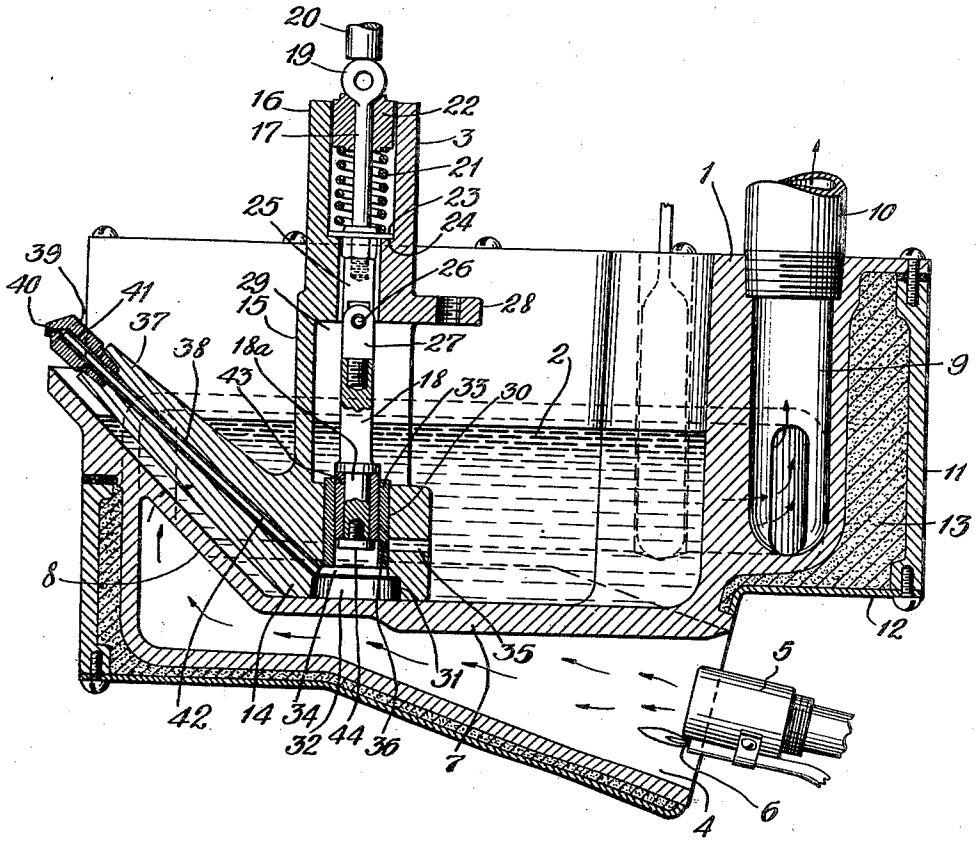
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DISCHARGE DEVICE FOR CASTING MACHINES

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DISCHARGE DEVICE FOR CASTING MACHINES

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This invention relates to casting or molding machines employing a pot or container for the heated metal or other casting or molding material employed, and particularly, to the discharge device commonly referred to as a gooseneck through which the casting or molding material is discharged; and the object of the invention is to provide a discharge device of the class described having improved means involving a piston or plunger for forcing the casting material through said device into the dies or molds, and particularly to the construction of a piston of such material as will withstand the temperatures of the casting material employed and at the same time be sufficiently hard to substantially eliminate wear or to reduce wear to a minimum; a further object being to provide a sleeve or cylinder in said device in connection with which the piston or plunger operates, which sleeve or cylinder is also composed of a material which will withstand the temperature of the casting material employed and also have the wearing qualities of the plunger so as to further eliminate wear between the engaging surfaces of the piston and sleeve and further whereby restricted clearance can be provided between the piston and sleeve; a further object being to provide a combined piston and sleeve or cylinder structure which, when exposed to relatively high temperatures and by virture of its low co-efficient of expansion and hardness, will have long life and maintain long accurate functioning; a further object being to provide the tubular discharge of the device or nozble with a rod controlling the area of the discharge passage to regulate and control the discharge of the casting material from the nozzle of the device; a still further object being to provide a universal joint coupling in the piston or plunger to insure proper alinement thereof in the sleeve or cylinder; and with these and other objects in view, the invention consists in a device of the class and for the purpose specified, which is simple in construction, efficient in use, and which is constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my invention are designated by suitable reference characters, and in which the drawing shows a longitudinal section through a pot and one of my improved discharge devices arranged therein.

For the purpose of illustrating one method of carrying my invention into effect and still further to illustrate the use thereof, I have indicated at 1 in the accompanying drawing a pot or container for the casting or molding material 2, which is to be intermittently discharged through the discharge device 3. Any type of pot or container may be employed, the one shown in the accompanying drawing forming the subject matter of a separate application and being illustrated simply to show one adaptation of the invention. The pot 1 has an outwardly and downwardly flared throat 4 at the lower surface thereof into which products of combustion are introduced through a suitable nozzle 5, the pilot light of which is indicated at 6.

The products of combustion in the pot shown circulate along the bottom wall 7 of the reservoir for the material 2, upwardly along the front wall 8 and then backwardly along the side walls of the reservoir into a common discharge 9 and then out through a pipe 10 which forms a stack or flue. The pot 1 includes an outer casing 11 and a lower cover plate 12 which serves to support suitable insulating material 13 around the walls of the pot 1 to retain the heat therein.

The discharge device 3 in the construction shown is in the form of what is commonly termed a gooseneck discharge and consists of a lower body portion 14 having an upwardly directed openwork extension 15, the upper end 16 of which is tubular in form to support the upper rod or part 17 of the piston or plunger 18. The part 17 has at its upper end a round or ball portion 19 in connection with which the operating pin or element 20 operates to depress the piston 18 against the action of a spring 21. The upper end of the spring 21 seats on a collar or sleeve 22 which bears against the end 19, and the lower end of said spring engages a disk or ring 23 which seats on a shoulder 24 formed in the tubular portion 16. Coupled with the lower end of the part 17 is a link 25 which is universally coupled, as seen at 26, with another link 27 secured to the piston or plunger 18. This universal coupling provides for automatic centering of the piston in the operation thereof. At the lower end of the tubular portion 16 is an apertured extension 28, by means of which the discharge device may be adjustably supported in the pot or container 1. As this means forms no direct part of the invention, further detailed description and showing thereof is not essential.

Between the lower end of the tubular portion 16 and the upper part of the body 14 is a space or chamber 29 which opens into the pot to expose the casting material to the plunger or piston 18 above the body 14, as is clearly illustrated in

the drawing. The body 14 has a vertical bore or passage 30 therein, the lower end of which is enlarged as indicated at 31 to receive a closure plug 32. At 33, I have shown a lining sleeve or cylinder fitting in the bore 30, and the lower end of which terminates short of the plug 32 so as to form a discharge chamber 34 within the body 14. The reservoir of the pot or the casting material 2 therein communicates with the chamber 34 through a passage 35 formed in the body 14, and another passage 36 formed in the sleeve or cylinder 33.

At one side of the body 14 is an upwardly and outwardly directed tubular portion 37, the bore or passage 38 of which communicates with the chamber 34 and opens into a nozzle 39 secured in the upper free end of the tubular extension 37. The nozzle 39 has a small discharge orifice 40 which is adapted to communicate with the impression or mold chamber of the dies or molds of a casting or molding machine. The dies or molds are not shown, as they form no direct part of this invention.

Arranged within the bore 38 and also extending into the bore 41 of the nozzle 39 is a feed control rod 42, the purpose of which is to restrict the passage in the bores 38 and 41 so as to limit the amount of casting material therein to regulate the feed or discharge of the casting material through the nozzle 39 and also to provide the proper suck-back action for drawing the casting material back into the pot or into the chamber 34. By providing a rod 42 of the class described, the cleaning out of the passages 38 and 41 from time to time may be facilitated, whereas, if a small bore were employed, the tendency of clogging and the difficulty of cleaning would prevail. The diameter of the rod may be varied to suit or be consistent with the requirements in supply of the casting material into the molds or dies, depending upon the size of the impression or mold cavity.

The lower end of the piston or plunger 18 is reduced as seen at 18*a*. Arranged on this reduced portion is a tube 43 which forms the piston proper and fits and operates in the sleeve or cylinder 33 so as to force the casting material 2 arranged in the chamber 34 as well as in the lower portion of the cylinder 33, below the piston, into the passages 38 and 41, it being understood that as the piston passes the port 36, the communication to the reservoir of the pot will be closed and the only exhaust or discharge is through the orifice 40 in the nozzle 39. However, in the upward stroke of the piston, casting material is drawn back into the chamber 34 as above stated, and additional casting material is drawn into said chamber through the ports 35 and 36. A screw or cap 44 is employed to retain the piston tube 43 in position on the reduced end 18*a* of the piston rod 18.

It is preferred that the cylinder or sleeve 33 as well as the piston tube 43 be composed of a material having a low co-efficient of expansion, and one which almost approaches that of "Invar metal". I have found from experimentation and tests that certain metals, such as, tungsten carbide, commonly referred to as "Carboloy" or tantalum carbide, commonly referred to as "Vascaloy Ramet", are suitable for this purpose in that they will withstand high temperatures of casting materials employed in machines of the class under consideration, such as the various casting metals or metal alloys, and at the same time, will be suitable for other casting or molding materials, especially where these materials have a relatively high melting point. Furthermore, the "tungsten carbide" and "tantalum carbide" are also hard metals which will produce long wearing life, notwithstanding their being subjected to the high temperatures of the casting material employed. It is well known to use these metals as substitutes for diamonds in the machining of hard metals, but it is one of the distinctive features of my invention to utilize these types of metals on the exposed wearing surfaces of reciprocating or rotating parts to provide long life and close fitting and especially so where the parts are subjected to relatively high temperatures or become hot in actual use due to stresses, strains, etc. In this respect, it will be apparent that the showing in the accompanying drawing is illustrative of only one method of carrying my invention into effect or to show one commercial use or adaptation thereof.

In mounting the piston tube 43 in position upon the reduced end 18*a*, suitable clearance will be provided to allow for the expansion of said reduced portion 18*a* so as to avoid the possibility of breakage to said tube which is substantially non-expansible. In this connection, other methods of mounting or supporting the sleeve may be employed or in fact for constructing the piston end as a whole. For example, in some cases, where a smaller piston can be employed, the entire piston may be composed of a rod of the material specified. The sleeve or cylinder 33 is simply shrunk into the body 14, said body being heated sufficiently to expand the metal to receive the cylinder sleeve 33 so that in chilling the metal, the body will shrink around said sleeve, the shrinkage being computed so as not to in any way affect the structure of said sleeve or cylinder. Here again, it will be understood that the sleeve or cylinder, which constitutes primarily a liner, may be mounted and supported in any desired manner.

While I have referred to two metal compounds which have the desired characteristics, other compounds of the same or substantially the same characteristics may be employed, and these may be varied to suit the different temperatures, and especially, the wide range of temperatures of the casting materials employed.

By reason of the fact that the parts 33 and 43 are composed of the same material, having the same hard and substantially non-expanding characteristics, these parts may be fitted snugly one within the other to effect a substantial seal between the parts and yet permit free relative movement which brings about highly efficient operations in casting machines of the kind under consideration, and this is especially true in casting machines operating at high speed wherein a large number of castings are made per minute, such for example, as the casting of the coupling links or scoops on the stringers of separable fasteners as disclosed in Patent No. 1,975,966 dated October 9, 1934, as well as in making or die cast or molded parts, devices or elements. However, in dealing with casting or molding machines, these structural features will be advantageous regardless of the speed of the machine, especially from the standpoint of the accuracy in the plunger operation in discharging the required amount of the casting material into the impression or mold cavity or cavities of the die. While the question of wear is not such an important factor in the slower types of machines, close fitting and ease of operation of the plunger or piston and

the ability of the parts to withstand the temperature of the casting material are important features.

The operating pin or element **20** is operated through the usual means on a die cast machine to timely discharge the casting material from the orifice **40** of the nozzle **39** into the dies when in closed position and the importance of utilizing the universal coupling as at **26** will be apparent, bearing in mind the close fitting of the piston within the sleeve or cylinder **33**.

If, at any time, it is necessary or desirable to remove the sleeve or cylinder from the body **14**, this body may be heated sufficiently to cause the same to expand away from said sleeve permitting the easy removal thereof. In view of the fact that the materials employed in the parts **33** and **43** are expensive, when repairs become necessary after long use thereof, a saving can be effected by simply grinding the bore of the sleeve or cylinder **33** and fitting a slightly larger piston sleeve **43** therein. If the removed piston sleeve requires grinding and finishing, it can be fitted into a sleeve or cylinder **33** having a slightly smaller diameter. In this way, from time to time, over relatively long periods, a renewed use of the parts may be effected by simply renewing or replacing some of the parts, but, in operating a large number of machines, the number of renewed parts required would be relatively small, especially from the standpoint of wear.

The sleeves or tubes **33**, **43**, may be made of different diameters and thicknesses as well as in different lengths, depending upon the relative movement of the member or part in conjunction with the bearing surface thereof.

While I have referred to two types of materials or metal alloys or compounds, other metal alloys having similar or substantially similar characteristics from a standpoint of expansion as well as from the standpoint of hardness may be employed. In the present adaptation of my invention, the use of two of said metallic bodies fitting one within the other with their adjacent surfaces ground to a very close fit, constitutes an important feature from the standpoint of effecting a seal between said parts and assuring a transmission of the casting material under pressure through the orifice of the discharge nozzle into the dies or molds.

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

1. A gooseneck for discharging casting material in die casting machines, said gooseneck comprising a body having a pump cylinder, a piston in said cylinder, means for admitting casting material into the cylinder, the cylinder having a discharge passage through which the casting material introduced into the cylinder may be discharged in the operation of said piston, the cylinder having a liner and the piston a sleeve fitting closely and operating in said liner, and said liner and sleeve being each composed of tungsten carbide.

2. A gooseneck for discharging casting material in die casting machines, said gooseneck comprising a body having a pump cylinder, a piston in said cylinder, means for admitting casting material into the cylinder, the cylinder having a discharge passage through which the casting material introduced into the cylinder may be discharged in the operation of said piston, the cylinder having a liner and the piston a sleeve fitting closely and operating in said liner, said liner and sleeve being each composed of tantalum carbide.

3. A gooseneck for discharging casting material in die casting machines, said gooseneck comprising a body having a pump cylinder, a piston in said cylinder, means for admitting casting material into the cylinder, the cylinder having a discharge passage through which the casting material introduced into the cylinder may be discharged in the operation of said piston, the cylinder having a liner and the piston a sleeve fitting closely and operating in said liner, said liner and sleeve being each composed of one of a group consisting of tungsten carbide and tantalum carbide.

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