March 26, 1957 J. S. NELSON 2,786,248

PERMANENT MOLD FOR MAKING CAST STUD LINK CHAIN

Filed July 7, 1953 2 Sheets-Sheet 1

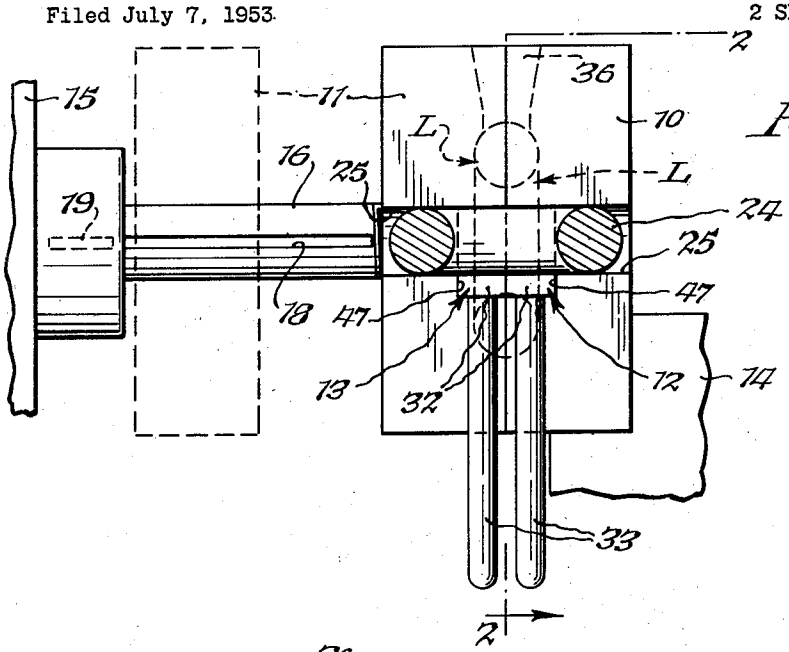

Fig. 1.

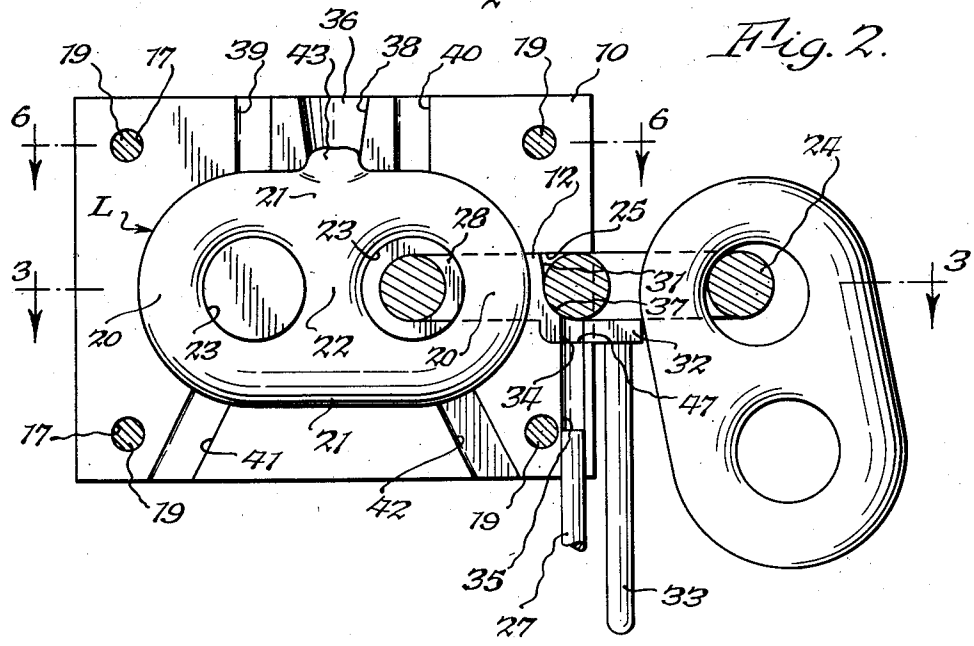

Fig. 2.

INVENTOR.
BY John S. Nelson
Popp and Sommer
Attorneys.

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Filed July 7, 1953 2 Sheets-Sheet 2

Fig. 3.

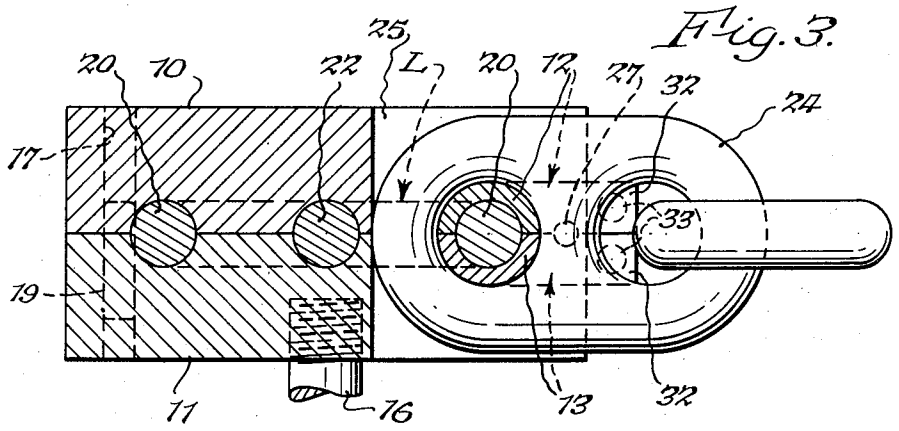


Fig. 4.

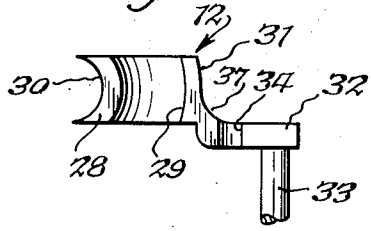


Fig. 5.

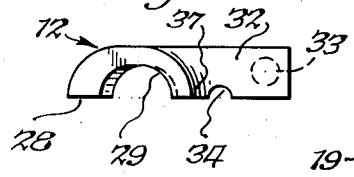
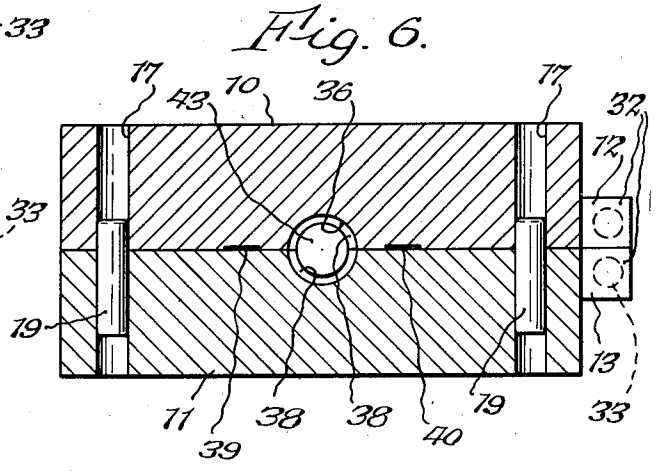


Fig. 6.



INVENTOR.
John S. Nelson
BY
Popp and Sommer
Attorneys.

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PERMANENT MOLD FOR MAKING CAST STUD LINK CHAIN

John S. Nelson, Buffalo, N. Y.

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2 Claims. (Cl. 22—137)

This invention relates to a permanent mold for making cast stud link chain known as anchor chain of aluminum or bronze. The link in such a chain consists of the usual ring connected by a transverse stud so as to provide the link with two openings or eyes through which the curved ends of the adjacent links in the chain pass.

It is known to cast stud links of iron or steel in sand molds but this method of molding is relatively time consuming and expensive and moreover is unsuited for aluminum or bronze casting.

The primary objective of the present invention is to provide a permanent mold for use in the casting of aluminum or bronze stud link chain. Such chain, particularly when made of aluminum, has the advantages of being light in weight and non-corrodible under the conditions which adversely affect ferrous type chain so that maintenance of the chain is minimized.

Another object is to provide such a mold which permits the stud link to be cast so as to be connected to a similar preformed link whereby a chain of such links can be expeditiously produced.

A further object is to provide a multiple part mold which can be both rapidly assembled preparatory to the casting operation and also quickly disassembled to free the link after it has been cast.

Other objects and advantages will be apparent from the following description and drawings in which:

Fig. 1 is an elevational view of one side of a permanent mold embodying my invention and showing the mold closed with stud links arranged therein and further showing the mold associated with power operated apparatus, fragmentarily illustrated, for opening and closing the mold.

Fig. 2 is a vertical sectional view along the parting line of the mold shown in Fig. 1, this view being taken on line 2—2 thereof.

Fig. 3 is a horizontal sectional view thereof taken on line 3—3 of Fig. 2.

Fig. 4 is an elevational view of the inner face of one of the mold inserts shown in Fig. 1.

Fig. 5 is a top plan view of the mold insert shown in Fig. 4.

Fig. 6 is a horizontal sectional view of the mold and taken on line 6—6 of Fig. 2.

The permanent mold embodying my invention is shown as having four parts 10, 11, 12 and 13. The mold parts 10 and 11 are in the form of metal blocks with the part 10 being shown as stationary as by being rigidly connected to the base 14 and the part 11 being movable in a horizontal direction for opening and closing the mold. As shown, the movable mold part 11 is moved by a piston and cylinder device 15, preferably actuated by compressed air, which includes a piston rod 16 emerging from the cylinder and suitably connected at its outer end to the block 11. The piston rod 16 is further shown as having a longitudinal keyway 18 which cooperates with a key 19 to prevent turning of the mold part 11 during

movement thereof and thereby assure proper registry of the mold parts 10 and 11 when the mold is closed. The balance of the compressed air actuating mechanism will be understood to those skilled in the art and hence has not been illustrated in the drawings hereof.

To assure further registry of the mold parts 10 and 11, the block 11 is shown as having four dowel pins 19 arranged adjacent the corners thereof (Fig. 2) and adapted to be received in recesses 17 provided in the block 10 (Fig. 6). These pins and recesses are provided respectively on and in the vertical meeting faces of the mold blocks 10 and 11.

These vertical meeting faces are suitably recessed to provide jointly a mold cavity to form the cast stud link L. As shown in Fig. 2, the stud link L is generally in the form of an elongated ring having curved ends 20, 20 and straight sides 21, 21 connected by a centrally disposed transverse stud 22 so as to provide a pair of eyes or openings 23.

In order to cast one curved end 20 of the link L through the eye of an adjacent link 24 which has been preformed and is similer to the link L, I slot the mold blocks 10 and 11 at one side as indicated at 25 and in such slot removably arrange the mold parts 12 and 13. These parts or inserts 12 and 13 are identical to each other except that one is contoured in reverse to the other so as to complement each other as hereinafter described. The upper and lower walls of the slot 25 are parallel and slidingly receive the upper and lower parallel surfaces of the inserts 12 and 13. Each such insert has a flat vertical inner side face 28 which engages with the corresponding face of the other insert and each such face is recessed with a curved groove 29 so that these grooves jointly provide a round and curved form for the molding of the intermediate portion of the curved end 20 of the link L. The inner ends of the inserts 12 and 13 are externally grooved for their full height as indicated at 30 to engage the curved end of the link 24. The outer ends of the inserts are preferably convexly rounded as indicated at 31 so as to accommodate the intermediate cross part or stud of the link 24.

Each of the inserts 12 and 13 has a downwardly offset arm 32 extending outwardly from the outer end thereof. When assembled in the mold these arms extend outwardly beyond the sides of the mold blocks 10 and 11 as shown in Fig. 2. A handle 33 is shown as depending from the outer extremity of each arm 32.

In order to lock the inserts 12 and 13 to the mold blocks 10 and 11 when the mold is fully assembled, the arms 32 are provided with semi-cylindrical vertical grooves 34 which register with corresponding grooves 35 provided in the meeting faces of the mold blocks 10 and 11 below the slot 25 so as all jointly to form a continuous cylindrical hole leading upwardly from the bottom of the mold and into which a locking pin 27 can be inserted from below. The pin 27 is shown in Fig. 2 as being partly inserted in this hole.

It will be noted that the inner end of the slot 25 is rounded as shown in Fig. 2 so as to receive the curved surface of the end of the link 24 and permit the stud of this link to be arranged behind the inserts 12 and 13 against the curved surfaces 31 thereof. Also, the inserts when together have a total width such that they are closely embraced by the inner eye of the link 24 as shown in Fig. 3. Referring to Fig. 2, it will also be noted that the stud or cross bar of link 24 rests on the upper surfaces of the arms 32 of the inserts, the upper surface at the connection of each arm with the main body of the respective insert being suitably curved, as indicated at 37 in Fig. 4, to accommodate the cross sectional curvature of the stud. It is further to be noted that the lower surface of the slot 25 in the mold

blocks 10 and 11 is recessed or downwardly stepped for the width of the inserts, as indicated at 47 in Figs. 1 and 2, adjacent its outer end to accommodate the downward offset of the arms 32 of the inserts. The inserts 12 and 13 cannot turn or twist on the mold blocks 10 and 11.

Thus when the inserts 12 and 13 are assembled with the mold blocks 10 and 11 and locked in position, the grooves 29 in these inserts jointly form part of the mold cavity for the link L. Molten metal is introduced into this cavity through a gate 36 provided by complementary grooves 38—38 in the opposing vertical faces of the mold blocks 10 and 11. One or both of such vertical faces is also provided with shallow broad grooves leading from the exterior of the mold blocks to the mold cavity. Four such grooves 39, 40, 41 and 42 are shown in Fig. 2 with the grooves 39 and 40 being arranged on opposite sides of the filling groove 38 in the block 10 and the grooves 41 and 42 being on this block below the cavity. The grooves 39, 40, 41 and 42, in cooperation with the inner vertical face of the mold block 11 form vents for the mold cavity as shown in Fig. 6. By providing such shallow and broad vents, adequate venting area is provided and the molten metal will not flow into these vents adjacent the mold cavity. The grooves 39, 40, 41 and 42 are only several thousandths of an inch deep and I have found that the molten metal will not flow into these grooves. While I have shown these grooves as provided only in the inner vertical face of the mold block 10, it will be understood that they can be provided instead in the inner vertical face of the mold block 11, or registered grooves can be provided in both faces as long as the thickness of the vent hole formed jointly by them is not more than a few thousandths of an inch. Also, of course, the direction of the grooves and their number can be varied from that shown in the drawings as long as provision is made for a liberal venting of the mold cavity. With such a venting arrangement I have found that good sound links can be cast with a very low percentage of rejects because of blow holes and the like.

Assuming the mold to be open and the inserts 12 and 13 removed and it is desired to cast a stud link so as to be interconnected to a preformed stud link, the mold blocks 10 and 11 are first closed or brought together by operating the piston and cylinder device 15 to move the piston rod 16 to the right as shown in Fig. 1. The two inserts 12 and 13 are then held together with their side faces 28 contacting each other and preformed stud link such as link 24 is arranged thereon. In placing the link on the inserts the curved end of the link is first placed in the grooves 30 and the cross bar or stud of this link is then turned down to fit behind the curved surfaces 31 and 37 of the inserts. The inserts 12 and 13 with the stud link 24 thereon are then slid into the slot 25 in the closed mold blocks 10 and 11 until the grooves 34 in the inserts aline with the grooves 35 in the mold blocks. The locking pin 27 is then inserted into these grooves. Thus the preformed stud link 24 prevents separation of the inserts in a lateral or horizontal direction as does also the offset arms 32 being arranged in the stepped recess 47 which also serve to prevent turning or twisting of the inserts in the slot 25; the upper and lower walls of the slot engaging the corresponding surfaces of the inserts prevents vertical offsetting of the same; and the locking pin 27 prevents displacement of the inserts outwardly of the slot 25.

Molten metal is then poured through the gate 36 into the mold cavity which is suitably vented by the grooves 39, 40, 41 and 42. A sprue 43 is formed on the cast link L which may be later removed as by grinding off the same.

After the link L is cast the piston and cylinder device 15 is operated to retract the piston rod 16 and move the movable mold block 11 to the broken line position shown in Fig. 1. The cast link L, preformed link 24 and the inserts 12 and 13 will either remain on the mold block 10 or 11, being held thereto by holding the handles 33 as desired. When the blocks 10 and 11 have separated sufficiently, the links L and 24 and inserts 12 and 13 are completely removed from the mold block to which they were held by sliding the inserts in a direction normal to the vertical inner face of such block. Thereafter the link 24 is tipped up so as to free the inserts which are then withdrawn from the eye of this link. The mold is then ready to be prepared for the casting of another link in the manner just described.

I claim:

1. A permanent mold for making cast stud link chain of aluminum or bronze, said mold comprising four parts which include a pair of separable mold blocks having complementary mold cavities and arranged so that their opposing mold cavity faces meet and extend vertically defining a mold cavity for casting a stud link, said mold blocks being slotted at one side horizontally across said mold faces providing an open slot through one curved end mold cavity section, a pair of separable inserts removably arranged in said slot, each of said inserts having a curved groove cavity which complement each other to jointly provide a round and curved mold cavity for the intermediate portion of one of the curved end sections of said stud link, the combined mold cavity faces of said mold blocks and inserts providing a mold cavity for casting a complete stud link wherein only a part of one curved end portion of the link is formed in said insert mold cavity grooves, an offset arm extending outwardly from the outer end of each insert, the inner ends of said inserts being provided with external grooves to engage the curved end portion of a preformed stud link, the outer ends of said inserts being externally convexly rounded on one side of said arms to accommodate the intermediate cross part of said preformed stud link, said inserts while disposed in said slot being adapted to be received in an eye opening of the preformed stud link to which the stud link to be cast is to be connected to provide a chain, the curved end portion of said preformed link fitting snugly in the external groove on the inner ends of said inserts and the cross bar or stud of said preformed link fitting over the convexly curved outer ends of said inserts and arranged on said one side of said arms, said blocks being recessed adjacent the outer end of said slot to receive said offset arms, means comprising a pin for locking said inserts in said mold blocks, said pin being received in semi-cylindrical grooves which register with corresponding grooves in the meeting faces of said mold blocks, and a plurality of spaced venting grooves arranged in both the top and bottom portion of said mold and communicating with said mold cavity.

2. A permanent mold for making cast stud link chain of aluminum or bronze, said mold comprising four parts which include a pair of separable mold blocks having complementary mold cavities and arranged so that their opposing mold cavity faces meet and extend vertically defining a mold cavity for casting a stud link, said mold blocks being slotted at one side horizontally across said mold faces providing an open slot through one curved end mold cavity section, a pair of separable inserts removably arranged in said slot, each of said inserts having a curved groove cavity which complement each other to jointly provide a round and curved mold cavity for the intermediate portion of one of the curved end sections of said stud link, the combined mold cavity faces of said mold blocks and inserts providing a mold cavity for casting a complete stud link wherein only a part of one curved end portion of the link is formed in said insert mold cavity grooves, an offset arm extending outwardly from the outer end of each insert, the inner ends of said inserts being provided with external grooves to engage the curved end portion of a preformed stud link, the outer ends of said inserts being externally convexly rounded on one side

of said arms to accommodate the intermediate cross part of said preformed stud link, said inserts while disposed in said slot being adapted to be received in an eye opening of the preformed stud link to which the stud link to be cast is to be connected to provide a chain, the curved end portion of said preformed link fitting snugly in the external groove on the inner ends of said inserts and the cross bar or stud of said preformed link fitting over the convexly curved outer ends of said inserts and arranged on said one side of said arms, means comprising a pin for locking said inserts in said mold blocks, said pin being received in semi-cylindrical grooves which register with corresponding grooves in the meeting faces of said mold blocks, a plurality of spaced venting grooves arranged in both the top and bottom portion of said mold and communicating with said mold cavity to vent the same, said blocks being recessed adjacent the outer end of said slot to receive said offset arms, and elongated handles connected to the outer extremities of said arms for positioning said inserts.

References Cited in the file of this patent

UNITED STATES PATENTS

345,732	Penman	Dec. 21, 1886
510,748	While	Dec. 12, 1893
843,977	Traum	Feb. 12, 1907
1,314,874	Knadler	Sept. 2, 1919
1,538,584	Owen et al.	May 19, 1925
1,920,578	Matzow	Aug. 1, 1933
2,672,662	Morin	Mar. 23, 1954

FOREIGN PATENTS

17,010 of 1884	Great Britain	Dec. 29, 1884
657,288	Great Britain	Sept. 12, 1951