No. 661,143. Patented Nov. 6, 1900.

C. GRASSER.

APPARATUS FOR CASTING HOLLOW CYLINDERS.

(Application filed May 12, 1899.)

(No Model.)

Fig. 1,

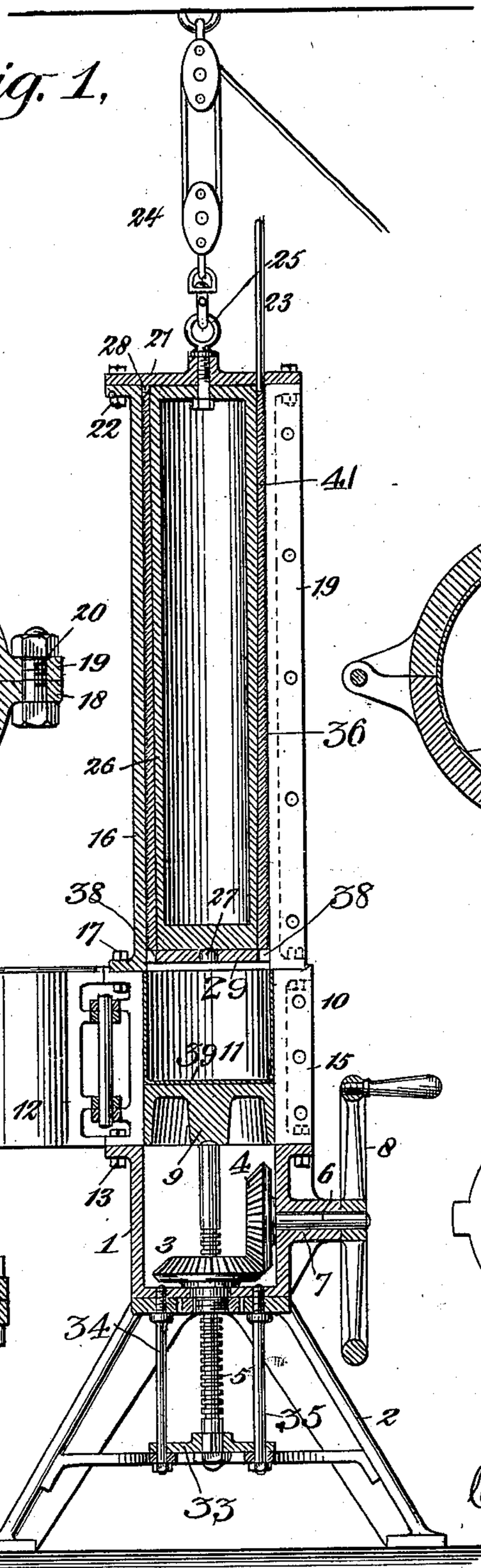


Fig. 2,

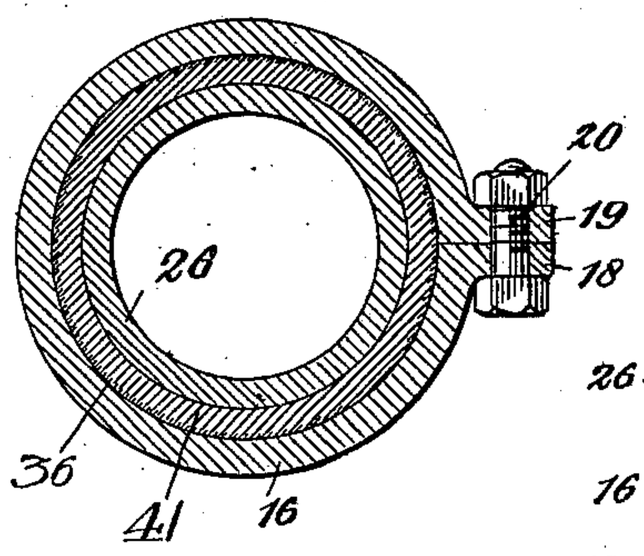


Fig. 3,

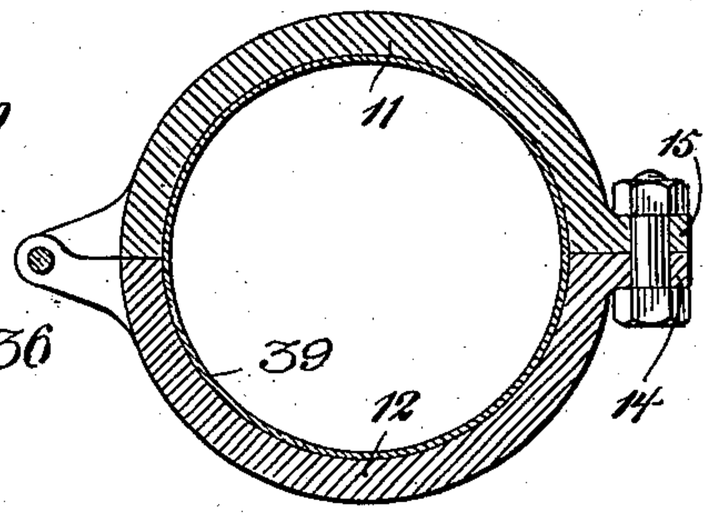


Fig. 4,

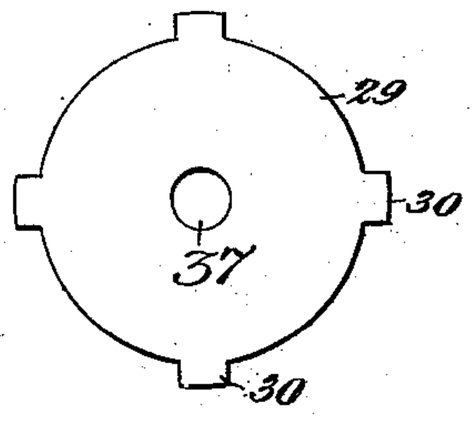
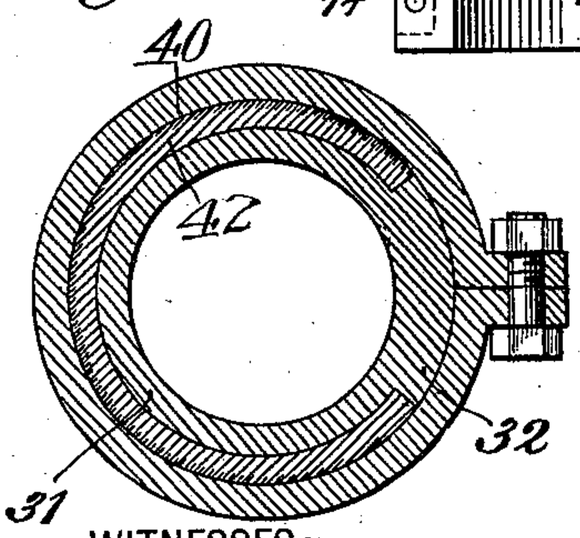


Fig. 5,



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APPARATUS FOR CASTING HOLLOW CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 661,143, dated November 6, 1900.

Application filed May 12, 1899. Serial No. 716,482. (No model.)

To all whom it may concern:

Be it known that I, CHARLES GRASSER, a citizen of the United States, and a resident of Passaic, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Making Printing or other Cylinders or Curved Bodies, of which the following is a specification.

The especial object of this invention is the provision of an efficient apparatus adapted for use in making printing-surfaces for the lithographic or typographic art curved or cylindrical in shape and preferably tubular. The apparatus may be used, however, in making bodies tubular or cylindrical in shape, or partly so, for other purposes.

Tubes or cylinders for printing-surfaces, which I am able to make by my invention, require the following essential qualities: First, the cost of production should be lower than the cost of drawn-metal tubes such as are now used; second, the surface of the tubes or cylinders must be absolutely sound and smooth, just the same as rolled or drawn metal; third, the tubes or cylinders should be produced of sufficient accuracy on the outside and inside surfaces so as to avoid expensive finishing work to make them fit for practical use.

I effect the production of tubes or cylinders which have the aforementioned qualities by using the herein-described apparatus.

By means of the apparatus and manipulations herein described I can cast and form such tubes or cylinders of metals or compositions of metals which have little or no shrinkage in cooling from the melting to the solidifying point.

If I wish to make tubes or cylinders of such metals which have great shrinkage in cooling or are of a short structure—for instance, pure zinc or so-called "hot short brass"—then I adopt the manner and process of combining a sheet of rolled metal formed first into a cylindrical shape, which gives me the exterior surface of the tube of the desired metal, and combine it by means of casting to it an interior body of other metals that have little or no shrinkage in cooling. In both cases I employ the within-described apparatus.

My apparatus belongs to the types of the sundry kinds of machines which are used for forcing fluid metals by mechanical pressure in a mold or space to be filled with metal.

My invention consists of the features and combinations of features herein set forth.

In the accompanying drawings, forming part of this specification, and in which like numerals of reference designate corresponding parts in the several figures, I have shown the preferred embodiment of this invention as used in making tubes.

Figure 1 is a vertical sectional elevation of the apparatus. Fig. 2 is a horizontal section through the mold. Fig. 3 is a horizontal section through the fluid-metal receptacle. Fig. 4 is a plan view of a detail. Fig. 5 is a horizontal section through the mold containing a modified core.

Referring now more particularly to the apparatus as shown in the drawings, I proceed to describe its construction and operation.

The apparatus consists of four principal parts, each for a special function. 1 is a base-frame resting on legs 2. In this frame is arranged a pair of bevel-gears 3 and 4. In the gear 3 travels a screw 5 in a perpendicular way. For this purpose the plate 33, fixed on the screw 5, travels on the rods 34 and 35, carried by the base 1. The gear-wheel 4 is attached to a horizontal shaft 6, which has a substantial bearing in a long boss 7. To the outside end of shaft 6 is attached a hand-wheel 8, which if turned imparts up or down motion to the screw 5. On top of the screw 5 rests a piston 9, which fits loosely into a cylindrical fluid-metal receptacle 10, for which the piston 9 forms the movable bottom. This cylindrical receptacle is composed of two halves, (marked, respectively, 11 and 12.) The half 11 is fastened to the top of the base-frame 1 by means of bolts 13 passing through the lower flange of the part 11 into the top of base-frame 1. The half 12 is hinged to half 11 at one side and can be firmly fastened to it on the other side by means of bolts passing through the flanges 14 and 15 of the receptacle, whereby is obtained a cylindrical vessel with a traveling bottom and of sufficient strength to resist the required pressure which is to be applied to the fluid metal it is

to receive in the operation of casting. This cylindrical receptacle is also provided with a movable lining 39, formed of asbestos sheeting, in such a manner as to fit the sides and bottom of the receptacle. This lining prevents the chilling of the metal and serves as a packing on the joint of the piston. On one edge of the cylindrical metal-receptacle 10 rests a removable cylindrical iron mold 16. It is of such an interior size and diameter as is suitable for forming or casting a desired tube or cylinder or curved body 41. This mold is fastened by screw-bolts 17 passing through the lower flange of the mold into the upper flange of the metal-receptacle 10. This iron mold is composed of an outside shell, which may be of two equal separate halves fastened together by means of bolts passing through longitudinal flanges; but as I prefer it it may be made of one piece and having a longitudinal split between the flanges 18 and 19, as shown in the drawings. The split can be firmly closed when required by operating on the bolts 20.

The mold 16 is provided with a removable cap 21, secured in place by bolts 22.

23 is a vent-tube for the escape of air from the interior of the mold as the cast metal rises therein.

24 is a hoisting-tackle adapted to be attached to an eyebolt 25, secured to the cap 21, and whereby the mold may be raised and lowered apart from the rest of the apparatus.

In forming or casting cylindrical tubes I generally employ a core 26. This core is preferably hollow and closed at top and bottom and is provided at the top with a threaded opening into which the eyebolt 25 may enter. The core may be of any exterior shape desired; but I generally prefer to make it cylindrical and with a slight taper. At its lower end it is provided with a fixed pin 27. When the core is put into the mold, it is centered at the top by means of the flange 28, formed on the under side of the cap 21, and it is centered at the bottom by means of the plate 29, having the peripheral projections 30. This plate has a central hole 37, designed to receive the pin 27. The projections 30 contact with the inner surface of the mold, so as to hold the core firmly in place at the bottom. Between the periphery of the plate 29 and the interior of the mold is left a space forming a gate 38 for the entrance of the fluid metal from receptacle 10 into the mold. This gate is of such a size with respect to the space within the mold when the core is in place as to permit and require the fluid metal to enter the mold in a stream which rises equally within the mold. I sometimes employ a smooth calendered sheet of asbestos to line the interior surface of the mold, so as to prevent the sudden chilling of the fluid metal.

By means of this apparatus I have been able to successfully cast tubes of type-metal or britannia metal or similar metal compositions having little or no shrinkage in cooling. Even the so-called "hot malleable brass" presents no serious difficulties. Pure zinc, however, which is the metal preferably used in making curved metallic printing-surfaces for use in the lithographic or typographic art, is of such nature, owing to its shrinkage when cooling and the shortness of the metal, that I found great difficulties in practically casting a tube or cylinder of this metal. When alloyed with about fifteen per cent. of lead much better results were obtained; but an alloy of this nature is not satisfactory for a printing-surface. I therefore resorted to a different process in making the tube of zinc. In this process I cut a sheet of zinc 36 of accurate predetermined dimensions and formed it into a tube, leaving its edges disconnected. The tube is then put into the mold and the core inserted. During this operation the mold is left open at its longitudinal split, so as to enable the sheet-tube to be easily entered in place. The mold is then tightly closed by means of the bolts 20, which bring together the edges of the sheet into firm contact, the sheet accurately fitting and completely covering the interior surface of the mold. The receptacle 10 is filled with the fluid metal before the mold is fastened thereto. When the fluid metal is forced into the mold, it fills the space between the sheet-zinc and the core and becomes firmly attached to the sheet and integral therewith. I generally prefer to coat the interior surface of the sheet metal with tin or solder, which is fused by contact with the cast metal and serves to unite the sheet to the cast metal. I generally put the mold into an oven before casting the fluid metal therein and raise it to about 500° Fahrenheit. After the metal in the mold has solidified the mold is detached from the fluid-receptacle and the surplus metal removed from the tube, the tube and core withdrawn from the mold, and the core forced from the tube.

When the apparatus is to be used for making a curved body, as 42, Fig. 5, less than a complete cylinder, the core may be so made as to fill in the space in the mold from which the cast metal is to be excluded. In Fig. 5 the core 31 is thus made having a thickened portion 32. I may use this core when making a curved body having a sheet-metal exterior in the same way as is above described with reference to a complete cylinder. The edges of the sheet metal 40, however, instead of abutting each other in firm contact will abut the edges of the thickened portion 32 in firm contact.

Of course it will be understood that the apparatus forming the subject of this invention may be used in making cylinders or tubes or similar curved bodies whether they are to be used in the printing art or for some other purpose.

While I have described the preferred embodiment of my invention, it will be under-

stood that various changes may be made in the apparatus as shown without departing from my invention.

What I claim, and desire to secure by Letters Patent, is—

1. In a casting apparatus, the combination of a fluid-receptacle, provided with means for forcing the fluid metal therefrom under pressure, a mold connected with the fluid-receptacle, a cap-plate adapted to be secured to the upper end of the mold, a removable core, means for securing the core to the cap-plate and thereby centering the core at its upper end in the mold, and a removable plate at the lower end of the mold arranged to center the core at its lower end, said plate providing a peripheral gate for the simultaneous flow of the fluid metal around the core into the mold.

2. In a casting apparatus, the combination of a fluid-receptacle, provided with means for forcing the fluid metal therefrom under pressure, a cylindrical metallic mold having a longitudinal split and flanges 18 and 19, whereby the mold may be tightly closed when desired, said mold being adapted to be removably connected with the fluid-receptacle, a removable cap for the mold, a removable core, means for connecting the core with the cap and thereby centering the core at its upper end in the mold, and a removable plate at the lower end of the mold arranged to center the core at its lower end, said plate providing a peripheral gate for the simultaneous flow of the fluid metal around the core into the mold.

3. In a casting apparatus, the combination of a fluid-receptacle, provided with a vertically-moving piston, at the bottom of the receptacle, a mold connected with the fluid-receptacle, a cap-plate adapted to be secured to the upper end of the mold, a removable core, means for securing the core to the cap-plate and thereby centering the core at its upper end in the mold, and a removable plate at the lower end of the mold arranged to center the core at its lower end, said plate providing a peripheral gate for the simultaneous flow of the fluid metal around the core into the mold.

4. In a casting apparatus, the combination of a fluid-receptacle, provided with a vertically-moving piston at the bottom of the receptacle, a cylindrical metallic mold having a longitudinal split and flanges 18 and 19, whereby the mold may be tightly closed when desired, said mold being adapted to be removably connected with the fluid-receptacle, a removable cap for the mold, a removable core, means for connecting the core with the cap and thereby centering the core at its upper end in the mold, and a removable plate at the lower end of the mold arranged to center the core at its lower end, said plate providing a peripheral gate for the simultaneous flow of the fluid metal around the core into the mold.

5. In a casting apparatus, the combination of a fluid-receptacle, a piston at the bottom of the receptacle and provided with a screw-threaded piston-rod, a beveled gear loosely mounted on said piston-rod and a hand-wheel mounted on the shaft carrying the beveled gear-wheel, which meshes with the gear on the piston-rod, a mold connected with the fluid-receptacle, a cap-plate adapted to be secured to the upper end of the mold, a removable core, means for securing the core to the cap-plate, and thereby centering the core at its upper end in the mold, and a removable plate at the lower end of the mold arranged to center the core at its lower end, said plate providing a peripheral gate for the simultaneous flow of the fluid metal around the core into the mold.

6. In a casting apparatus, the combination of a fluid-receptacle 10, a split mold 16, provided with a core 26, a removable cap-plate arranged to be secured to the upper end of the core and center it at its upper end in the mold, a removable plate at the lower end of the mold arranged to center the core at its lower end, said plate providing a peripheral gate for the simultaneous flow of the fluid metal around the core in the mold, and hoisting-tackle for handling the mold 16.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES GRASSER.

Witnesses:
GEO. H. BARNES,
EDWIN SEGER.