F. G. WACKER.

METHOD OF SHAPING METAL ARTICLES.

APPLICATION FILED AUG. 13, 1912.

1,234,586.

Patented July 24, 1917.

2 SHEETS—SHEET 1.

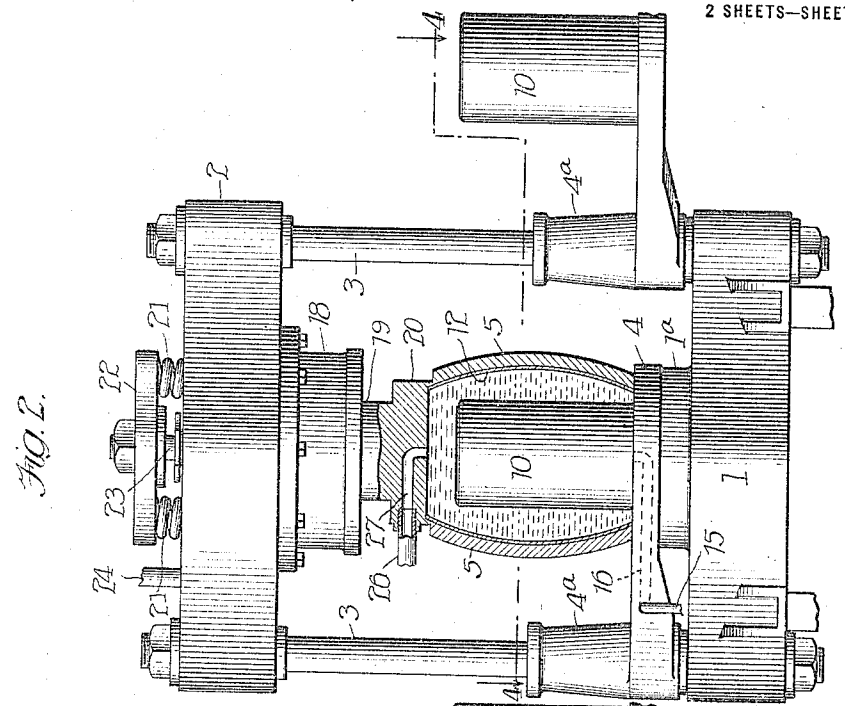


Fig. 2.

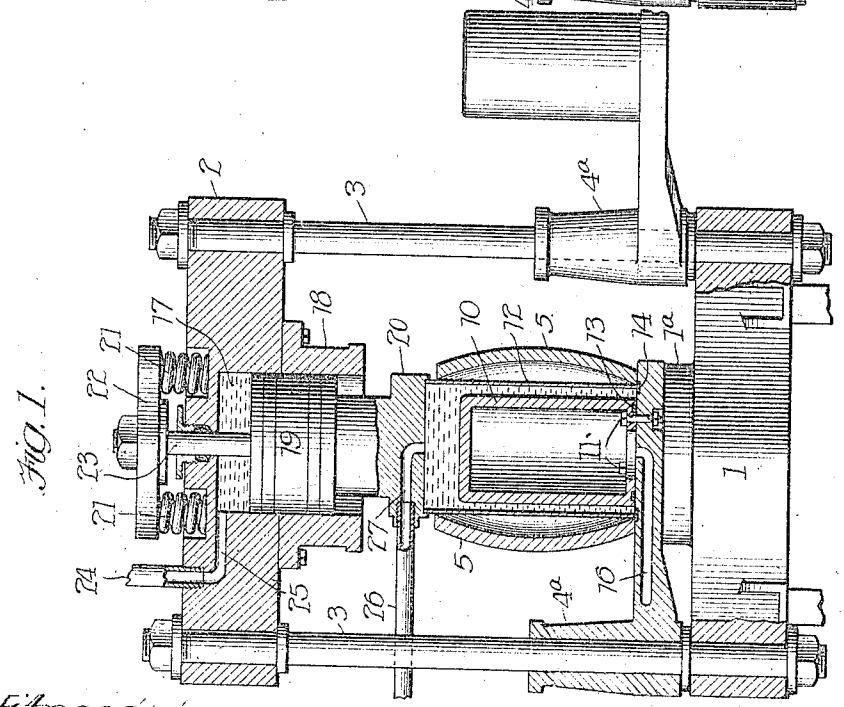


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 3.

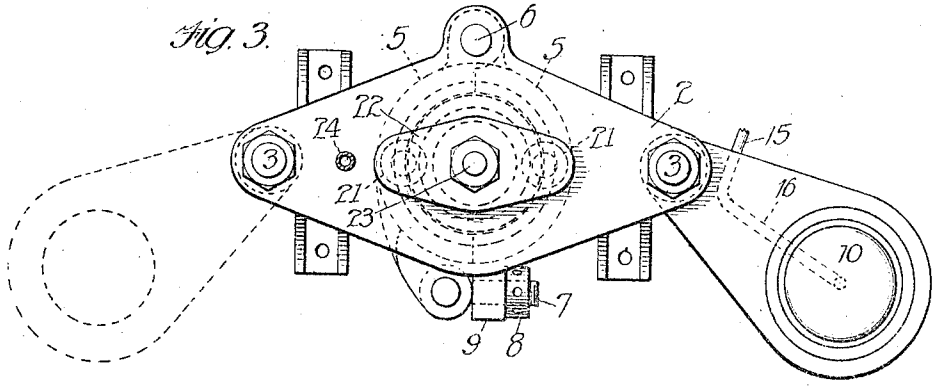


Fig. 4.

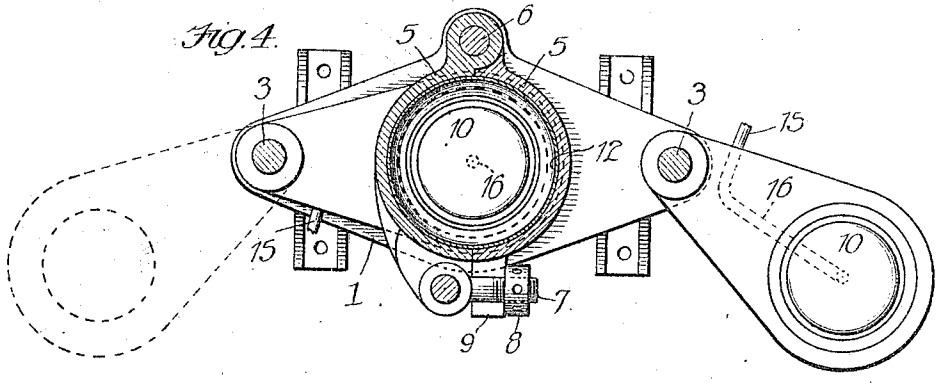
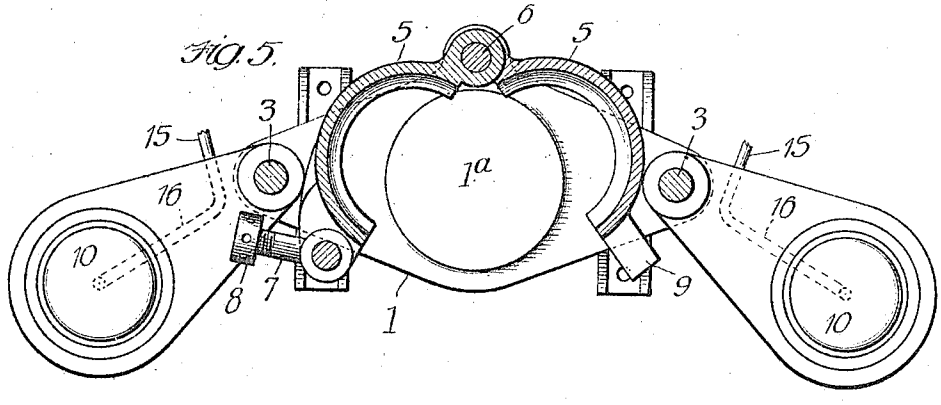


Fig. 5.



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UNITED STATES PATENT OFFICE.

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METHOD OF SHAPING METAL ARTICLES.

1,234,586. Specification of Letters Patent. Patented July 24, 1917.

Original application filed April 1, 1912, Serial No. 687,634. Divided and this application filed August 13, 1912. Seral No. 714,839.

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 a certain new and useful Method of Shaping Metal Articles, of which the following is a specification.

My invention relates to the art of shaping hollow metal articles by means of suitable fluid pressure applied to the interior thereof for expanding such articles against a die or mold whereby such article is given the desired shape. One object of my invention is to provide a new and improved method for so shaping metal articles whereby the chill may be taken off the article thereby rendering it less liable to breakage or rupture in the shaping operation, such method consisting in preliminarily heating the metal articles before the pressure is applied, the heat being supplied through the body of water within the hollow article in case hydraulic pressure is the power or pressure employed. Another object of my invention is to provide a method for so shaping metal articles whereby a minimum amount of fluid under pressure, such as water, may be employed to which end the cubical contents of the hollow metal article in which such fluid may be contained is materially reduced by the insertion of a core or the like, the remaining space being filled with the fluid pressure. My method or process may be practised by machines or apparatus of different character and in the present instance, for the sake of a clear and definite description of my invention, I have shown one form of apparatus which may be advantageously used for this purpose.

In the drawings, Figure 1 is a vertical sectional elevation of an apparatus or machine embodying my invention illustrating the beginning of the operation of forming a barrel; Fig. 2 an elevation of said machine with a portion thereof in section illustrating the completion of said operation; Fig. 3 a plan view of the machine illustrated in Fig. 2; Fig. 4 a horizontal section on the line 4—4 of Fig. 2 and Fig. 5 a similar section but illustrating different positions of some of the parts.

I will proceed to describe the construction of the illustrated apparatus which is capable of practising my method and in the course of said description I will explain said method or process.

In the present instance, the apparatus or machine has a main frame consisting of a base 1 and an elevated horizontal cross-head 2 which is supported upon such base and properly spaced therefrom by means of the vertical posts 3. Upon each post 3 is mounted a single movable support 4, having a sleeve 4^a to provide a bearing upon the post. Each support is adapted to swing in a horizontal plane and when swung inwardly to a position between the two posts, the same is adapted to rest upon and to be supported by a bedplate 1^a rising as a boss centrally of the base. While my machine would be complete and my method could be practised with a single one of these supports 4, I prefer to employ a plurality of them in order to facilitate the operation as will be hereinafter made apparent.

Mounted upon the base 1 is the die or mold 5 which is made in two halves pivoted together upon the vertical pintle 6 which is mounted in and supported by such base at one side of the boss 1^a as illustrated in Figs. 3, 4 and 5. The two parts or sections of the die or mold are held together in closed condition in suitable manner as by means of the bolt 7 pivoted on one section and having a nut 8 adapted to engage the parallel lugs 9 on the other section. Each of the swinging supports 4 is provided with a core which may or may not be integral therewith but which, in the present instance, is formed as a hollow casting 10 separate therefrom and secured to the upper face of the support in suitable manner as by means of the bolts 11. This core is of a sufficient size to materially decrease the cubical contents of the interior of the die or mold as well as of the cylindrical metal blank 12 from which the article is to be shaped. Consequently and as clearly shown in Fig. 1 this core is of somewhat less dimensions than the interior of the cylindrical blank thereby leaving an annular space between it and the walls of the blank and also above it in order to receive a body of water in case the fluid pressure employed is hydraulic pressure. To form a tight joint a circular gasket 13 is used between the bottom of the core and the top face of its support and in addition, for the purpose of sealing the lower end of the blank in the shap-

ing operation, I provide a circular gasket 14 upon said support and upon which the lower end of the blank rests. The core is made hollow both for lightness and for a steam space, the steam being supplied through the lower open end of the core from a suitable source of steam supply passing through a flexible hose 15 and through the horizontal passage 16 in the support 4. As a result the core as well as the body of water surrounding it is heated and the heat thereby imparted to the blank 12 to both facilitate the shaping operation and to avoid rupture or other injury to the blank in such operation.

The cross-head 2 is provided with a chamber 17 which is continued downwardly by means of the cylindrical extension 18 secured to the under side of the cross-head. Within this chamber travels a piston 19 carrying at its lower end a head 20 which is adapted to engage and close and also seal the upper end of the blank. In addition this head follows the blank downwardly as it shortens in length by reason of the expanding of the body of such blank until the margin of such head comes in contact with the top surface of the die, Fig. 2. The piston 19 and its head are adapted to be held in a normally raised position in suitable manner as by means of the coil springs 21 bearing upwardly against a cross-head 22 which in turn transmits the pressure of the springs to a vertical rod 23 attached to the piston. This piston is moved downwardly by fluid pressure, preferably hydraulic pressure, which is supplied from a suitable source through the pipe 24 communicating with the passage 25 in the cross-head 2 which passage enters the upper end of the chamber 17. The fluid pressure, preferably hydraulic pressure, is supplied to the interior of the blank from any suitable source, as for instance through the supply pipe 26 communicating with the passage 27 in the movable head 20. In the present instance and by preference, I employ separate sources of fluid pressure for supplying the pressure through the pipes 24 and 26.

In practice, assuming that the die sections are open, as shown in Fig. 5, and the movable supports 4 are swung outwardly, a barrel blank is placed over the core of one of these supports, whereupon such support is swung inwardly to a position immediately over the boss 1^a and the die sections are thereupon closed and locked. A sufficient quantity of water may be introduced into the blank either before or after it takes this position within the die. The water so introduced is heated by means of the core which is itself heated by the steam admitted to its interior, as hereinbefore stated, with the result that prior to the expanding operation the blank is heated. The parts now being ready for the expanding operation the pressure is admitted to the chamber 17 whereupon the head 20 descends and engages the upper edges of the blank and at the proper time fluid pressure is supplied through this head to the interior of the blank with the result that such blank will be expanded from its cylindrical shape, shown in Fig. 1, to the barrel or bilged shape shown in Fig. 2. Another blank is inserted over the core of the other support 4 which is thereby made ready to be swung into working position just as soon as the first blank or article is shaped. The die is now opened and the first-mentioned support 4 is swung outwardly and the other support swung into operative position. The formed article which, in the present instance, is a barrel body is now removed from its support by raising it upwardly and the water within is permitted to drain away. The operation is continued by using these supports alternately in the manner described.

It will be understood from the foregoing description that I am enabled by my method and apparatus to expand or shape the article with a considerable less quantity of water than otherwise. Without the use of a core the amount of water required equals the cubical contents of the article shaped and all of this water, whose amount is considerable, for instance as much as fifty-six gallons in case of a full-sized barrel, must be twice handled, first in being introduced into the blank and then in being removed or permitted to drain away. According to my method and apparatus a comparatively small amount of water, much less than the cubical contents of the article shaped, is necessary so that the operation of introducing the water into the blank and permitting it to drain therefrom is materially facilitated, to say nothing of the economy resulting from the less quantity used. The core which may be inserted within the blank in any suitable or desired manner but preferably from below in the manner explained, has the function not only of reducing the cubical contents of the blank but also the function of heating the blank indirectly through the medium of the water which is itself utilized in applying the hydraulic pressure, thereby avoiding rupture or injury to the blank which might result in case the blank were acted upon in chilled condition.

I prefer to mount the core upon the support as illustrated in the drawings although it is obvious that it might be secured to the movable head with the result that the core would be inserted into the barrel blank from above in the downward movement of this head. In this event the proper provision would be made as in the case of the core described to heat the hollow interior by means of steam.

This application is a division of an ap-

plication heretofore filed by me on April 1, 1912, Serial No. 687,634, which has become Patent No. 1,111,198, granted September 22, 1914, and which claims the apparatus shown herein.

I claim:

1. The method of forming sheet-metal barrels, which consists in inclosing a suitable blank within a forming chamber, introducing fluid under pressure within the blank to expand the same, and supplying heat to such fluid through a heating medium applied to the interior of a body within such blank.

2. The method of forming sheet-metal barrels, which consists in inclosing a suitable blank within a forming chamber and around a hollow body, introducing fluid under pressure between such body and the interior of the blank to expand the latter, and supplying heat to such fluid through a heating medium applied to the interior of said body.

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