F. G. WACKER.

METALLIC BARREL MAKING MACHINERY.

APPLICATION FILED MAY 31, 1911.

1,090,178. **Patented Mar. 17, 1914.**

2 SHEETS—SHEET 1.

Fig. 1.

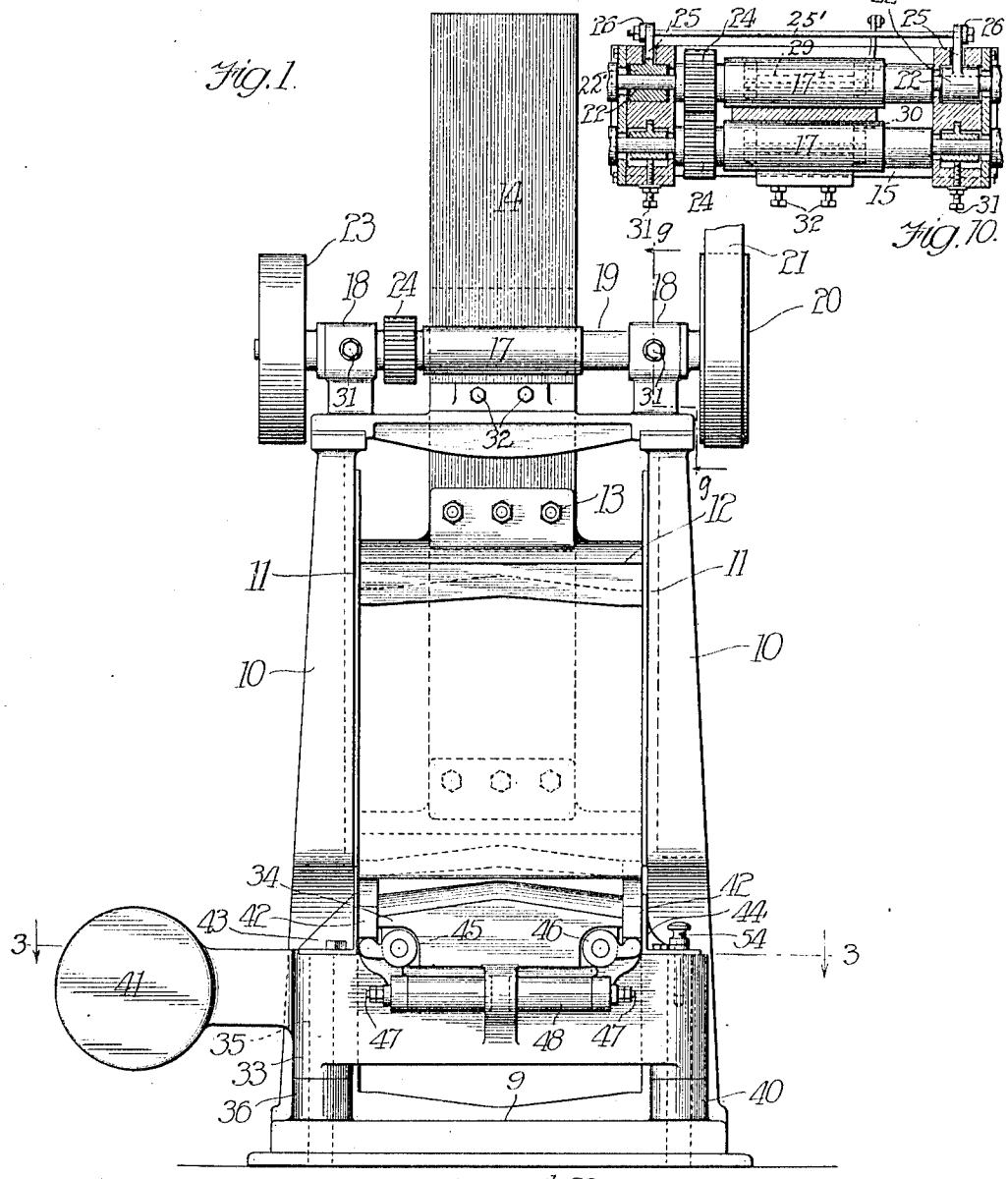
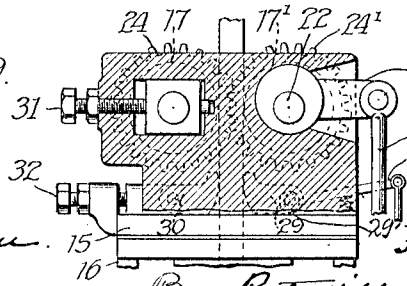


Fig. 10.

Fig. 9.



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2 SHEETS—SHEET 2.

Fig. 2.

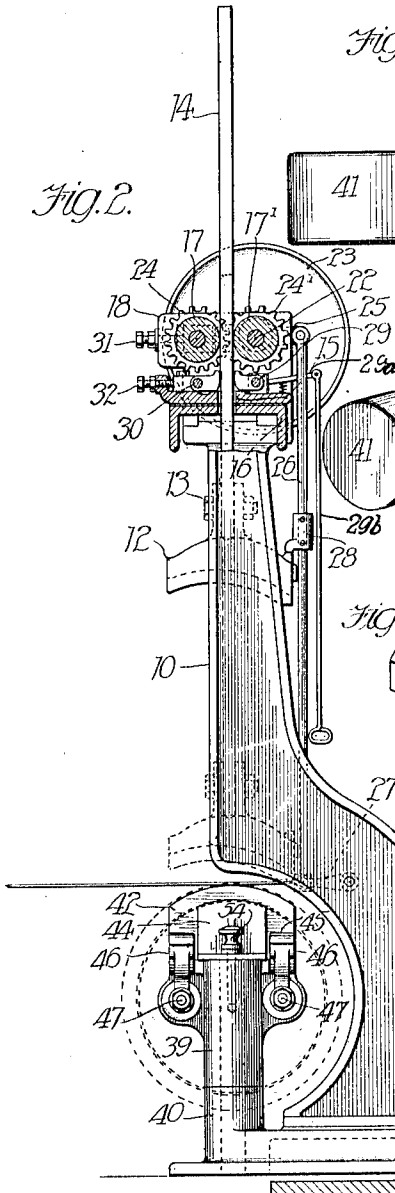


Fig. 3.

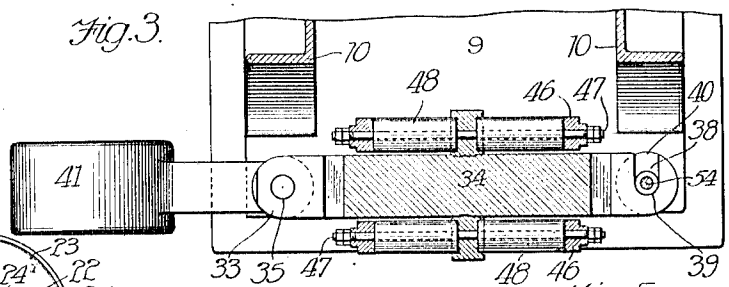


Fig. 4.

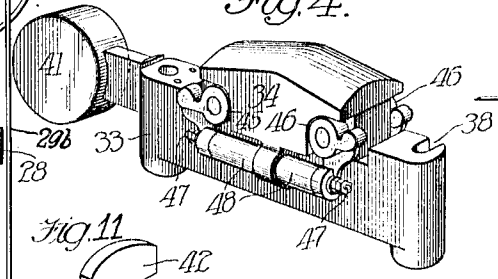


Fig. 5.

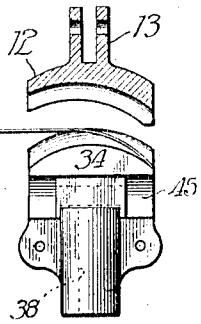


Fig. 11.

Fig. 6.

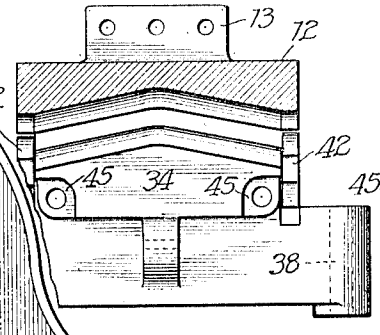


Fig. 7.

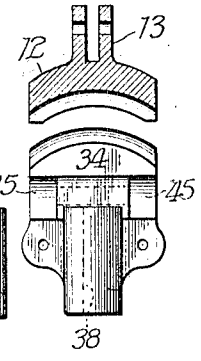
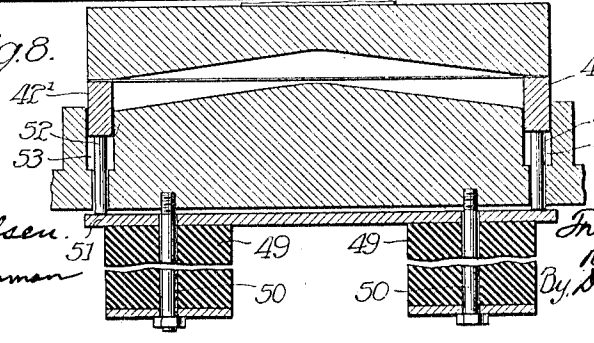


Fig. 8.



Witnesses

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METALLIC-BARREL-MAKING MACHINERY.

1,090,178. Specification of Letters Patent. Patented Mar. 17, 1914.

Application filed May 31, 1911. Serial No. 630,372.

To all whom it may concern:

Be it known that I, FREDERICK G. WACKER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in and Relating to Metallic-Barrel-Making Machinery, of which the following is a specification.

Metallic barrels have been formed in a number of ways, among others by making the bilge section from a single blank and applying the head thereto, and the bilge section of such barrels has been formed from sheet metal either by making a cylinder of uniform diameter and crimping it toward either end to produce the usual taper, or starting with such a cylinder blank it has been proposed to draw the metal without the formation of crimps to the required shape. The latter method results in the production of a more sightly barrel embodying less waste material than the other method mentioned, but is open to the objection, among others, that it puts such a great strain upon the blank as to frequently rupture the longitudinal seam or joint uniting the edges of the sheet from which the blank is formed.

My apparatus produces a barrel which is also free from crimps and in which the metal is brought to shape by a drawing process without incurring the waste due to the rupture of the longitudinal joints referred to above.

As distinguished from the prior procedure my apparatus acts upon the raw material, the sheet blank in its original form, that is to say prior to the formation of any seam or joint, and while it is in this condition the metal thereof is drawn to shape the bilge, the apparatus operating preferably on successive portions of the blank as it is fed through such apparatus which includes an anvil and a hammer coöperating therewith, the product of the present machine being a bilge barrel section having its final form but with the meeting edges thereof free, that is to say unconnected to each other. After the operation just referred to and which I am about to describe more fully, the meeting edges of the bilge section are joined together in any suitable or preferred manner, as for example by seaming, welding, sweating or soldering.

In the drawings accompanying and forming part of this application I have shown two specific forms of machine, and each embodying the fundamental features of my improved apparatus. It will be understood, however, that these specific forms are described merely by way of illustration and that my invention is of greater breadth than either of them and includes other species coming within the terms of the following claims and the fair equivalents of the forms disclosed.

Figure 1 is a front elevation of a preferred form of device embodying the invention of my apparatus; Fig. 2 is a side elevation partly in section for the purpose of showing certain operating mechanism; Fig. 3 is a cross section on the line 3—3 of Fig. 1; Fig. 4 is a perspective of the anvil of my mechanism; Fig. 5 an end elevation thereof with the hammer or movable die in proper relation thereto shown in section; Figs. 6 and 7 partly sectional elevations in longitudinal and transverse section respectively of a modification as to the die members; Fig. 8 is a cross section of a further modification of such die members; Fig. 9 is a vertical section on line 9—9 of Fig. 1; Fig. 10 a horizontal section partly in elevation showing certain details of the die raising mechanism and Fig. 11 a perspective of a detail of the sheet metal blank holding means.

Referring now more particularly to Figs. 1 to 5, inclusive, it will be seen that the machine embraces a normally stationary die member or anvil and a reciprocating die member coöperating therewith, between which members the sheet of material to be treated is fed. In the particular construction which is chosen for illustration a bed-plate 9 supports a pair of standards 10—10 which are provided with guides 11—11 within which the reciprocating die 12 slides. The particular mechanism by which this reciprocating die member is operated forms no part of my invention and is representative of a structure common in drop hammers and similar mechanisms; it need therefore be but briefly described. To the back of the die member is secured by bolts 13, a strip or board 14 which may be and preferably is of wood and serves as a tongue or tang by which the reciprocating die member is raised. The tang extends through an opening 15 formed in the cap

plate 16 of the machine into the bite of a pair of rollers 17—17′ mounted upon said cap plate. The journals 19 of roller 17 are mounted in stationary but adjustable bearings 18 on the cap plate and are provided with a band pulley 20 around which passes a driving belt 21 from any suitable source of power. The journals 22 of the other roller 17′ are eccentrically mounted in oscillating bearing blocks 22′ for rotation with respect thereto and one of the journals carries a fly-wheel 23. The rollers are provided with intermeshing gears 24—24′ whereby roller 17′ is driven and by rotating through a small arc the blocks 22′ the roller 17′ may be caused to approach or recede from the stationary roller to grip or release the tang 14 of the hammer. In order to control this relative movement between the rollers the blocks 22′ are provided with arms 25 connected by rod 25′ for joint movement, to which rod is pivoted the upper end of a link 26, the movement of the lower end of which is guided by a pivoted arm 27. The link 26 extends parallel to the path of the movable die member and is provided with a finger 28 adjustable thereupon with which the movable die member is adapted to engage at the upper end of its stroke to slightly lift the link. The arm 27 likewise projects into the path of the movable die member at the lower end of its stroke and the link is consequently lowered when the arm 27 is struck by the movable die. It will be obvious that by raising the link 26 and thereby rotating the blocks 22′ the roller 17′ is withdrawn from contact with the tang of the hammer sufficiently to let the latter fall, and when the latter reaches the end of its stroke it operates upon the arm 27 to draw down the link 26 and so bring the roller 17′ in engagement with the hammer tang. By this means the hammer is alternately raised by the rollers and released, and if no other mechanism were employed the hammer would constantly reciprocate. It is usual, however, in devices of this character to employ clamping dogs such as shown at 29—30 to hold the hammer in elevated position until released. These dogs as shown in Fig. 2 are pivoted and formed with eccentric faces. The roller 17 and dog 30 are adjustable toward their respective co-acting elements 17′—29 by the usual adjusting screws 31—32. While I have described this actuating mechanism for the hammer with some particularity, I here repeat that it is not of my invention but is of a character well known in the prior art. In order that the blank may be removed from the anvil or lower die member which it encircles when completely formed, it is necessary to provide for the endwise removal thereof. For this purpose the casting 33 which bears the anvil or lower die member 34 is pivoted at 35 upon a boss 36 rising from the base of the machine. At its free end the casting is formed with a lateral vertical groove or recess 38 (see Figs. 4 and 5) which, when the anvil is beneath the reciprocating die member receives a post 39 upon the frame, and at this time the outer end of the casting rests upon a boss 40 from which the above mentioned post projects. In order to facilitate manipulation, the casting is formed on the side of its pivot opposite the anvil with a counterweight 41. As shown in the drawings, the operative upper face of the anvil 34 is convex and conforms to the shape of the barrel to be made and the movable member is adapted to bend the blank a little at a time to conform to this surface of the anvil.

The operative surfaces of the upper and lower die members may, if desired, correspond or mate as shown in Figs. 6 and 7. In my preferred form of apparatus, however, the upper die member is curved on a somewhat longer radius than the lower die member and eccentric thereto. It follows that when the die members are in contact at one edge there is a gradually enlarging opening toward the opposite edge between them, and it may be here stated that in operation the blank is gradually fed into that side of the machine in which the edges of the die members are more remote and between the dies toward the meeting edges thereof. Whether the form of die members shown in Figs. 4 and 5 be employed or that shown in Figs. 6 and 7 be preferred, the lower die member is provided at its opposite ends with members to clamp the edges of the blank prior to each blow of the hammer. The specific means shown for this purpose consists of a pair of curved end pieces 42—42 which are arranged to slide between guide brackets 43—44 and the adjacent ends of the anvil 34 which, for this purpose, terminates within the planes of the end faces of the movable member. Upon the stationary die member is pivoted a set of four bell-crank levers 45—46, one arm of each of which supports an end of a clamp member 42 and the other arm of which is perforated to receive a rod 47 upon which, between the pivoted arm of the lever and the stationary part of the casting, is mounted a spring member 48 which may consist of rubber or other resilient material. The relation and arrangement of parts is such that the bell-crank levers normally support the end pieces 42 above the corresponding edges of the anvil 34.

If desired in place of the resilient means for supporting the clamping members 42 described above, I may employ a substantially similar construction shown in cross section at Fig. 8. In this modification upon each side of the anvil casting is arranged a pair

of spring members 49, 49, mounted upon depending rods 50, 50, and sustaining a cross-bar 51 guided upon the pins 50. Upon this cross-bar are supported pins 52—52 which project through openings in the anvil and upon which rest the ends of the clamp members 42′ which are free to reciprocate within grooves 53 in the face of the anvil or lower die member. It will now be evident that which ever form of resilient support is used for these clamp members they will project upwardly from the face of the lower die member toward the upper or movable die member and be yieldingly supported. When the latter descends, as heretofore described, it will engage the clamping members 42 or 42′ and force them backward into their seats until it is arrested by the anvil. If, however, a blank for forming a barrel has been fed into the machine it will be firmly gripped between the clamping members and the corresponding portions of the upper die member and firmly held during the remainder of the progress of the hammer toward the stationary die member and the consequent drawing of the material of the blank. Thus the blank will be drawn to form while held by the clamping members against crimping or creasing. After the barrel has been formed the anvil carrying it and encircled thereby may be swung from beneath the reciprocating member after the pin 54 which engages the bracket 44 and the post 39 has been withdrawn. The formed blank may then be withdrawn endwise from the anvil. It is to be noted in this connection that the operative surface of the anvil corresponds to only a small part of the circumference of the barrel so that the sheet metal must be fed over it by successive increments. With the form of die member shown in Figs. 6 and 7 in which the surfaces when they are brought together are concentric and substantially mate with each other, each section treated is completely formed at a blow. In the preferred form of my apparatus, however, as shown in Figs. 4 and 5, not only is the blank fed progressively through the machine but the operation upon each element of the blank is progressive as it is gradually moved between the converging die faces. The blank is thus gradually molded to its ultimate shape by a succession of drawing operations and whenever subjected to the molding action of the dies is firmly clamped at its edges between the clamps 42 and the upper die.

The complete formation of the bilge portion of a barrel consists in drawing the sheet to its ultimate form and then joining the longitudinal edges. The blank may be initially shaped so that when the drawing operation is complete the edges which are to be united will be parallel, or the edges may be sheared after the blank has been given its shape, as a preliminary to making the seam or joint. This completed bilge section may have applied thereto its heads in any suitable or well-known manner. By the use of my machine the finished barrel will have its seam of its original strength unweakened by the strain of the drawing operation, there is no loss due to distortion or crimping and the barrel-forming operation can be performed more expeditiously than as heretofore practised.

What I claim is:

1. In a device of the class described, a pair of relatively movable curved dies adapted to operate upon a strip of sheet metal, and means for feeding such strip between the dies with a step by step movement.

2. In a device of the class described, a pair of relatively movable curved dies, means for feeding a strip of sheet metal between the dies with a step by step movement, and means for clamping the metal during the operation thereon by the dies.

3. In a device of the class described, a pair of relatively movable curved dies, means for feeding a strip of sheet metal between the dies with a step by step movement, and a swinging support for one of the dies.

4. In a device of the class described, the combination of a pair of dies, one being normally stationary and the other movable, means for feeding a strip of sheet metal between the dies with a step by step movement, and a laterally swinging support for the stationary die whereby when the support is swung the work may be removed.

5. In a device of the class described, the pair of relatively movable dies which are curved on their adjacent faces with arcs that are eccentric and are adapted to operate upon a strip of sheet metal, and means for feeding such strip between the dies with a step by step movement.

6. In a device of the class described, means for drawing the sheet metal blank fed with a step by step movement, and means for securing it at its ends during drawing to prevent crimping or creasing thereof.

7. In a device of the character described, a pair of relatively movable dies for drawing the sheet metal fed between the dies with a step by step movement, and means for clamping the metal during the drawing operation.

8. In a device of the class described, a pair of relatively movable dies adapted to operate upon a strip of sheet metal fed between the dies with a step by step movement, and means for operating with one of the dies to clamp the edges of the metal during treatment.

9. In a device of the class described, the combination with dies for drawing the metal

to be treated, which is fed between the dies with a step by step movement, end members movable with reference to each of the dies and coöperating with one of them to clamp the edges of the material treated.

10. In a device of the class described, the combination with dies for drawing the metal to be treated, which is fed between the dies with a step by step movement, yielding end members movable with reference to each of the dies and coöperating with one of them to clamp the edges of the material treated.

11. In a device of the class described, a pair of dies for drawing a strip of sheet metal which is fed between the dies with a step by step movement, end members adapted to coöperate with the face of one of the dies, and resilient means for normally projecting them beyond the face of the other die member.

12. In a device of the class described, stationary and movable die members, between which a strip of sheet metal is fed with a step by step movement, clamping members arranged at the ends of the stationary member and adapted to clamp two opposite edges of the sheet metal against the movable die member.

13. In a device of the class described, a stationary die member and a movable die member, clamping members arranged at the end of the stationary member to coöperate with the movable member, bell-cranks supporting the clamping members and resilient means operating upon the bell-cranks.

14. In a device of the class described, a pair of relatively movable die members adapted to act progressively upon a strip of sheet metal fed between them, the operative faces of which die members converge toward one side of the pair.

15. In a device of the class described, a pair of relatively movable curved die members, adapted to act progressively upon a strip of sheet metal fed between them, the operative faces of which die members converge toward one side of the pair.

16. In a device of the class described, a stationary die member, the operative face of which is curved substantially on the arc of a circle, and a reciprocating member the operative face of which is curved on an arc eccentric to that of the stationary member.

17. In a device of the class described, the combination of a reciprocating die member and an anvil pivoted at one end and adapted to be moved into and out of registry with the reciprocating member, said member and anvil being curved on eccentric arcs.

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