R. R. RUST.

METHOD OF MAKING CAST CHAINS.

APPLICATION FILED FEB. 18, 1918.

1,398,706.

Patented Nov. 29, 1921.

2 SHEETS—SHEET 1.

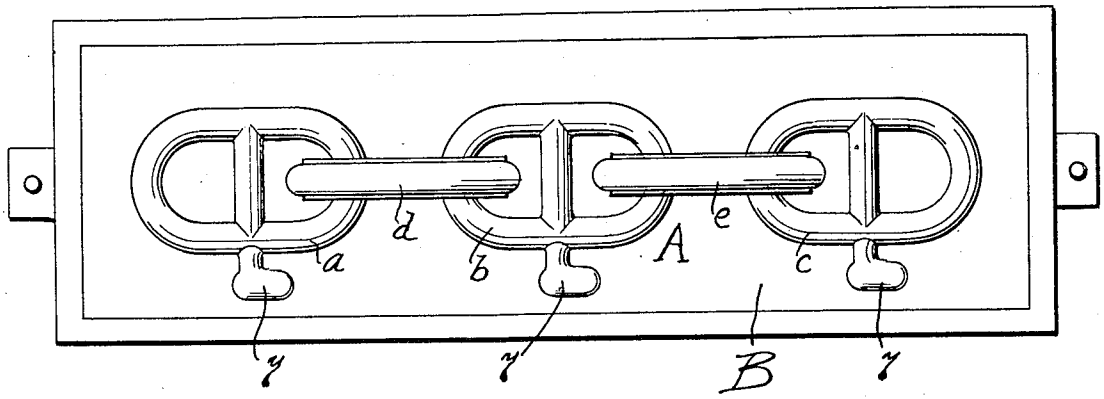


FIG. 1.

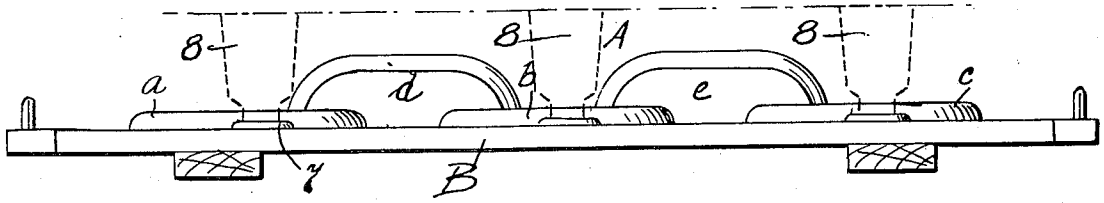


FIG. 2.

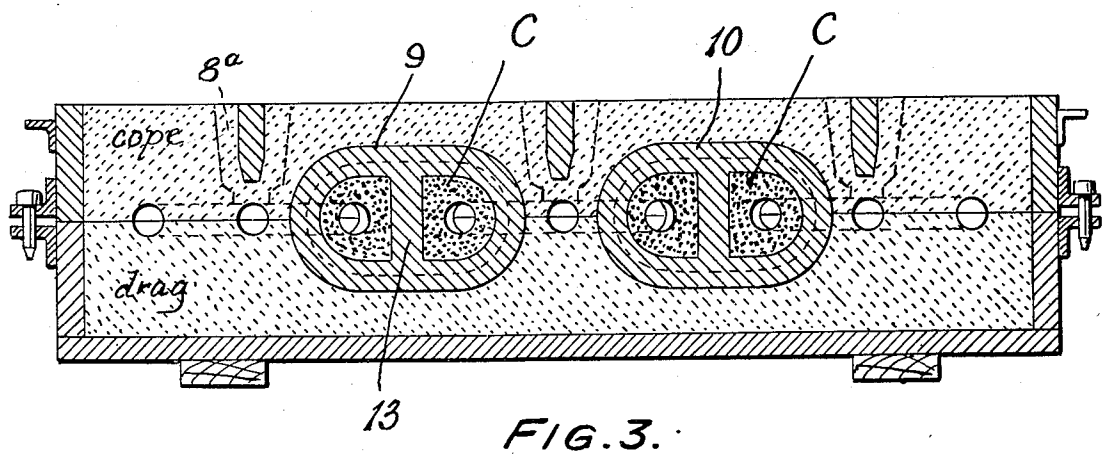


FIG. 3.

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2 SHEETS—SHEET 2.

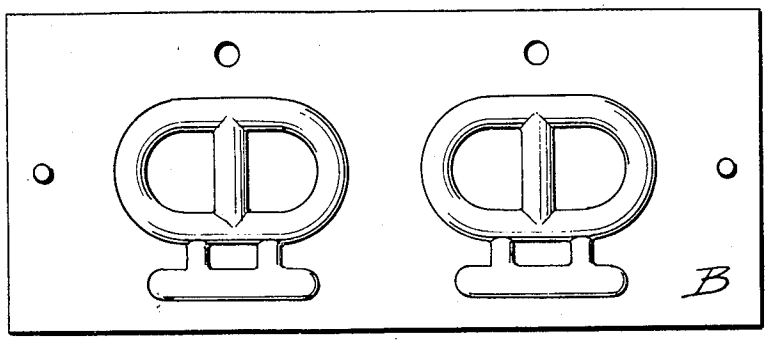


FIG. 4.

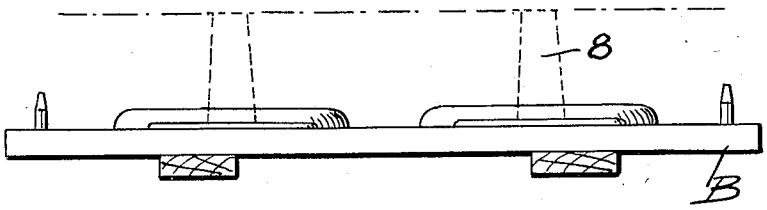


FIG. 5.

FIG. 9.



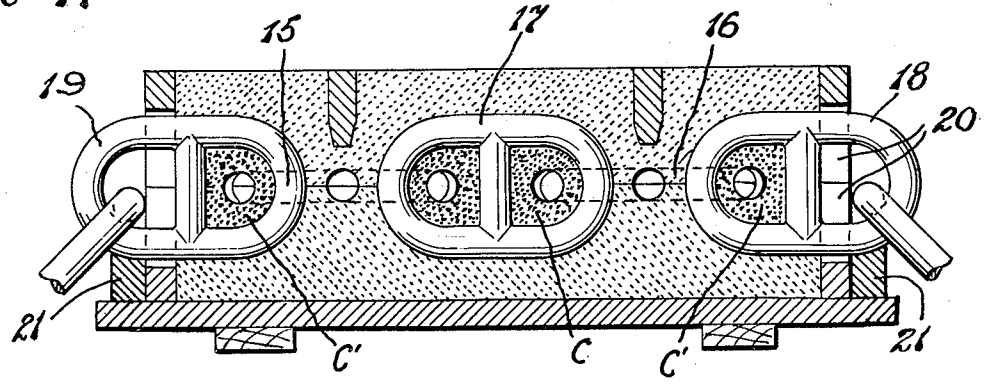
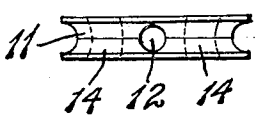


FIG. 6.

FIG. 7.



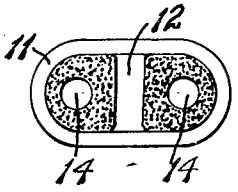


FIG. 8.

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METHOD OF MAKING CAST CHAINS.

1,398,706. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed February 18, 1918. Serial No. 217,953.

To all whom it may concern:

Be it known that I, ROBERT R. RUST, a citizen of the United States, residing at Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods of Making Cast Chains, of which the following is a specification.

This invention relates to a method of making cast chain, and particularly to the casting of anchor chains, and it has for one of its objects the provision of a simple method whereby chain can be cast economically and expeditiously in a divided sand mold, the parts of which can be rammed up by machine, whereby I am enabled to overcome all of the disadvantages incident to the casting of chain from permanent molds and hand made sand molds, and also reduce the cost over the forging methods in current use, while at the same time the resultant chain has all of the desired properties.

My improved method will be best understood by a description of one form of apparatus which may be employed in carrying it out, the preferred embodiments of such apparatus being shown in the accompanying drawings, wherein:—

Figure 1 is a plan view of a split pattern and its pattern plate utilized in forming the half mold; Fig. 2 is a side elevation of Fig. 1; Fig. 3 is a longitudinal section through a completed mold; Figs. 4 and 5 are respectively a plan and side elevation of a split pattern for the making of molds for individual link units; Fig. 6 is a section through a completed mold illustrating a modification of the invention; Figs. 7 and 8 are respectively a top plan and longitudinal section of a detail of my invention; and Fig. 9 is a plan view of a modification of my invention.

Heretofore chain, particularly the larger sizes of chain such as are suitable for anchor chains and the like, has been produced either by a forging method or by permanent molding. The forging method is obviously slow and expensive, and permanent molding is unsatisfactory from a practical standpoint, owing to the difficulty in maintaining proper and uniform temperatures, and in keeping the complicated mechanism necessary involved in proper condition. Attempts have often been made to cast chain in sand molds in which the general lines of permanent molding have been followed out, that is to say, the mold is made up of a plurality of parts, usually four in number, but such molding has practical disadvantages as will be readily apparent to those skilled in sand molding, while in addition special, complicated machinery and equipment are necessary. Attempts have also been made to cast chain by hand-made molds such as that shown in the patent to McGlashan & Williams, #1,050,370, issued January 14, 1913, but such processes involve a multiplicity of operations and are slow.

By my invention I propose to employ a divided sand mold, the arrangement being such that the molds can be formed on any conventional molding machinery, such for example, as a split pattern machine or other form of squeezer or jolt ramming machine, from a split pattern, a gated pattern, or a double face match plate. The molds may be made of green sand, baked sand or may be skin dried.

Referring now to Figs. 1, 2, and 3, it will be seen that I have therein illustrated the application of my invention to the making of molds from a split or half pattern. The pattern which I have indicated as a whole at A is mounted on a suitable pattern plate B, the pattern parts *a*, *b*, and *c* form the cavities in each half mold for the horizontal links and the pattern parts *d* and *e* are adapted to form cavities in the half molds for the reception of links already completed as will hereinafter be more fully pointed out. The half pattern parts *a*, *b*, and *c* save with the exception of where they merge into the pattern parts *d* and *e*, are true halves of the link to be cast, and they are provided with members 7 adapted to form gates for the pouring. The pattern parts *d* and *e* are adapted to form cavities with plain sides merging in the cavities formed by the pattern parts *a*, *b*, and *c*, the edge or periphery of the pattern parts *d* and *e* being rounded to form a rounded cavity corresponding to the outside half of a link.

In making half molds from the split pattern described, the pattern plate is placed in a conventional form of molding machine, such for example, as a split pattern machine; the flask is placed in position thereover and filled with sand; after which the parts are elevated toward the platen or presser head of the machine and the sand compacted or rammed by such squeezing op-

eration. The parts are then lowered away from the presser head after which the pattern is drawn from the mold, leaving a half mold having cavities corresponding to the parts of the pattern, such cavities merging at adjacent ends. The cope halves of the mold are similarly made but in this case, the pattern parts 8 are placed in position and are withdrawn upwardly after ramming to leave enlarged riser or header cavities 8^a.

The plain cavities formed by the pattern parts *d* and *e* are adapted to receive the links 9 and 10 (see Fig. 3) already cast, such links having associated therewith mold parts C in the nature of cores and made of substantially the same material from which cores are made. These mold parts C, in conjunction with the completed links 9 and 10 are adapted to fill the cavities formed by the pattern parts *d* and *e*, to complete the ends of the cavities formed by the parts *a*, *b* and *c*, and to separate the cavities for the links to be cast from the links 9 and 10.

The mold parts C are illustrated in Figs. 7 and 8, from inspection of which it will be seen that each may be split longitudinally, the halves being so formed as to provide a peripheral half-cavity 11 corresponding to the inside half of the links already cast, and the cavity 12 corresponding to the stud portions 13 of a cast link. Adjacent each end and intermediate the half-cavity 11 and the cavity 12, are a pair of cavities 14 which correspond to and aline with and complete the ends of the cavities formed by the pattern parts *a*, *b*, and *c*. The two halves of the mold parts C are placed in position about a link already cast, one from each side, and when the links and their mold parts are thus assembled they are placed in position in their respective cavities in the drag half of the mold, after which the cope half of the mold is placed in position, and when this is done, the mold cavities for the links to be cast are completed, such cavities being separated from the links placed in position by the walls of the mold parts C in the manner indicated in Fig. 3. The mold is now poured, each link being preferably poured singly.

It will of course be understood that the mold parts C may be formed in any one of a number of different ways, the essential feature to be observed being that they shall complete the mold cavities for the links to be poured and separate such cavities from the cast links which are placed in position in the mold. Thus, for example, in Fig. 9 the core is shown with plain sides and ends and made in one piece for direct insertion. The adjacent sand will support the core, so that prints will be unnecessary.

By this method it will be seen that I can produce molds and pour them with great rapidity, on standard molding machinery, without the necessity of any special equipment. These chains can be produced in any foundry, and by the ordinary molder without any special training, and the resultant chain will be superior to chain produced by the permanent molding and the sand molds herein before referred to, and with less cost than chain produced by such old methods and by forging.

While I have shown the casting of three links about two links already completed, it will be understood that any number of links within practical limits may be so cast about one or more links already cast. After a number of sections of chain have thus been made, such sections are joined in the manner indicated in Fig. 6, to which attention is now directed.

In joining two sections of chain I prefer to provide a mold such as shown in cross-section in Fig. 6, as this form provides a practical means for supporting the ends of the sections. This mold is provided with two cavities 15 and 16 for the casting of two connecting link units about the ends of the sections to be joined, and an intermediate separate link 17. The halves of this mold are formed from a split pattern in substantially the same manner as the mold shown in Fig. 3 is formed, the shape of the pattern being altered to suit. The intermediate link 17 is provided with mold parts C of the character already described and the end links 18 and 19 of the sections to be joined are provided with similar mold parts C′, such parts, however, being halves of the parts C but in other respects the same. At the ends the flasks for the drag and the cope are provided with recesses 20 to permit of the insertion of the links 18 and 19 with their mold parts C′ to complete the outer ends of the cavities 15 and 16. Blocks 21 are placed in position to further support the links 18 and 19, and to prevent injury to the mold.

The patterns utilized in forming the individual links utilized in forming the sections of chain as described in connection with Figs. 1, 2, and 3, and in joining completed sections of chain as described in connection with Fig. 6, are shown in Figs. 4 and 5. These are split patterns and are utilized in making the halves of a two-part sand mold on a split pattern machine, as will be readily understood from the foregoing description.

Among other advantages not previously specifically mentioned is that fifty per cent. of the links of the chain can be tested before casting the connecting links, which correspondingly reduces the liability of defective links; the links can be made of cast steel from green sand molds; and the heading 8^a produces superiority of product and is greatly simplified if the connecting links be

cast vertically. This heading is of great importance in pouring cast steel links to provide a volume of molten metal from which to draw as the link shrinks.

I claim:—

1. The herein-described process of making cast chains from a two-part sand mold, the halves of which are to be brought face to face to form the completed mold, which consists in forming the half molds with a single ramming with cavities in each half mold for a pair of links and a cavity between such cavities and merging therewith, in inserting in said central cavity a link already cast and a mold member having therein formed cavities corresponding to and completing the cavities for the pair of links, in bringing the halves of the mold together and in pouring the links.

2. The herein described process of making cast chain from a two-part sand mold, the halves of which are to be brought face to face to form a completed mold, which consists in forming the half-mold with cavities in each half-mold merging with one another, in forming a mold member having a cavity therein which, with one of said first cavities, completes a link-forming cavity, in placing such mold member in a link already cast, in inserting said link with its mold member in the other of said cavities, in bringing the halves of the mold together and in pouring the link.

3. The process of making cast chain which consists in forming a plurality of sand mold parts having portions of link forming cavities therein, in forming other sand mold parts having cavities, which, when said last mold parts are interposed between the first mold parts, complete the link forming cavities, in assembling the mold parts, in inserting during assemblage a link already formed in alternate link cavities, and in pouring the connecting links in the cavities passing around the links already formed and in place.

In testimony whereof I have hereunto signed my name.

ROBERT R. RUST.