Aug. 19, 1941. A. H. JUNG 2,252,808

SLIP-OFF INGOT AND FEEDER THEREFOR

Filed Aug. 9, 1939 2 Sheets-Sheet 1

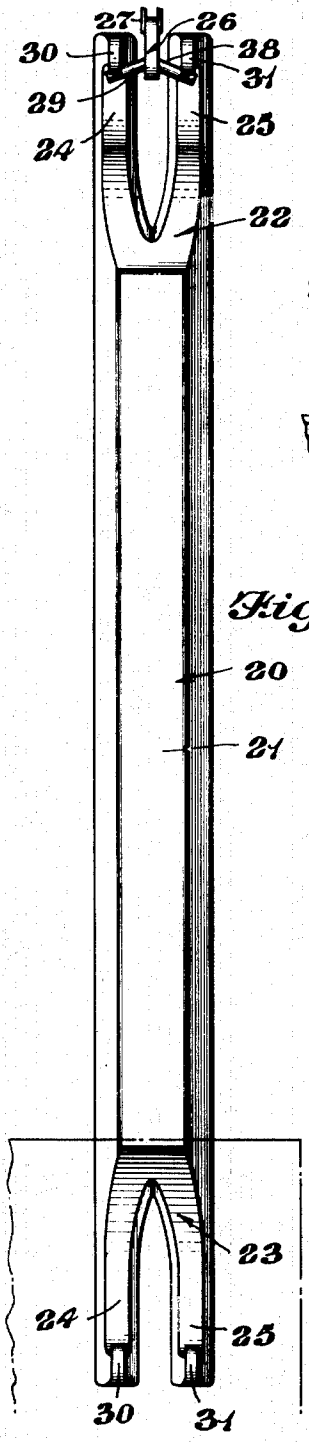


Fig. 1.

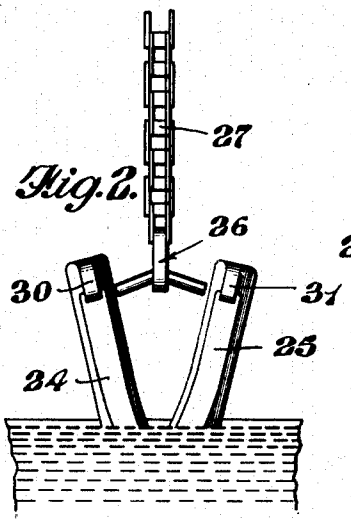


Fig. 2.

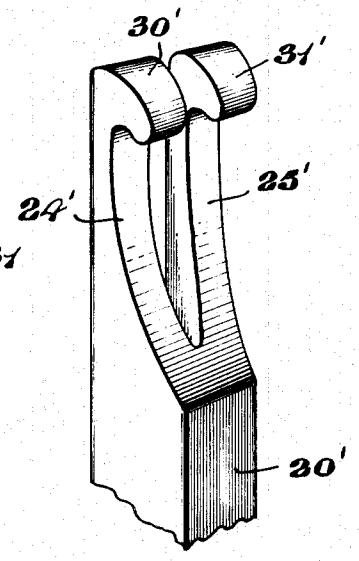


Fig. 5.

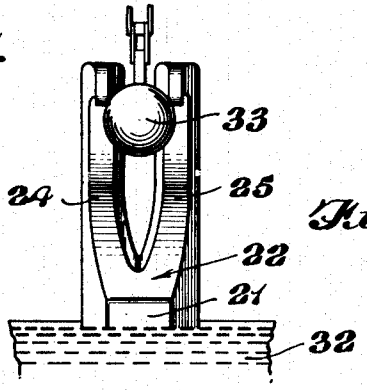


Fig. 3.

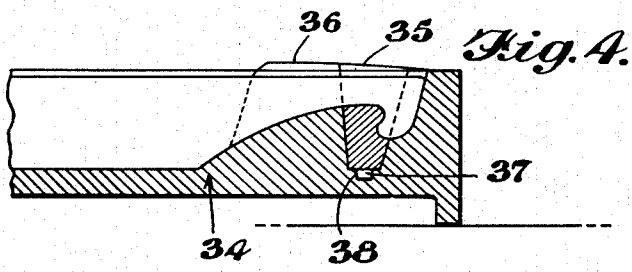


Fig. 4.

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SLIP-OFF INGOT AND FEEDER THEREFOR

Filed Aug. 9, 1939 2 Sheets-Sheet 2

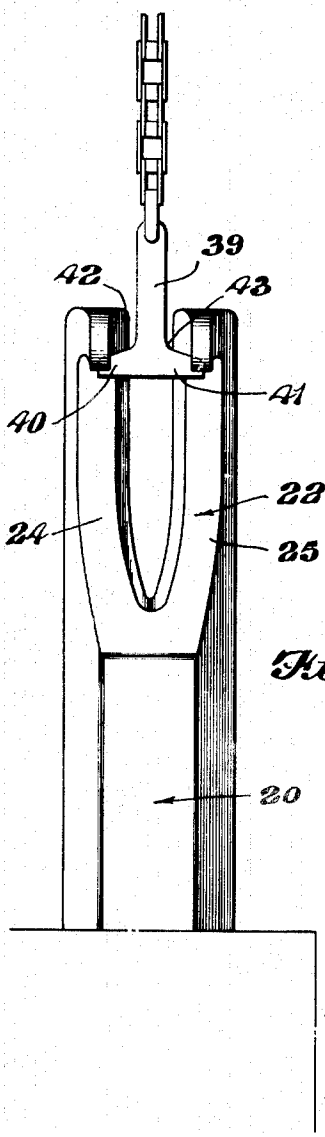


Fig. 6.

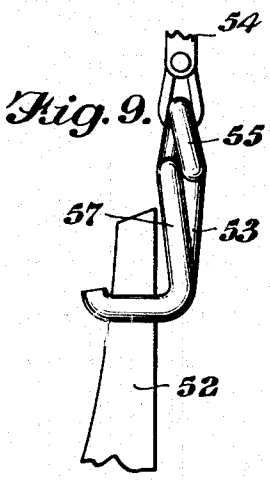


Fig. 9.

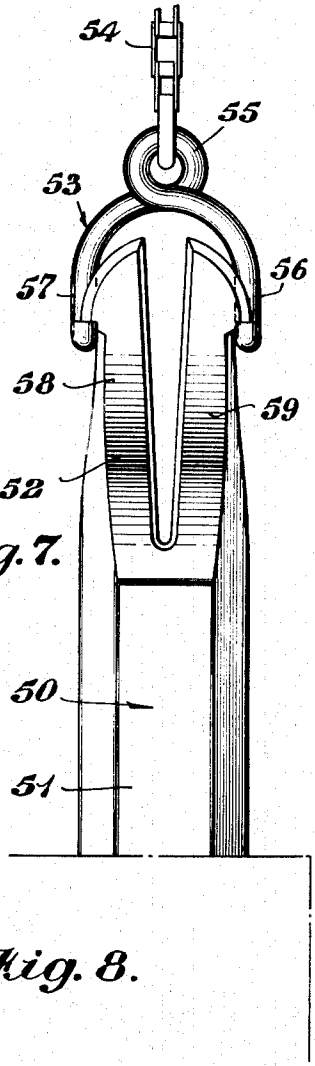


Fig. 7.

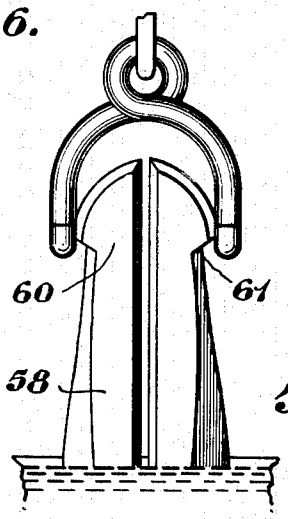


Fig. 8.

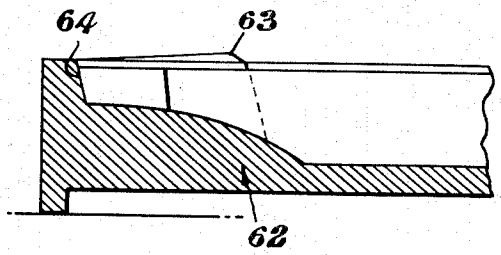


Fig. 10.

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SLIP-OFF INGOT AND FEEDER THEREFOR

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Application August 9, 1939, Serial No. 289,298

12 Claims. (Cl. 22—80)

This invention relates to ingots, molds, and the feeding of the ingots into a molten bath; more particularly the invention relates to type metal ingots of the automatic slip-off variety which are adapted to be associated with the automatic feeders usually found in cooperative relation with line type casting machines and the like, the association of the ingots with the feeders, and the design of the ingot ends which are adapted to be associated with the feeders, which ingot ends facilitate the disassociation of the ingot ends from an ingot feeder after the body portion of the ingot has been fed and melted.

Prior to the instant invention, elongated type metal ingots having pierced ends have been associated with automatic feeders of the "Margach" type by the threading of the pierced end to the feeder hook suspended from a movable chain incorporated in the feeder. Such ingots permit of automatic feeding of the body portion of the ingot up until the ingot end and no provision is made for the automatic removal of the ingot end which is associated with the feeder hook. Such prior ingots are known to the trade as "Margach" ingots. In order to provide for the automatic slipping off of the ingot end, after the body portion of the ingot has been melted, the pierced ends of the ingots of the "Margach" type have been sawed by hand in order to provide a "slotted ear" and thereby permit of the automatic disassociation of the ingot end from a feeder hook upon the metling away of the body portion of the ingot up to the pierced portion of the ingot end.

Not only have slotted eared ingots been made by hand, but in later developments, molds have been made to cast "Margach" ingots with a slot formed therein. Such molds comprise relatively heavy or thick cores corresponding to the piercings of the ingot end and relatively thin and fragile webs integral with the core and end wall of the mold, which webs correspond to the slot of the automatic slip-off slotted eared ingot. While ingots made in such molds incorporate the automatic slip-off feature, yet the molds have been relatively unsatisfactory because of their susceptibility to breakage at the junction of the web with the core and of the web with the mold walls and also breakage of the web at intermediate portions. The disadvantage of ingots made in such molds lies in the fact that they are relatively difficult to thread and require careful attention by the operator.

It is an object of the instant invention to provide novel ingot molds capable of casting automatic slip-off ingots, which molds are relatively substantial in configuration and are relatively rugged by reason of such configuration.

It is another object of the instant invention to provide novel slip-off ingots of relatively rugged end characteristics.

It is a further object of the instant invention to provide novel associating means between the feeder and the ingot to be fed in order to facilitate the association of the ingot with the feeder.

Other objects and the nature and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a top plan view of an ingot in accordance with the invention and illustrating one form of feeder associating means;

Fig. 2 is a fragmentary view in elevation of an ingot end just at the time of its disassociation from the feeder;

Fig. 3 is a view similar to Fig. 2 but illustrating an end of the ingot in Fig. 1 in cooperating relation with a second form of feeder associating means;

Fig. 4 is a fragmentary sectional view of a mold for casting ingots similar to that illustrated in Fig. 1;

Fig. 5 is a fragmentary perspective view of an ingot end similar to that illustrated in Figs. 1 and 3 but slightly modified;

Fig. 6 is a view similar to Fig. 3 but illustrating a third form of feeder-ingot associating means;

Fig. 7 is a view similar to Fig. 6 illustrating a third form of ingot and a fourth form of feeder-ingot associating means;

Fig. 8 is a view similar to Fig. 2 but illustrating the ingot in Fig. 7 subsequent to the time of its disassociation from the feeder;

Fig. 9 is a side elevational view of the ingot and associating means illustrated in Fig. 7; and,

Fig. 10 is a view similar to Fig. 4 but illustrating a fragment of a mold for casting ingots similar to that illustrated in Fig. 7.

Referring to the drawings and particularly to Figs. 1 and 2, an ingot **20** having a body portion **21** and symmetrical end portions **22** and **23**, each of which are bifurcated and include arms **24** and **25**, is illustrated as in cooperating relationship with the feeder-ingot associating means **26** which is secured to feeder chain **27**. The feeder-ingot associating means **26** may comprise a pair of downwardly depending rod-like members **28** and **29**, the outer portions of which engage the hook-like extensions **30** and **31** from the arms **24** and **25**, respectively.

It is of significance that the opposite ends 22 and 23 of the ingot are symmetrical in order to facilitate the association of the ingot with the feeder with the least amount of attention on the part of the attendant or operator for either end may be associated with the lower portion of the feeder chain. It will be appreciated that these ingots are as a general rule relatively heavy and a minimum of handling thereof is necessary in accordance with the instant invention. It is also of significance that each ingot end is so constructed that the space between adjacent portions at the outermost edges of the arms 24 and 25 are as far apart or further apart than any other adjacent portions of the arms whereby threading or association of the ingot with the feeder requires a minimum of attention and skill. As illustrated in Fig. 1, once the ingot end is associated with the feeder chain, the ingot will automatically take a symmetrical position to insure the disassociation illustrated in Fig. 2 upon the melting away of the body 21 of the ingot 20. After the body portion 20 of the ingot 21 has been melted, there is no support between the two arms 24 and 25 and the angle of inclination of the depending rod-like members 28 and 28 is such as to facilitate the slipping off of the said arms 24 and 25 into the molten bath 32.

Not only may the feeder-ingot associating means take the form illustrated in Figs. 1 and 2, but it may simply comprise a sphere 33 or similar geometrical form as illustrated in Fig. 3, and still effect slip-off action upon the melting away of the ingot end 22 from the body portion 21, and the fabrication of the associating means 33 may be effected by conventional machinery and at relatively low cost. It is well known that spheres like spheres 33 may be fabricated by automatic machinery whereas hooks must be cast or forged. The associating means 26 illustrated in Figs. 1 and 2 may also be fabricated at relatively low cost by reason of the fact that the parts are made of conventional rolled stock, the cost of which, as is well known, is a minimum.

When desired, the hooked end portions 30' and 31' of the arms 24' and 25' may be made relatively rugged as illustrated in Fig. 5 in order to reduce premature breakage, due to handling, to a minimum, when the material of which the ingots 20' are cast is very fragile. This ingot 20' is adapted to be cast with one of its long sides in the bottom of the mold.

The ingots 20 and 20' may be cast in a mold 34, see Fig. 4, comprising a removable element 35 which extends within the underside of the hooks formed by the hooked end portions 30 and 31 as well as through the relatively rugged fin 36 which serves to bifurcate the ingot ends 22 and 23 and form the arms 24 and 25. The removable element 35 may be formed with an aligning plug 37 formed in its lowermost portion cooperating with a socket 38 arranged in the mold 34. With the removable element 35 in position an ingot 20 may be cast in the mold 34 to form an ingot such as illustrated in Figs. 1 and 4. Upon removal of the ingot the element 35 will be removed simultaneously. The removable element 35 may be then disassociated from the ingot and again located within the mold 34 with the plug 37 setting within the socket 38 and a second ingot cast within the said mold.

Referring to Fig. 6, the ingot 20 is identical with that illustrated in Fig. 1, but the feeder-ingot associating means is somewhat different and includes simply a T-shaped stamping 39 which functions substantially the same as the associating means 26 shown in Figs. 1 and 2. It will be appreciated that the T-shaped stamping 39 is relatively simple to manufacture and, what is very important, the ingot end 22 may be very readily associated therewith and if there is any inaccuracy in the association, the horizontal extending portions 40 and 41 have their upper sides 42 and 43 so inclined as to make for the automatic alignment of the ingot 20 and thereby insure proper feeding of the ingot and automatic slipping off of the arms 24 and 25 of the ingot end 22.

Referring to Figs. 7, 8 and 9, an ingot 50 having a body portion 51 and a slip-off ingot end 52 is illustrated in cooperating relation with the bent rod feeder-ingot associating means 53, which in turn is suspended from the bottom of the feeder chain 54. The associating means is symmetrical to its vertical axis and comprises a loop 55 at its upper portion and a pair of hook-like arms 56 and 57, see Fig. 9 in particular. It is of significance, that in this form of the ingot, there be sufficient space between adjacent portions of the arms 58 and 59 of the ingot end 52 to permit them to take the position illustrated in Fig. 8 subsequent to the melting of the body 51 of the ingot and the disassociation of the arms 58 and 59 from the hook-like arms 56 and 57 of the associating means 53. The upper outside portions of the arms 58 and 59 of the end 52 of the ingot 50 are formed with cooperating notches 60 and 61 which engage the upper surface of the hook-like arms 56 and 57 of the associating means 53 during the normal feeding to the body of the ingot 50. In the embodiment of the invention illustrated, notches 60 and 61 are angular and are greater than ninety degrees in opening, but it is to be understood that it is within the scope of the invention to form these notches in the shape of hooks or at angles less than ninety degrees. It is preferred, however, to form the notches 60 and 61 as illustrated in Figs. 7 and 8 in order to facilitate the slip-off action. This slip-off action takes place by virtue of the great eccentricity of disposition of center of gravity of the disconnected arms 58 and 59 of the ingot end 52. One advantage of this form of ingot is that the disconnected arms 58 and 59, subsequent to the melting of the body portion 51, fall inwardly of the associating means 53, thereby incurring a minimum of detrimental splash and requiring a minimum of space about the melting pot. In fact, a smaller melting pot may be utilized in connection with the operation of this form of the device when desired.

Referring to Fig. 10, the mold 62 is relatively very rugged and comprises simply a relatively thick slightly tapered strong fin 63 extending from the end wall 64 of the mold 62. If desired, the bottom portion of the mold cavity adjacent the end wall 64 may be elevated, as illustrated in Fig. 10, to reduce the dimension of the ingot end, but this is not necessary and the ingot end may involve the same depth as the body portion of the ingot, without departing from the spirit of the invention. It is of significance that this type of ingot may be cast in a one piece mold and that the provision of draft presents no problem by virtue of the configuration of the slip-off end of the ingot.

It is to be understood that all of the forms of ingots described may have symmetrical opposite ends as depicted in Fig. 1, and that the feeder-ingot associating means illustrated in Figs. 1, 3

and 6 are interchangeable and that while the feeder-ingot associating means for the ingot 50 has been made of rod stock, that this rod stock may also be used in connection with the form of a one piece feeder-ingot associating means for use with the ingots 20 and 20'.

In accordance with the invention, the ingots 20 and 20' and 50 may be type metal ingots for use in association with the automatic feeders of the "Margach" type, and other similar feeders, that each will provide for automatic slipping off of their ends subsequent to the melting of the body portions thereof and they each lend themselves to ready association with feeder chains and automatic alignment therewith. Further, the ingot 50 is particularly desirable for use in connection with machines utilizing very small melting pots and where the metal is precious and it is desired to have a minimum of splashing and also in such cases where splashing is undesirable for other reasons.

The molds 34 and 60 have been so designed as to comprise relatively substantial and rugged elements and are of such configuration as to eliminate relatively thin and fragile webs found in prior molds for casting the slotted ear type of slip-off ingot.

It will be obvious to those skilled in the art that various changes may be made in this device without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. A slip-off ingot comprising an elongated body portion and a bifurcated end portion including a pair of symmetrical arms hooked at their outermost ends, the distance between adjacent sides of said arms being at least as great at the outermost portions thereof as between the adjacent sides at any intermediate position located between the outermost portion and the junction of the arms with the body portion, whereby the said ingot end will be of the automatic slip-off type and at the same time will be relatively massive in configuration and correspondingly strong.

2. A slip-off ingot having an elongated body portion and an end portion comprising a pair of arms extending therefrom, the said arms being formed to cooperatively engage a feeder associating means, the distance between adjacent sides of the said arms at their outermost portions being at least as great as between intermediate portions of the adjacent sides of said arms between the outermost portions thereof and the innermost portions thereof.

3. A slip-off ingot comprising an elongated body portion and a pair of symmetrical end portions, each of said end portions comprising a pair of symmetrical arms, each of said arms being formed with a full hook at its outermost portion.

4. A slip-off ingot comprising an elongated body portion and an end portion, said end portion including a pair of arms, each of said arms being formed with a hooked outermost portion, said hooked outermost portions extending in spaced parallel planes.

5. A slip-off ingot comprising an elongated body portion and an end portion, said end portion comprising a pair of arms extending in a direction away from each other along adjacent sides unto the outermost portions thereof, said arms being formed with feeder engaging indentations.

6. A slip-off ingot comprising an elongated body portion and an end portion, said end portion comprising a pair of arms, said arms having feeder engaging formations, said formations being located on said arms in positions spaced from adjacent sides of said arms.

7. A slip-off ingot comprising an elongated body portion and an end portion, said end portion comprising a pair of arms having top and bottom sides, adjacent sides, and outer sides, said arms formed on their outer sides with depressions to effect feeder engaging portions.

8. The combination of a feeder and a slip-off ingot comprising an ingot having a bifurcated ingot end to form a pair of arms, the said arms being formed with feeder engaging indentations, an ingot engaging element associated with said feeder for supporting said ingot end while it is attached to the remainder of the ingot, said ingot engaging element comprising a portion secured to the feeder and independent of the ingot end, said ingot engaging element also comprising a pair of extending arms for engaging the arms of said ingot end.

9. The structure in claim 8, said ingot arms each having sloping upper ends to facilitate disassociation of the ingot end from the ingot engaging element of the feeder upon the melting away of the body portion of the ingot.

10. The structure recited in claim 8, the feeder engaging element comprising an inverted T-shaped plate.

11. The structure recited in claim 8, the ingot engaging element comprising a body member and a pair of depending rod-like arm extensions.

12. The structure recited in claim 8, the ingot engaging element comprising a piece of bent rod stock including a complete loop at its upper end and a pair of hooked arms extending therefrom.

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