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METHOD OF AND FLASK FOR FACILITATING SOLIDIFICATION OF METAL CENTRIFUGALLY CAST AGAINST A REFRACTORY LINING

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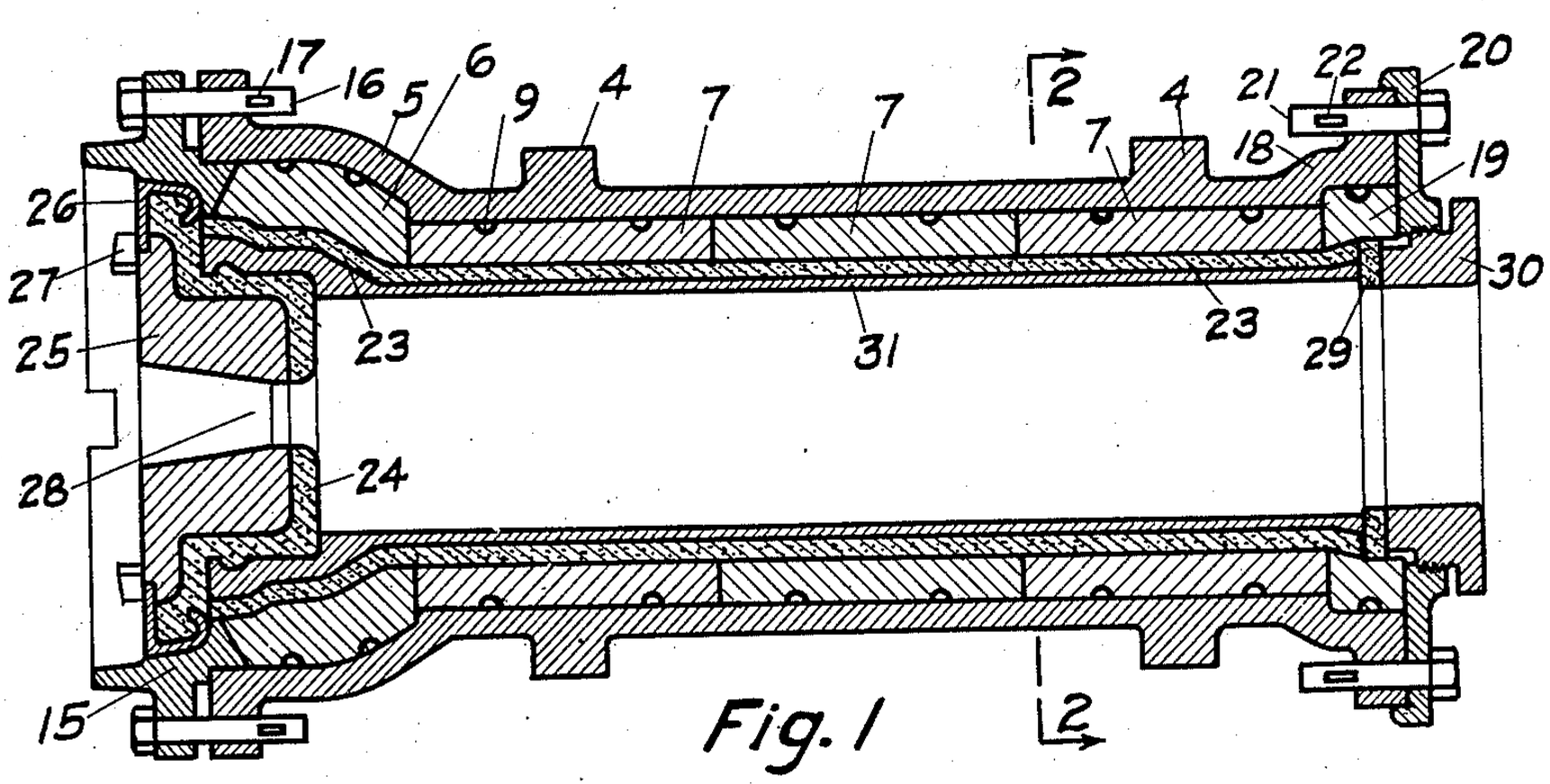

Fig. 1

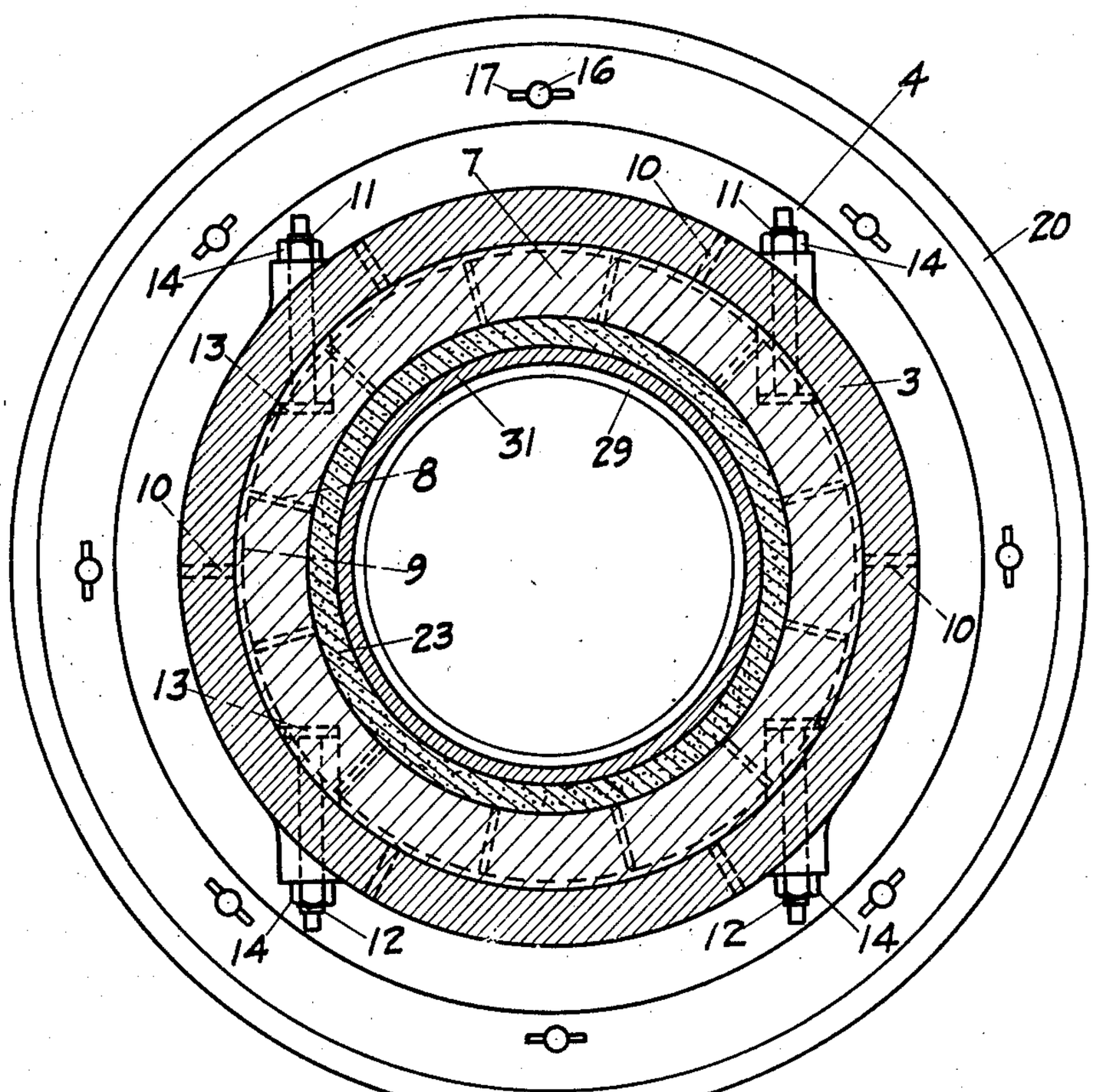

Fig. 2

Witnesses:

E. Sebastian

Inventor:

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UNITED STATES PATENT OFFICE

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METHOD OF AND FLASK FOR FACILITATING SOLIDIFICATION OF METAL CENTRIFUGALLY CAST AGAINST A REFRACTORY LINING

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This invention relates to improvements in method of and flask for facilitating solidification of metal centrifugally cast against a refractory lining.

The principal object of my invention is to facilitate solidification of metal from a fused state into a useful solid form and conserve heat now dissipated when metal pipe and other articles are centrifugally cast, without bringing about abnormal stresses of the metal during solidification, thereby making it possible to manufacture centrifugally cast products of superior quality in refractory lined moulds more efficiently than by methods now in use.

With the above and other objects in view, the present invention broadly considered, provides certain novel features such as will expedite the moulding, casting and extracting operations, as follows:

In the manufacture of centrifugally cast pipe by the usual method in which a rotary metal flask with a refractory sand lining is employed, both sensible heat and the latent heat of fusion of the metal are absorbed by the refractory sand lining during the casting operation and is rejected as each hot sand lining surrounding the hot pipe is removed, whereas; by my method, the heat is permitted to pass through a minimum thickness of refractory sand lining and is conducted and absorbed at a much higher rate by a silicon-carbide lining which is provided within an outer flask member, whereby a minimum quantity of heat is rejected as the thin sand lining is removed, while the heat absorbed by the silicon-carbide lining which remains within the rotary flask member is conserved and this absorbed heat is utilized to evaporate moisture from a subsequently rammed moist sand lining preparatory to a centrifugal casting period.

Another novel feature of my invention resides in the provision of a method of arranging and using a silicon-carbide lining within a rotary flask member adapted to receive an inner sand lining, constructed in such manner as will facilitate the solidification of metal centrifugally cast against said inner sand lining.

Another novel feature of my invention resides in the provision of a method of arranging and using a silicon-carbide inner core, about which is formed a baked sand bell-core which is inserted at bell end of the flask, for facilitating solidification of the otherwise slow cooling, thick bell end of centrifugally cast pipe.

Still another novel feature of my invention resides in the provision of a certain method of arrangement and use of prepared materials more fully illustrated in the drawing, described in the specification and set forth in the claims.

My invention is illustrated in the accompanying drawing, in which:—

Fig. 1— is a longitudinal section through a rotary mould containing a centrifugally cast pipe, in accordance with my invention.

Fig. 2— is an enlarged transverse section through said mould and pipe on line 2—2 of Fig. 1—.

Like numerals refer to like parts throughout the views.

It should be understood that the drawing is suggestive and the invention may be embodied in various forms other than the one shown.

A preferred form of flask constructed in accordance with my invention is as follows:

An outer flask member 3 is provided with band rails 4 which permit rotation of the assembled flask on its longitudinal axis when mounted upon rollers of a centrifugal casting machine. The bell end of the outer flask member is enlarged at hub 5 to receive a silicon-carbide heat absorbing flask hub lining 6. Inserted in the barrel of said outer flask member are a plurality of silicon-carbide heat absorbing lining units 7 which are provided with vent perforations 8 and annular vent grooves 9. The annular vent grooves register with vent perforations 10 which are provided through the wall of the outer flask member, serving to permit escape of gases and vapors.

Adjusting screws 11 and 12 shown in Fig. 2— bear against bearing plates 13 and serve to secure their respective alternate silicon-carbide heat absorbing lining units and are

locked by lock nuts 14. Four adjusting screws 11 for each respective alternate unit serve to force said unit against the opposite side of the outer flask member; likewise four adjusting screws 12 for each of the remaining alternate units serve to force each respective alternate unit against the opposite side of the outer flask member. A bell-core centering flange 15 is attached to the bell end of the outer flask member by key bolts 16 and wedge keys 17. The spigot end of the outer flask member is enlarged at hub 18 to receive a silicon-carbide heat absorbing spigot ring 19. A pattern centering flange 20 is attached to the spigot end of the outer flask member by key bolts 21 and wedge keys 22.

A heat absorbing flask having been prepared as above described, a moist sand lining 23 is rammed around a pattern which is centered at the spigot end by the pattern centering flange and at the bell end by the bell-core centering flange. After removing the pattern any suitable facing may be applied to the moist sand lining. A bell-core 24 having been formed around a silicon-carbide heat absorbing inner core 25 securely engaged by a core retaining ring 26 is inserted into the bell-core centering flange and secured by wedge keys 27. A Venturi flue 28 formed through the axis of the silicon-carbide inner core facilitates the acceleration of gases flowing from the bell end of the mould during the casting operation. A baked sand stop ring 29 is inserted into the silicon-carbide heat absorbing spigot ring and is held in place against the refractory sand lining by a stop bushing 30.

The prepared mould may then be delivered to a centrifugal casting machine where molten metal is poured into the rotating mould. After solidification has been facilitated by the silicon-carbide heat absorbing flask hub lining, inner core, lining units and spigot ring, the mould may be removed from the casting machine, and the sand lining and the centrifugally cast pipe 31 may be removed without removal of the silicon-carbide heat absorbing lining from the outer flask member. Another rammed moist sand lining may be formed within the flask and heat absorbed by the silicon-carbide heat absorbing lining may be employed to evaporate moisture from the moist sand lining preparatory to a repeated casting operation.

Various constructions may be employed other than that shown in the drawing and although I have described a construction and operation relating to the manufacture of pipe, it is not intended as a limitation of my invention which may be used in the manufacture of various cast products, and what I claim as being new and desire to secure by Letters Patent is:

1. A mold for the centrifugal casting of hollow bodies, composed of molded silicon carbide, and a rammed lining of molding sand, said lining covering each part of the mold with which the molten metal contacts during the casting.

2. A hollow mold for centrifugal casting, comprising a flask, a lining for the flask of molded silicon carbide, and a rammed facing for the lining of molding sand.

3. A refractory mold for the centrifugal casting of hollow bodies, including a limiting wall of silicon carbide, a rammed molding sand facing for the wall, and a head core including an inner core of silicon carbide and a moist sand facing for the core covering every part thereof engaged by the molten metal during casting.

4. A hollow mold for centrifugal casting, comprising a flask, a lining for the flask of molded silicon carbide, and a rammed facing for the lining of molding sand, the silicon carbide casting having radial vents and external annular grooves with which the vents communicate.

5. A head or bell end core for centrifugal casting, including an inner core or body of silicon carbide, and a facing of molding sand to contact with the molten metal molded onto the body.

6. A head or bell end core for centrifugal casting, including an inner core or body of silicon carbide, and a facing of molding sand to contact with the molten metal molded onto the body, said inner core or body having an axial opening for the purpose specified.

7. Mechanism for casting hollow bodies centrifugally, consisting of a mold composed of a body of silicon carbide and a molded facing of molding sand, and a head core including a body of silicon carbide and a facing of molding sand for the purpose specified.

In testimony whereof, I have signed my name to this specification this second day of March, 1927.

ARTHUR LOSEY.