latter is further provided at about its center with a shallow groove 30'' when it is desired to introduce a strengthening rib within the barrel. The intermediate section however, is divided longitudinally along a horizontal plane into halves the lower of which is integral with the end sections and the upper 31 hinged thereto as at 32, see Figs. 2 and 6, for the purpose of permitting the ready insertion of the cylindrical blanks and the removal of the same after they have been expanded. The standards of the main casting are provided with perforations 33 and the pivoted upper section with perforated ears 34, the perforations in two parts registering for the reception of a hinge bolt 35 about which the hinged member turns.

On the edge of the upper member 31 opposite the hinges are horizontally extending lugs 36 which are engaged when the die is closed by an eccentric bolt or shaft 37 carried by links 38 pivoted to the main casting at 39, see Figs. 2 and 6. The eccentric bearings of the bolt are shown at 40, Fig. 6, and the bolt is further provided with arms 41 having handles 42 for rotating the same, and inwardly projecting pins 43 which limit the movement of the arms by engagement with the edges of the corresponding links. In the upper faces of the lugs 36 are steel inserts 44 which serve as wear plates and receive the pressure of the eccentric shaft or bolt. It will be understood that the hinged section of the die may be released

by turning the eccentric shaft and swinging the links and shaft away from the lugs 36. I also provide a lug 45 upon the hinged section of the die which is perforated for the reception of a cable 46 or other means for conveniently raising the latter.

The means for expanding the cylindrical blanks consists of two similar expansible heads which are movable toward and from each other within the hollow die and are carried by slides 47, 47 reciprocating within the cylindrical ends 29, 29 of the die casting. Each of the slides 47 is connected to a screw 48, 48' by which it is reciprocated and which in turn is fed by mechanism to be described later on. The inner end of each screw is connected to its slide by a reduced neck 48'' and a head 48''' the former fitting within a central bore in the slide and the latter received within an enlarged cavity 47' within the slide. For the purpose of assembling each slide is formed in halves separated from each other along a diametrical plane and secured together by bolts 47''. Each expanding head consists of a central portion or support 49 and a number of laterally movable sections and the support 49 is provided with a stem 50 and a flange 51, the former extending within a bore 52 in the sliding head and the latter bolted thereto as at 53. With this construction the expanding head is firmly secured to the corresponding slide and yet it is readily removable therefrom. Each expanding head consists of a central support, a plurality of outer die members 54 which engage the blank and a plurality of intermediate die members 55 which directly support the outer die members. The central support is a prism in the present instance hexagonal in cross section, and to each of its faces is linked an intermediate member 55 by parallel motion links 56 shown as three in number. The support and intermediate members are suitably recessed to accommodate the links when the intermediate members are in contact with the support, and said members are substantially hexagonal prisms so shaped that when the expanding head is contracted they form a practically continuous body around the central support, but their adjacent outer faces lie in planes which together form reëntrant angles as at 57 and within these angles rest and slide the outer die members 54, the members of the two sets being connected together by a tongue and groove connection 58 which may be of any ordinary or desired form, the tongues and grooves however extending transversely of the faces of the members. As clearly shown in Fig. 4, when the expanding heads are contracted the members of the two movable series project beyond the end of the central members. When, however, the expanding heads are thrust inward

the ends of the laterally movable members meet and as the supports continue to approach, the sets of intermediate members of the two heads mutually force each other outward on their link connection and the outer die members slide with relation to the intermediate members and separate to accommodate the outward movement of the latter. When the expansion has been completed the supporting members are in contact at their ends along the central plane of the die and both the die members 54 and the intermediate members 55 are in contact with the inner surface of the barrel blank, the intermediate members however engaging it only along a comparatively narrow strip. It will be noted that the expanding sections are tapered longitudinally to correspond to the interior contour of the die chamber.

The operating screws 48, 48' referred to above extend through guiding bores 59 formed in the end standards for this purpose and the key 60 sliding in a key-way 61 in each screw serves to prevent rotation thereof while permitting reciprocation. Motion is imparted to the screw from a power shaft 62 journaled in the end standard at 62', and in the die casting at 62'' and driven by oppositely rotating driving pulleys 63, 64. The power shaft carries at opposite ends pinions 65, 66, which engage gears 67, 68 driving the respective screw shafts 48, 48'. Each gear is provided with a bushing 69 preferably of bronze keyed thereto and threaded to engage the corresponding screw shaft. The bushing is secured against longitudinal movement by a divided collar 70 which is internally grooved and embraces a flange 71 on the bushing and a corresponding flange 72 formed integral with the adjacent standard 15. A suitable clutch 73, see Fig. 2, of any approved construction serves to connect either of the driving pulleys 63, 64 with the power shaft according to the direction in which it is to be driven and a hand lever 74 pivoted at 91 engages a pin 76 to shift the clutch in the one direction or the other but there is further provided automatic means for shifting the clutch when the expander heads reach their extreme positions. For this purpose one of the screws, that shown at the right of Fig. 2, is longitudinally grooved at 77, see Fig. 5, and a rack 78 is mounted in the groove. A bracket 79 attached to the outside of the end standard carries a small gear 80 which meshes with the rack 78. As shown in Figs. 10 and 11, this last-mentioned gear is provided with adjustable studs 81, 82 mounted in a dove-tailed circular groove 83 on the face of the gear wheel. The studs may be provided with rollers 84 though this is not essential. Upon the bracket 79 is also mounted a lever 85 which is connected at its lower end by a link 86 to a second lever 87 mounted upon a second bracket 88

secured to the end standard. The other end of the latter lever is connected by a link 89 extending through the end standard to an arm 90 secured to the lower end of the shaft 91 which carries the hand lever. It will be apparent that when one of the studs 81, 82 on the small gear wheel engages the lever 85 the latter through the intermediate connections which have just been described, will shift the clutch on the power shaft and by suitably adjusting the studs the points at which the clutch will be shifted can be made to correspond to the extreme inner and outer positions of the expanding heads.

The operation of the machine is obvious. To form a barrel the die is opened by turning the eccentric shaft 37, dropping down the links away from the lugs 36 and swinging back the upper die section 31. A cylindrical blank in which, if a strengthening rib is desired, a cylindrical band has been placed, as shown at 92, Fig. 4, is inserted and the die then closed. The power shaft having been set in motion the expander heads are fed inwardly but remain in their contracted condition until they come in contact. As soon, however, as the intermediate sections on the opposite expander heads are pressed against each other they are forced backward and outward by reason of the link connections, the outer die sections at the same time being borne outward by the intermediate sections with which they engage. The action is continued until the central supports abut each other at which time the links will have carried the die members to their extreme outer positions in which they press the blank into contact with the hollow die member. The direction of rotation of the power shaft being then reversed the expanding heads are withdrawn and as this occurs they are likewise collapsed by reason of the tapering section of the hollow die. After the expanders have been completely withdrawn from the barrel body within the cylindrical bores the hollow die is opened and the shaped barrel body removed. It will be obvious as stated above that numerous changes will suggest themselves as possible to the mechanics skilled in this and analogous arts which will yet be within the scope of my invention. The latter is defined however in the following claims.

What I claim is:

1. In a device of the class described a hollow stationary die member, and an expanding head comprising a central support, and die members each connected thereto by a pair of pivoted links and movable toward and away from the central support.

2. In a device of the class described, a hollow stationary die member, and an expanding head consisting of a central support, a series of die members each connected thereto by a pair of pivoted links and ex-

tending beyond the central support when in collapsed position and adapted to be swung outward by pressure upon their projecting ends.

3. In a device of the class described, a hollow stationary die member, an expanding head comprising a central support, a series of intermediate die members mounted upon and movable toward and away from the same and an outer series of die members surrounding and mounted upon the intermediate members and movable relatively thereto.

4. In a device of the class described, a hollow stationary die member and an expanding head consisting of a central support, a series of intermediate die members movable toward and away from the same, a series of outer die members wholly mounted upon the intermediate members and adapted to slide with relation thereto, the outer faces of both the outer and intermediate members shaped to conform to the interior of the hollow die member.

5. In a device of the class described, the combination of a hollow stationary die member and an expanding head consisting of a central support and a series of die members linked thereto and projecting beyond the central support in collapsed condition, a series of outer die members mounted upon the intermediate members and movable relatively thereto, the outer faces of both the outer and intermediate members of a shape to conform to the interior of the hollow die member.

6. In a device of the class described, the combination of a hollow die member and an expanding head consisting of a central support, a series of intermediate die members mounted upon the same and connected thereto so as to be movable toward and away from the central support, and an outer series of die members connected to the intermediate series by transverse tongue and groove connection.

7. In a device of the class described, a hollow die member, a pair of expanding heads movable toward and away from each other within the hollow die member, each head consisting of a central support, and a series of die members connected thereto and projecting beyond the central support when in collapsed condition, the expanding heads adapted to be expanded by contact with each other.

8. In a device of the class described, a hollow die having a barrel form in its mid section, and cylindrical end sections constituting guides, slides in the guides each carrying a sectional expander head which heads are adapted to expand when forced against each other, and means for reciprocating the slides.

9. In a device of the class described, a

hollow die, expanding heads movable toward and from the center of the die, screws for moving the heads attached thereto, gears having threads engaging the screws for reciprocating the same, a power shaft with pinions meshing with the gears, a clutch for reversely moving the power shaft, and means driven by one of the screw shafts for automatically reversing the clutch.

10. In a device of the class described, a hollow die, expanding heads movable toward and from the center of the die, screws for moving the heads attached thereto, gears having threads engaging the screws for reciprocating the same, a power shaft with pinions meshing with the gears, a clutch for reversely moving the power shaft, a rack carried by one of the screws, a gear meshing with the rack and having an adjustable pin operating a lever one arm of which extends into the path of the pin, and connections between the lever and clutch for reversing the latter.

11. In a device of the class described, the combination of a hollow die, and a pair of heads movable toward and away from each other, and having expanding die members which are of greater width at their outer ends in order to initially contact the blank midway of its length.

12. In a device of the class described, the combination of a hollow die, and a pair of heads movable toward and away from each other, and having expanding die members which are of greater width at their outer ends and are inclined from such ends inwardly toward their central longitudinal axis in order to initially contact the blank midway of its length and to apply pressure progressively toward the opposite ends of the blank.

13. In a device of the class described, the combination of a hollow die, expanding heads cooperating with the die, plungers connected with the heads for moving them toward and away from each other, and mechanism for operating the plungers in

unison, including means for automatically reversing the movement of the plungers after the operation of the heads.

14. In a device of the class described, the combination of a hollow die, expanding heads cooperating with the die, plungers connected with the heads for moving them toward and away from each other, and mechanism for operating the plungers in unison, including means driven by one of the plungers for automatically reversing the direction of their movement after the operation of the heads.

15. The combination of a casing having a die portion and a slideway, an expander head, a plunger on which such head is mounted and which includes a slide to which the head is secured and which is movable in the slideway, and a plunger rod secured to the slide.

16. The combination of a casing having a die portion and a slideway, an expander head, a plunger on which such head is mounted and which includes a slide to which the head is secured and which is movable in the slideway, and a plunger rod secured to the slide, said slide being made in detachable sections.

17. The combination of a hollow die, an expander head including a central support, a slide to which such support is secured, and a plunger rod connected with the slide.

18. The combination of a hollow die, an expander head including a central support having a stem 50 and flange 51, and a sectional slide receiving said stem and flange, and a plunger rod secured to the slide.

19. The combination of a hollow die, an expander head, a sectional slide to which the head is attached, and a plunger rod 48 having a stem 48'' and head 48''' received by said slide.

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