Oct. 24, 1933. F. W. McCONNEL 1,931,587

CASTING METALS IN METAL MOLDS OR DIES

Filed June 30, 1931

Fig. 1.

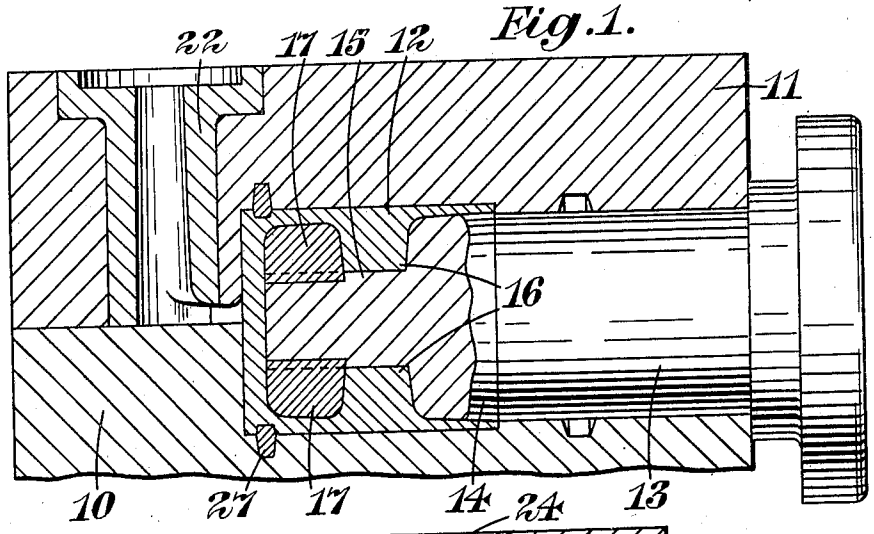


Fig. 2.

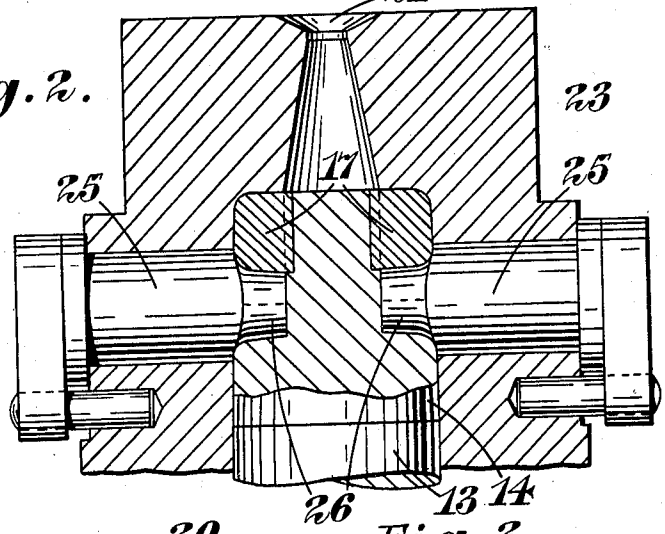
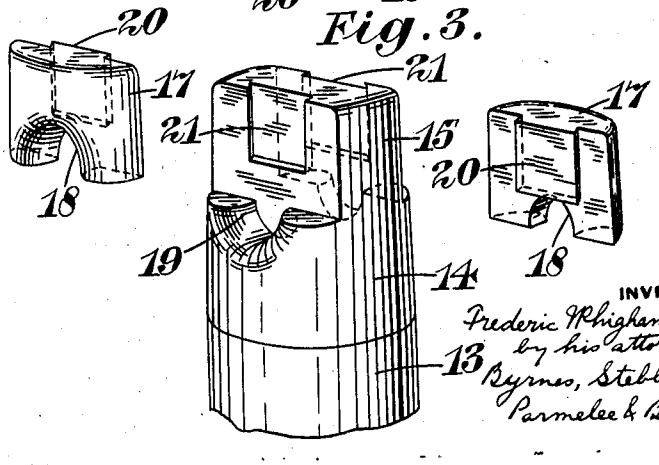


Fig. 3.



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CASTING METALS IN METAL MOLDS OR DIES

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2 Claims. (Cl. 22—168)

This invention is for improvements in casting metals in metal molds or dies (whether the metal is run into the die under pressure or under gravity only) and thus casting objects which have projecting portions, or recesses, which make it a matter of difficulty to withdraw the core from the interior of the cast article, or to remove the latter from the die. Such a difficulty occurs in the die-casting of aluminium alloy pistons, in which the inwardly projecting gudgeon-pin bosses make it difficult to withdraw the metal core from the interior of the cast piston. Usually the pistons are cast skirt uppermost, and no attempt is made to die-cast the piston-ring grooves. The difficulty of withdrawing the core has hitherto been combated by making the core in three or more pieces all extending the full length of the piston, viz two cheeks, in which are formed the recesses for the gudgeon pin bosses, and a central key-piece by which the cheeks are spaced apart, the flanks of this key-piece being tapered from the skirt end (which is uppermost when casting) down to the crown-end. The core is assembled and placed in the die, and after the piston has been cast the key-piece is withdrawn. This permits the two cheeks to be moved inwards towards each other clear of the gudgeon pin bosses and then withdrawn from the piston. With such a core the difficulty occurs that in course of time the sharp edges of the contacting faces of the cheeks and key-piece become rounded and hence in casting, a flash (i. e. a projecting ragged edge of metal) is cast onto the interior of the piston in the fillet formed by these rounded edges, and this flash embracing the peripheral edges of the cheeks as it does, prevents them from being moved in towards each other to clear the gudgeon pin bosses.

It will readily be appreciated that this formation of flash is not limited to the particular casting operations described above, nor is its formation limited to cores, but it will occur also on dies where loose pieces are used, and the present invention has for its chief object to provide a method of die-casting free from this disability.

The method provided by this invention consists in utilizing a mutilated core or die in conjunction with a renewable and removable loose piece (or pieces) which goes to complete the core or die and is formed previously by die-casting on to it.

A "mutilated" core or die is one which is incomplete in some essential feature, for example a mutilated core for a piston may be minus those portions (having two opposed recesses) in which the gudgeon pin bosses are formed.

In one form the invention is applied to the die-casting of a hollow article, such as a piston, having interior projections which would prevent the withdrawal of a solid core. In carrying out this application of the invention a mutilated core is employed, the mutilated part being confined to those portions of the core which will be overhung by the projections in the casting and which would, if the core was solid throughout, prevent removal thereof. Loose pieces corresponding to the mutilated part of the core are die-cast by using the mutilated core, to which they are complementary, as a portion of the die for casting. The core thus completed is used in the ordinary way in the known process of die-casting, and after the completion of the casting operation, the mutilated core is withdrawn, leaving the loose-pieces in situ but free for subsequent removal.

This invention also provides a method of die-casting articles, particularly pistons, which consists in the utilization of a mutilated core, completing said mutilated core by casting on to it one or more loose-pieces, employing the core thus completed in the known process of die-casting, and withdrawing the mutilated core from the cast object leaving the loose-pieces in situ for subsequent removal.

One method of die-casting pistons according to the present invention will now be described in detail with reference to the accompanying drawing, in which:—

Figure 1 is a cross-section through a die, showing the mutilated core and the piston,

Figure 2 is a cross-section through the die for casting the loose-pieces on to the mutilated core and,

Figure 3 is a perspective view of the mutilated core and the loose-pieces.

Throughout this description like reference numerals indicate like parts.

The metal piston-die shown in Figure 1 is divided into two portions 10 and 11, the joint face between them lying on the axis of the piston 12. The mutilated core 13 consists of a barrel-shaped portion 14 for the skirt of the piston, and, at its inner end a web 15 which is of the same width as the gap between the piston bosses 16. It will be appreciated that as no part of the mutilated core is overhung by the bosses 16, the core may easily be withdrawn from the piston after casting. The core is completed by two loose-pieces 17 which fit on opposite sides of it. One half of the recess for a piston boss is formed in a loose-piece as at 18 and the other half in the mutilated core as at 19. Each loose-piece is formed with

a dove-tailed projection 20 which is arranged to engage in a dove-tailed slot 21 in the mutilated core 13. The die-casting of the piston is carried out in the ordinary manner, metal being run in through a runner 22. When the casting has been effected, the mutilated core 13 is withdrawn, the two halves 10 and 11 of the die broken apart and the piston 12 removed and the two loose-pieces 17 moved in towards each other so that they may be withdrawn between the gudgeon pin bosses 16.

The manner in which the loose-pieces are cast on to the mutilated core 13 is illustrated in Figure 2. The core 13 is inserted in a die 23 having a runner 24. Pins 25 having conical projections 26 which correspond in shape to the gudgeon pin bosses 16 are inserted one from each side of the die. The loose-pieces are then cast in the ordinary manner.

One advantage of this method is that any wear which occurs on the main solid part of the core is built up each time the loose-pieces are cast on to it. If, as is preferred, the loose-pieces are cast from an alloy of the same analysis as that from which the piston is cast, bad castings may be remelted without the removal of the loose-pieces (which may have become locked in position) without entailing the introduction of foreign matter to the alloy. If undamaged the loose-pieces may be used several times. Normally, a small stock of loose-pieces will be cast off each mutilated core and used as and when required.

For forming the piston-ring grooves, a previously cast ring 27 is fitted into the die 10, 11, so that it projects as a flange into the bore of the die. This ring will remain in the piston when the latter is withdrawn from the die, and is subsequently broken out. In order to facilitate breaking, the ring may be slotted partly through. Alternatively, this ring 27 may be cast in situ in the die 10, 11 but the first method is preferred, particularly when the piston is to be formed with more than one piston-ring groove.

As indicated herein, the invention is not limited to the die-casting of pistons. It may be applied to the casting of any article which has projections or recesses which would prevent the removal of the core from the cast article or the removal of the latter from the die.

I claim:—

1. A core for die casting hollow articles having internal projections, comprising a main body portion adapted to be drawn as a unit from the hollow article after casting and to be used in a plurality of casting operations, means on said body portion for releasably holding supplemental core elements thereto, and a plurality of supplemental core elements of a shape to form at least a portion of the internal projections on said casting and die cast onto said holding means.

2. A core for die casting hollow artitcles having internal projections, comprising a main body portion adapted to be drawn as a unit from the hollow article after casting and to be used in a plurality of casting operations, means on said body portion for releasably holding supplemental core elements thereto and a plurality of supplemental core elements of a shape to form at least a portion of the internal projections on said casting and die cast onto said holding means, said supplemental core elements being formed of metal similar to that in the cast article.

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