March 24, 1942. R. G. LE TOURNEAU 2,277,334

CENTRIFUGAL CASTING APPARATUS

Filed March 14, 1941 2 Sheets-Sheet 1

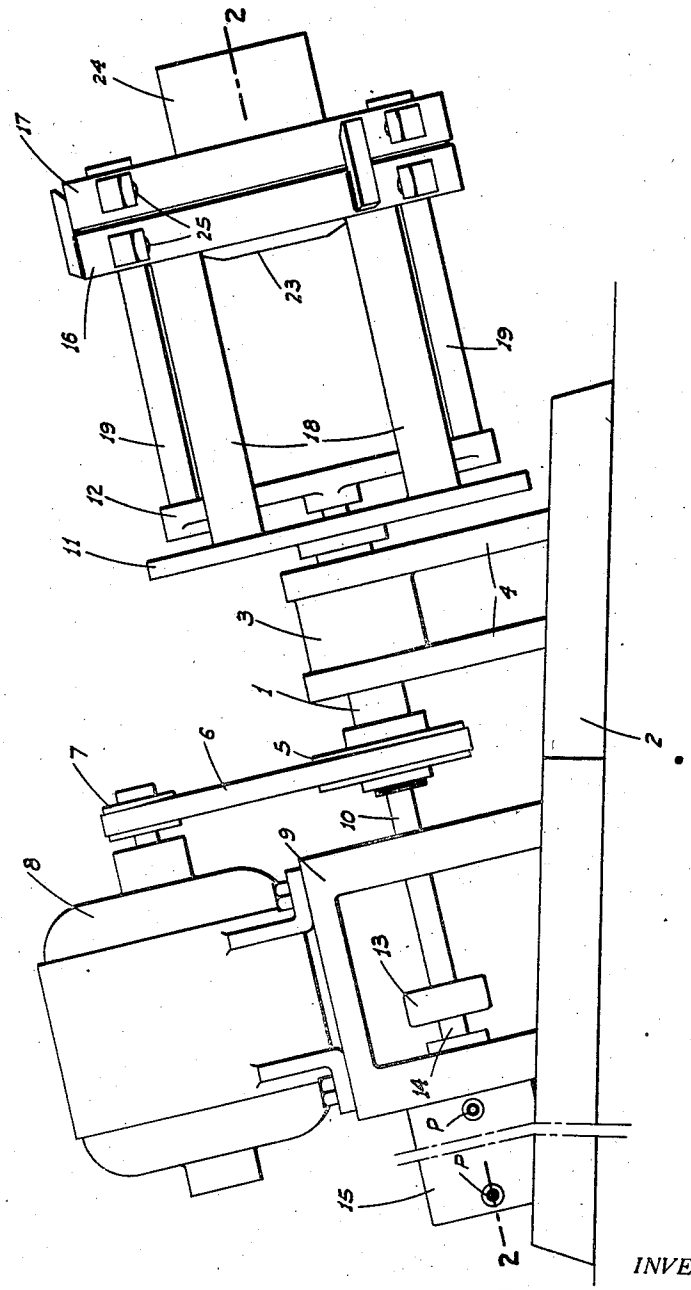


Fig. 1

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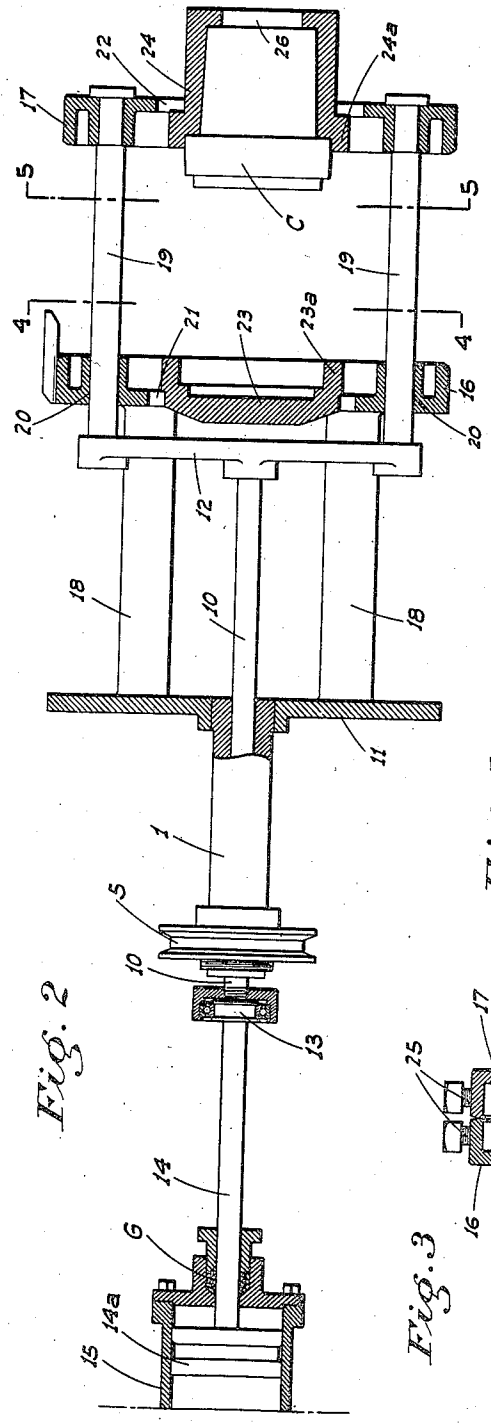


Fig. 2

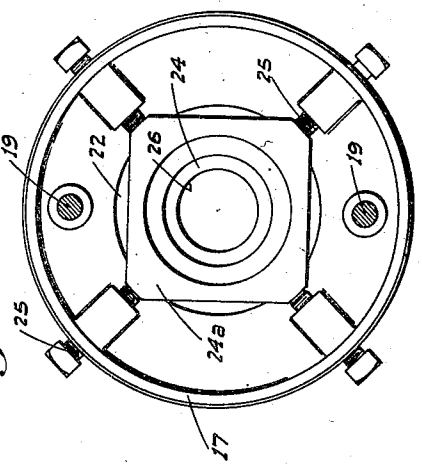


Fig. 5

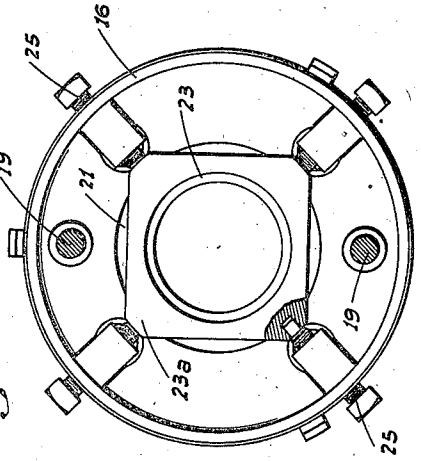


Fig. 4

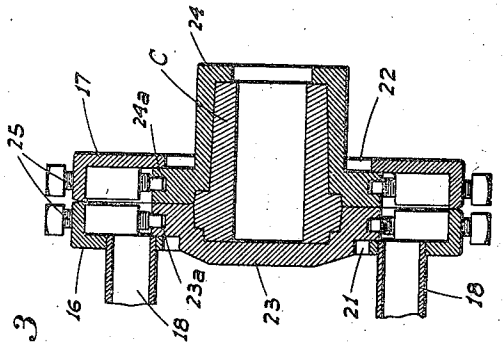


Fig. 3

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UNITED STATES PATENT OFFICE

2,277,334

CENTRIFUGAL CASTING APPARATUS

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Application March 14, 1941, Serial No. 383,310

2 Claims. (Cl. 22—65)

This invention relates in general to the casting of metals, and in particular the invention is directed to, and it is my principal object to provide, centrifugal casting apparatus of unique design.

Another object of the invention is to provide centrifugal casting apparatus which is operative to effect relatively fast radiation of the heat from the casting, and to provide improved slag control whereby to obtain a cleaner and denser casting and reduce the possibility of flaws.

An additional object of the invention is the provision, in centrifugal casting apparatus, of fluid actuated power means to both open and close the die, and to hold the die closed during the casting operation.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a side elevation of the apparatus with the die sections closed.

Figure 2 is a sectional plan on line 2—2 of Fig. 1 but with the die sections open and before removal of the casting.

Figure 3 is a fragmentary section in the same plane as Fig. 2, showing the die sections closed.

Figure 4 is a section on line 4—4 of Fig. 2.

Figure 5 is a section on line 5—5 of Fig. 2.

Referring now more particularly to the characters of reference on the drawings, the apparatus comprises a relatively short, tubular drive shaft 1 disposed above and at an upward slope relative to a base 2; such drive shaft being supported by a bearing sleeve 3 carried by posts 4 upstanding from base 2. The lowermost end of the shaft is fitted with a pulley 5 driven by an endless belt 6 from a drive pulley 7 on the shaft of an electric motor 8 supported above the base by means of a skeleton type base 9; the motor being set with its shaft likewise at a slope and parallel to shaft 1.

A rod 10 extends with a close running fit through tubular drive shaft 1; the high end of shaft 1 being fitted with a head plate 11, and the corresponding end of rod 10 extending therebeyond and having a radial spider 12 fixed thereon. At its low end and beyond pulley 5, rod 10 is mounted in axially alined and rotatable connection as at 13, with adjacent end of the piston rod 14, the piston 14a in a double acting power cylinder 15 which includes pressure fluid connections P adjacent opposite ends, and a conventional packing 17 surrounding the rod at the head of the cylinder. The cylinder is suitably supported in a rigid manner beneath base 9. Rod 10 is of such length that spider 12 is disposed adjacent head 11 when piston 14a is retracted in the cylinder 18.

Cooperating and annular die holders indicated generally at 16 and 17 are disposed in spaced relation ahead of head 11 and spider 12 but on the same axis; the innermost die holder 16 being rigidly supported from head 11 by means of a plurality of circumferentially and symmetrically spaced tubular members 18. The outer die holder 17 is mounted for axial opening and closing movement relative to holder 16 by means of diametrically opposed rods 19 fixed at one end on holder 17 adjacent its periphery, and secured at the other end on spider 12; such rods being parallel to the axis of rotation and slidably projecting through bores 20 in die holder 16.

The die holders 16 and 17 are formed with circular and central openings 21 and 22 of substantial diameter, and the separate sections 23 and 24 of a two piece die are centered in said openings by circumferentially spaced, radial centering screws 25 on the holders in equally spaced relation; the die sections including flanges 23a and 24a larger than openings 21 and 22, and which abut against corresponding holders in face to face relation. The centering or chucking screws 25 slidably engage sockets in said flanges, and as shown, at squared corners thereof. This centers the die sections, while allowing for their expansion due to heat. The die section 24 carried by holder 17 is formed with a pouring opening 26 whose diameter is preferably somewhat less than the adjacent internal diameter of the die.

Operation

In operation, the die sections are brought into positive engagement and held in such position during the casting operation by the power cylinder 15; the "pull" of such cylinder being imparted to movable holder 17 through rod 10, spider 12 and rods 19.

With the die sections held in such positive engagement, motor 8 is started, causing relatively high speed rotation of the entire die supporting assembly. While such assembly is so rotating,

the molten metal is poured through opening 26 into the die; the slope of the apparatus facilitating such pouring operation as the molten metal enters the die, it is immediately forced or thrown toward, and compacted against, the walls thereof, producing a casting C which is hollow or sleeve-like; the impurities being adjacent the surface so that they may be readily machined off, while the vital portions of the casting are clean, strong and of excellent quality.

Another advantage of centrifugal casting with the above described apparatus resides in the fact that the molten metal, when poured, can range closer to the point of solidity than otherwise possible, and further, this apparatus is constructed in a manner to effect a rapid radiation and dissemination of the heat, thus reducing production time.

After a casting has been poured and has solidified, the motor 8 is stopped and cylinder 15 actuated in a direction to forcefully separate the die holders 16 and 17 and consequently die sections 23 and 24; the casting remaining in one section (see Fig. 2) from which it is driven out manually.

The positive opening and closing action of the die sections, as well as the fact that they are subjected to a positive closing action while rotating, is a feature which contributes to much of the success of the apparatus, and enables a number of casting operations to be effected in rapid succession.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention, what I claim as new and useful and desire to secure by Letters Patent is:

1. In a centrifugal casting apparatus, a tubular drive shaft, a head plate on the outer end of the shaft, a die holder having a central opening spaced from the plate beyond said end of the shaft, rigid members connecting said plate and holder radially out from the opening thereof, another die holder disposed outwardly beyond the first named holder, rods parallel to the shaft secured on said other holder and slidably projecting through the first named holder radially out from the central opening thereof, a spider disposed between the head plate and first named holder on which the rods are secured at their adjacent end, and a shaft secured on the spider and projecting through the tubular shaft in axially movable relation thereto; there being means to move said last named shaft axially.

2. In a centrifugal casting apparatus, a rotary die holder, a die section separate from the holder, a plurality of screws mounted radially in the holder, the periphery of the die section being formed for substantially flat abutting engagement with the inner end of the screws and relatively small-diameter extensions projecting radially inward from the screws, the die section having sockets to receive said extensions.

ROBERT G. LE TOURNEAU.