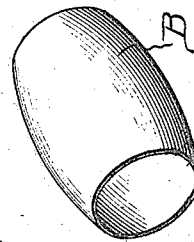
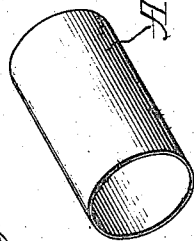


1,041,406.

4 SHEETS—SHEET 1.



8. D. 8.



7. 7. 7.

Witnesses:

Inventor:

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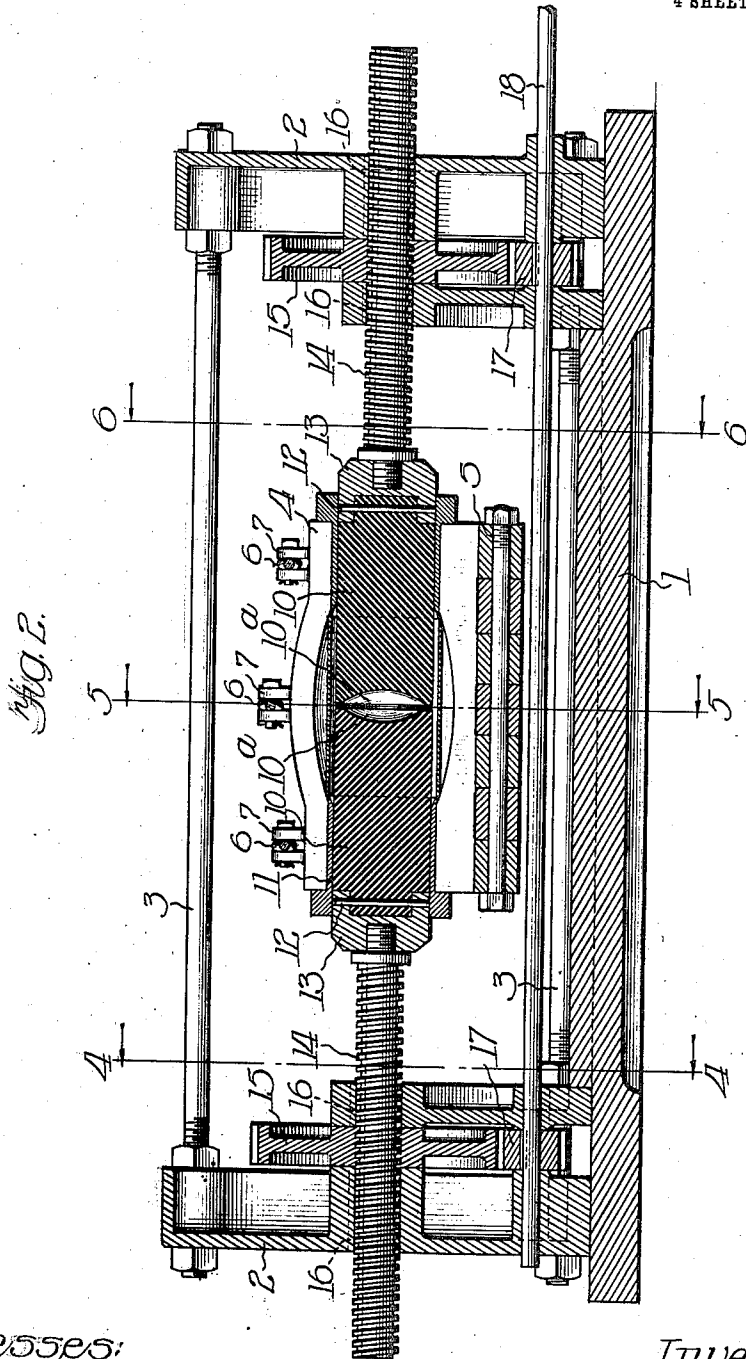
Kis Atten.

L. BAUROTH.
 APPARATUS FOR FORMING METALLIC BARREL BODIES.
 APPLICATION FILED MAR. 11, 1910.

1,041,406.

Patented Oct. 15, 1912.

4 SHEETS—SHEET 2.



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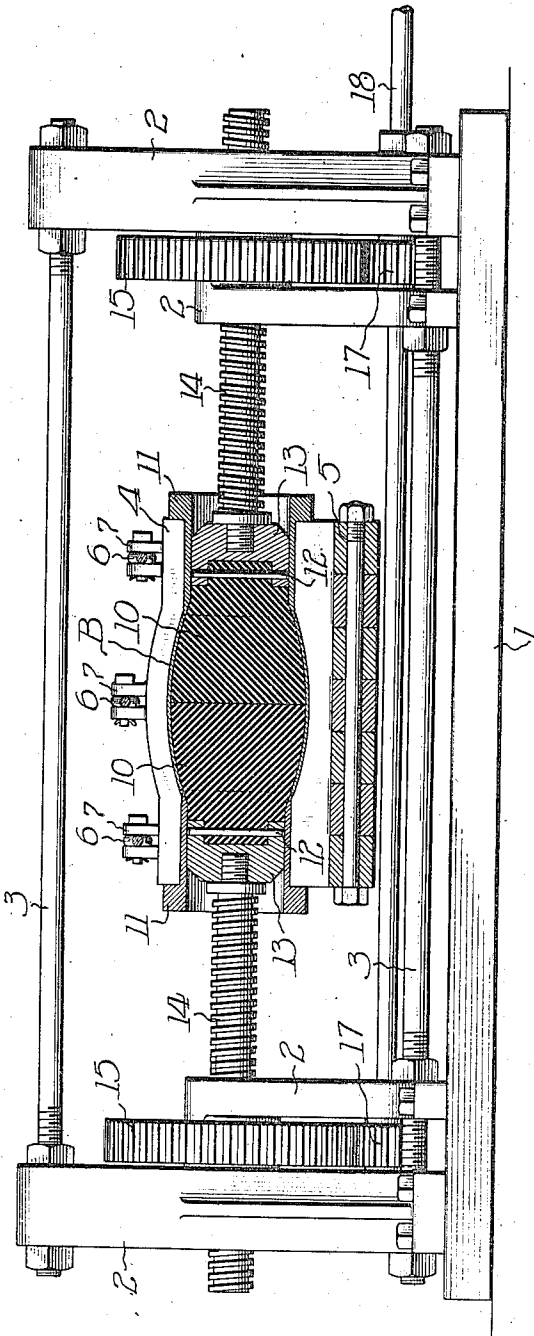
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4 SHEETS-SHEET 3.

Fig. 3.



Witnesses:
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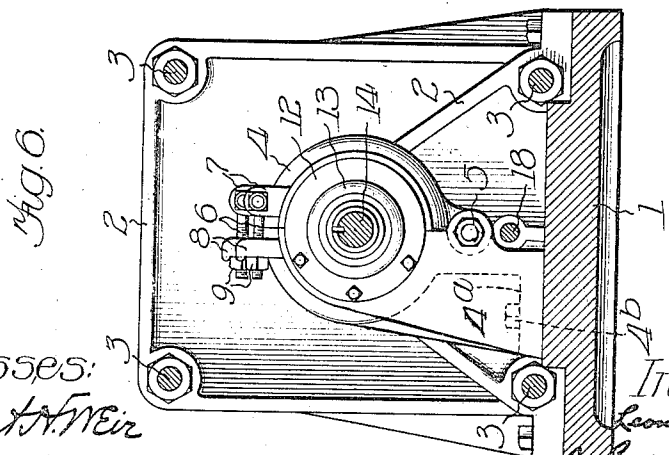
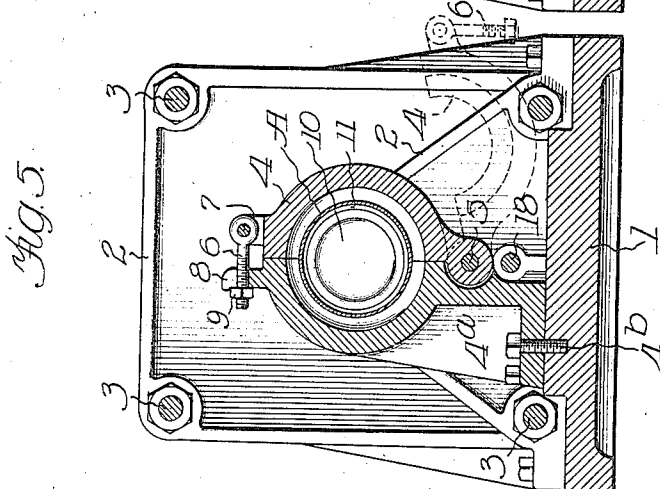
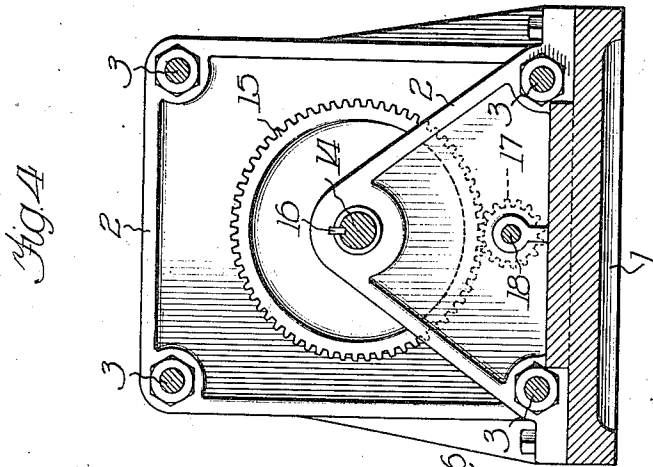
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4 SHEETS—SHEET 4.



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APPARATUS FOR FORMING METALLIC-BARREL BODIES.

1,041,406.

Specification of Letters Patent.

Patented Oct. 15, 1912.

Application filed March 11, 1910. Serial No. 548,624.

To all whom it may concern:

Be it known that I, LEONHARD BAUROTH, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Apparatus for Forming Metallic-Barrel Bodies, of which the following is a specification.

My invention relates to an apparatus for making the bodies of metallic barrels of bilge form by taking a cylinder of the proper diameter and length according to the size of barrel body desired and of suitable material, such as sheet metal, and after placing the same in a die whose inner surface corresponds to the shape or bilge of the barrel, applying pressure by means of an elastic substance such as blocks or cylinders of rubber pressed inwardly and caused to expand outwardly against the cylinder and to force it against the inner sides or faces of the die. The elastic substance or rubber is first caused to strike against the central portion of the cylinder and then to press outwardly from the center to the ends evenly, with the result that perfect, undistorted and uniform barrel bodies are formed.

The method of making barrels herein disclosed and practised by means of the apparatus described is not herein claimed but will form the subject matter of a divisional application to be filed hereafter.

Speaking in general terms of the apparatus, the same consists essentially of the die referred to, together with plungers carrying said blocks or cylinders of rubber and actuated by suitable mechanism in such a manner as to move inwardly and outwardly in unison within the die.

The various features of novelty and utility in my apparatus will be apparent from the description hereinafter given.

In the drawings, Figure 1 is a side elevation of my apparatus; Fig. 2 a vertical longitudinal section thereof; Fig. 3 a view similar to Fig. 2 but showing the parts in the position in which the rubber cylinders have bilged the barrel body; Figs. 4, 5 and 6 are sections on the vertical section lines of Fig. 2 corresponding in number with the numbers of said figures respectively; Fig. 7 a perspective of the cylinder from which the barrel body is formed; and Fig. 8 a perspective of the bilged barrel body.

For the purposes of a clear explanation and description of my invention I will de-

scribe the construction and mode of operation of the machine or apparatus herein shown and at the same time will describe the method which is practised by said apparatus.

Referring to the form of apparatus herein shown, the same comprises a base 1 resting upon any suitable support and having a suitable framework which is here shown as end supports or frames 2—2 which may be separate from or integral with the base as desired and which are connected by a series of horizontal tie rods 3, here four in number as clearly shown in Figs. 4, 5 and 6. Upon the base is suitably supported a die 4 which by preference is made of two sections hinged together by means of any suitable hinge structure as indicated at 5 and held clamped or locked in closed condition in suitable manner as by means of one or more latches. As shown in Figs. 5 and 6, one of the sections of the die has a depending extension or foot 4^a resting upon the base 1 and secured thereto by bolts 4^b. This particular section of the die is the stationary one, the other one being movable or pivoted upon said hinge 5 so as to be swung downward to open the die in the manner indicated in dotted lines in Fig. 5. The latches referred to may be of any desired construction but are here shown as swinging bolts 6 pivoted at one end to upwardly extending lugs 7 on the movable section of the die and whose other end extends between parallel upwardly extending lugs 8. Nuts 9, screwing upon their bolt 6 and against the lugs 8 clamp and secure the sections of the die firmly together.

The die is made with its interior surface of the form shown in Figs. 2, 3, and 5, wherein it is seen that the die has end openings which are cylindrical and of the same diameter, whereas the intermediate or middle portion thereof is of a bilged form corresponding with the desired shape or bilge form of the barrel body to be shaped or formed, said end openings being in axial alinement with each other as well as with the said bilge form of interior of die. Within the die two blocks or cylinders 10 of a suitable material, preferably elastic, such as rubber or the like, are adapted to reciprocate in unison toward and away from each other, these rubber cylinders being normally of such a diameter as to have an easy sliding fit in said cylindrical end openings of

the die, or rather within removable bushings 11 inserted in the opposite ends of the die. The rubber cylinders are secured in suitable manner, as by means of the pins 12 to plunger heads 13 which by suitable mechanism are caused to move inwardly and outwardly in unison with the result hereinafter described.

The means herein shown for operating the plunger heads consist of the screw shafts 14 secured at their inner ends to the plunger heads and passing through the screw-threaded hubs of gear wheels 15 which have suitable bearings in the end frames 2 in such a manner as to rotate but not to travel longitudinally upon said screw shafts 14, with the result that when the gear wheels 15 are rotated the screw shafts and the plunger heads will be moved inwardly or outwardly in unison according as said wheels are rotated in one direction or the other, it being understood of course that one of the screw shafts 12 has right-handed threads and the other left-handed threads. To prevent the screw shafts from rotating I provide them with keys 16 which cooperate with key ways in portions of the end frames 2 as shown more particularly in Fig. 6. According to the construction of apparatus now being described the gear wheels are operated by means of pinions 17 which are secured to and rotated by a drive shaft 18 having bearings in the end frames 2 and driven in any suitable or desired manner.

In practice, assuming that the rubber cylinders have been withdrawn outwardly so that their inner ends will be within the cylindrical end portions of the die so that the bilge portion of such die will be cleared thereby, the die is opened and a cylindrical metallic blank A such as shown in Fig. 7 is inserted and the die thereupon closed and locked in the manner explained. The machine is thereupon operated with the result that the plunger heads and their rubber cylinders will be advanced inwardly in unison toward each other. In due course the two adjacent or inner ends of the rubber cylinders will come into contact with each other and the same will be expanded outwardly at their meeting ends, the first contact of the rubber cylinders with the metallic cylinder being at the center of the latter so as to start the bilge formation at such point, after which the pressure will be applied evenly and successively from the center toward the opposite ends until the cylinder is forced fully against the inner surface of the die, thereby forming a bilged barrel body B such as shown in Figs. 3 and 8. This described initial expansion of the rubber cylinders and consequent initial central expansion of the cylinder blank is of great importance in my method particularly in that it serves to immediately fix or lock the blank in its proper

central position and against endwise movement which would result in improper forming of the barrel body in that one end thereof would be longer than the other. A further effect of the expansion first taking effect in the center is that the ends of the blank remain free to follow toward the center of the die as the blank is expanded. Therefore there is no stretching of the metal with consequent thinning of the walls of the intermediate portion and weakening of the resultant barrel. In order to assure the initial expansion of the rubber cylinders at their meeting ends I concave the same at such ends as indicated at 10^a, with the result that the first contact between the meeting marginal edges will cause an expansion of the rubber outwardly thereat so as to give the first or initial pressure at the central portion of the cylinder blank.

The cylinder blank may be formed in any desired manner, that is, it may be of one piece with its meeting edges joined, riveted, brazed, soldered, or welded together or it may be wholly jointless and weldless.

By means of the apparatus above described the bilged barrel bodies are formed perfectly and uniformly and without any unevenness or distortion with the result that all the barrel bodies produced will be precisely the same in every respect and will moreover be perfect as to bilge and length; in other words, perfect in every respect and identical with each other.

I claim:

1. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of a barrel, a pair of plunger heads, means for operating said heads, and blocks of elastic material mounted on said heads and arranged to be forced together to cause expansion against a blank placed within the die, thereby expanding the blank against said bilge form of the die.

2. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of a barrel, a pair of plunger heads, means for reciprocating said heads in unison toward and away from each other, and blocks of elastic material mounted on said head and arranged to meet midway of the die to cause expansion against a blank placed within the die, thereby expanding the blank against said bilge form of the die.

3. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of a barrel, a pair of plunger heads, screw-shafts connected with the heads, threaded gear wheels on said shafts, means for rotating said gear wheels in unison, and blocks of elastic material mounted on said heads and arranged to be forced together to cause

expansion against a blank placed within the die, thereby expanding the blank against said bilge form of the die.

4. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of barrel, said die having end openings in axial alinement with each other and with said interior form, a pair of plunger heads movable in said end openings, and blocks of elastic material mounted on said heads and arranged to be forced together within said die to cause expansion against a blank placed therein.

5. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of barrel, said die having cylindrical end openings in axial alinement with each other, and with said interior form, a pair of cylindrical plunger heads movable in said openings, and cylinders of elastic material mounted on said heads and arranged to be forced together within said die.

6. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of a barrel, a pair of plunger heads, means for operating said heads, and blocks of elastic material mounted on said heads and arranged to be forced together to cause expansion against a blank placed within the die, thereby expanding the blank against said bilge form of the die, said blocks being concaved on their adjacent ends.

7. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of barrel, said die having cylindrical end openings in axial alinement with each other, and with said interior form, a pair of cylindrical plunger heads movable in said openings, and cylinders of elastic material mounted on said heads and arranged to be forced together within said die, said cylinders being concaved on their adjacent ends.

8. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of barrel, said die having cylindrical end openings in axial alinement with each other, and with said interior form, a pair of cylindrical plunger heads movable in said openings, cylinders of elastic material mounted on said heads and arranged to be forced together within said die, and removable bushings arranged in said openings.

9. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge

of a barrel, a pair of plunger heads, means for operating said heads, blocks of elastic material mounted on said heads and arranged to be forced together to cause expansion against a blank placed within the die, thereby expanding the blank against said bilge, and removable bushings in the die, through which bushings the heads operate.

10. In an apparatus of the class described, the combination of a die having an interior form corresponding with the desired bilge of barrel, said die being made in sections, one stationary and the other arranged to swing, means for locking the sections together, said die having end openings, blocks of elastic material movable in said opening and adapted to be forced against each other to cause expansion against a cylinder blank which is thereby forced against the interior form for bilging purposes.

11. In an apparatus for forming metallic barrel bodies, the combination of a sectional die, the interior of which is shaped to conform to the exterior of a barrel, means for securing the die sections together, heads movable through the ends of the die and carrying bodies of expansible material, and means for forcing the heads toward the center of the die.

12. In a device of the class described, the combination of a die open at both ends and adapted to receive material to be changed in form, a pair of plunger heads each carrying a block of elastic material, and means for feeding the plunger heads through the opposite ends of the die and toward each other and thereby expanding the blocks of elastic material.

13. In a barrel forming machine, the combination of a hollow die, plungers movable toward each other from opposite ends of the die, and diametrically expansible heads of elastic material carried by the plungers.

14. In a barrel forming machine, a hollow die, plungers movable toward each other from opposite ends of the die, expansible heads of elastic material carried by the plungers and adapted to be expanded by pressure of each against the other.

15. In a barrel forming machine, the combination of a hollow die and a pair of plungers with means for feeding the latter toward each other simultaneously, and heads of elastic material on the plungers adapted to be expanded radially by pressure against each other.

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Witnesses:

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