Feb. 29, 1944. L. H. MORIN 2,343,073

HYDRAULIC TRIMMING ATTACHMENT

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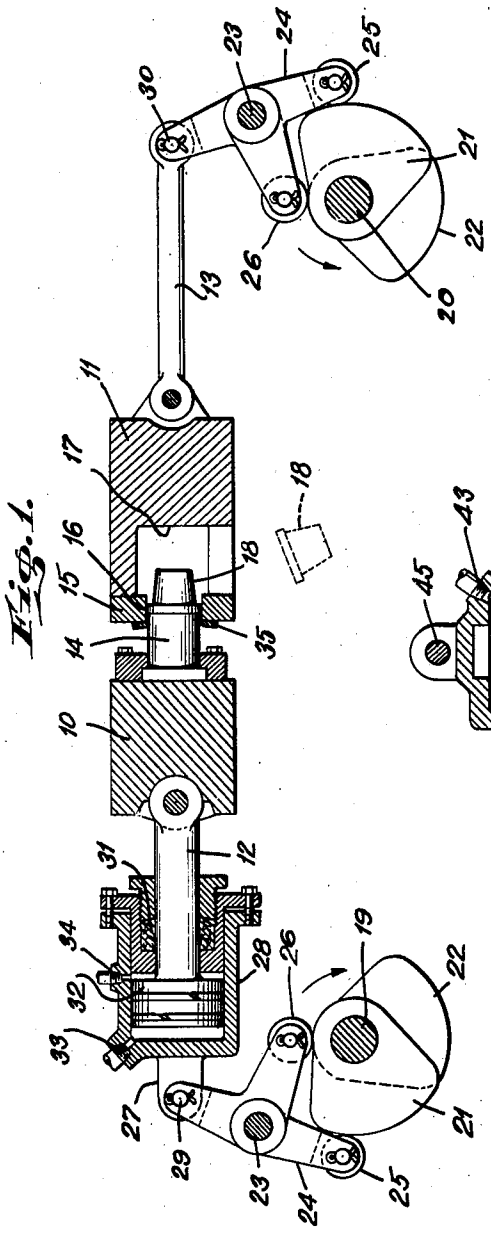


Fig. 1.

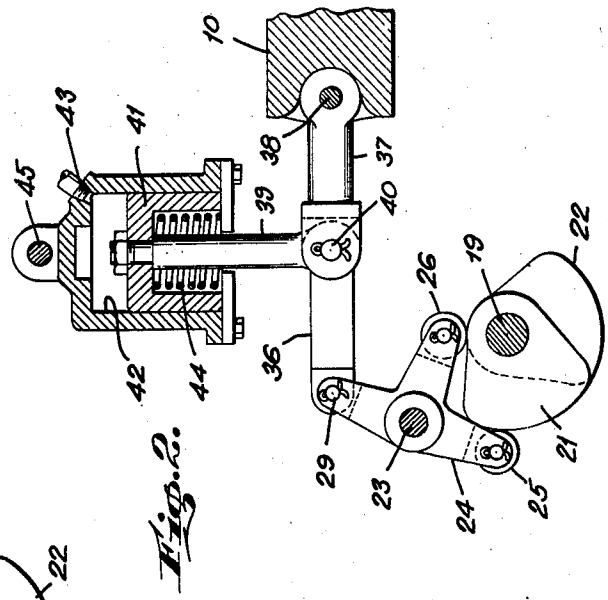


Fig. 2.

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HYDRAULIC TRIMMING ATTACHMENT

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20 Claims. (Cl. 164—95)

This invention relates to die casting machines, in which castings are first formed, and then trimmed before being discharged from the machine. More particularly, the invention relates to a hydraulically actuated trimming attachment for casting machines of this type and kind wherein the required pressure may be provided to perform the trimming operation in a simple and practical manner while maintaining relatively high speed production in the casting machine. The novel features of the invention will be best understood from the following description when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed, and in which the separate parts are designated by suitable reference characters in each of the views, and in which:

Fig. 1 of the drawing represents a diagrammatic sectional view of one form of attachment, and;

Fig. 2 is a view similar to Fig. 1 showing only a part of the machine construction, and showing a modification.

In trimming die castings in casting machines of the type, for example, illustrated in application Serial Number 347,426, filed July 25, 1940, quite often considerable pressure is required to perform trimming operations, and particularly in trimming fairly large castings. It also presents a problem in operating a machine at high speed. Efforts have been made to solve this problem by the use of large fly wheels, but the use of such fly wheels is not practical in that it is difficult to interpose a safety throw-out in machines of this type and kind.

I overcome the present difficulties by providing a hydraulically actuated trimming tool which will provide the required pressure for performing the trimming operation and by reason of the use of this hydraulically actuated tool, well known electrical safety throw-outs can be employed to control the operation of the tool in the event of improper registration of the casting with the tool, or in the event of the presence of any foreign material in alinement with the workpiece and tool. In addition to the hydraulic actuation of the trimming tool, mechanical means is also provided to move the trimming tools toward and from each other in permitting the automatic feed of the workpiece into position between said tools and in feeding the workpiece to a position preparatory to the final hydraulic trimming operation.

In the diagrammatic illustration 10 and 11 represent two plungers or slides to which are pivotally coupled projecting rods 12 and 13 respectively. Supported on adjacent surfaces of the slides 10 and 11 are a punch trimming tool 14 and a plate trimming tool 15 respectively, the latter having an aperture 16 for receiving the punch, and this aperture opens into a recessed portion 17 of the slide 11, from which the resulting trimmed castings 18 may be ejected.

Arranged at opposite sides of the slides 10 and 11 are cam shafts 19 and 20 each supporting dual cams 21, 22. Pivoted adjacent each cam shaft as seen at 23 are double bell cranks 24, one lever of each of which supports a roller 25 which operates upon the cams 21. Another lever of each crank supports a roller 26 which operates upon the cam 22, and the third lever of one bell crank is pivoted to an extension 27 on a hydraulic cylinder 28 as seen at 29, and the other to the free end of the rod 13, as seen at 30.

The rod 12 extends into the cylinder 28 through a suitable stuffing box or packing gland structure 31, and has within the cylinder a piston 32. At 33 and 34 are shown ports for admitting the hydraulic medium to the cylinder at opposite ends of the piston 32 to positively move the piston in both directions. When the hydraulic medium is introduced into the cylinder through the port 33, the punch trimming tool 14 moves the workpiece 18 in the direction of the trimming tool 15 in performing the trimming operation, to trim the gate and any flared metal 35 which may prevail on the casting, therefrom. In this operation of the trimming tool the casting is projected into the recess 17 and is automatically discharged from the machine as is diagrammatically indicated.

In the operation of the trimming attachment herein diagrammatically illustrated, it will be apparent that the cams 21 and 22 operating upon the bell cranks 24, mechanically control the movement of the tools 14 and 15 toward and from each other in separating the tools for the positioning of a casting therebetween, and then in feeding the tools toward each other preparatory to the final trimming stroke which is performed by the admission of the hydraulic medium to the cylinder 28, from any suitable source of supply, through the port 33. Upon completing the trimming operation, the flow of the hydraulic medium is reversed and admitted through the port 34 and the tools are then again separated preparatory to receiving the next casting to be trimmed.

Fig. 2 of the drawing is shown as a slight modification of the structure shown in Fig. 1, wherein 10 represents a slide similar to the slide

10 of Fig. 1. The cam shaft 15 with the cams 21, 22, and the associated bell crank 24, pivoted as at 23 and supporting the rollers 25 and 26, are also similar to the showing in Fig. 1. With this construction the pivot 29 of the bell crank lever is pivoted to one link 36 of a toggle link arrangement, instead of extension 27 as in Fig. 1. Also substituted for the rod 12 is another link 37 of the toggle, the link being pivoted as seen at 38 to the slide 10 and the two toggle links 36 and 37 are pivoted to each other and to piston rod 39 as seen at 40.

On the rod 39 is a piston 41 operating in a cylinder 42 into which a hydraulic medium is adapted to be admitted through the port 43 in actuating the piston 41 to close the toggle links 36, 37 in moving the trimming tool in its trimming operation.

With the construction shown in Fig. 2, instead of hydraulically moving the piston 41 in the opposite direction to release the toggle, a spring 44 is employed which will automatically release the toggle and withdraw the trimming tool upon the exhaust of the hydraulic medium through the port 43. The cylinder 42 is preferably supported on a pivot 45, which allows the cylinder to compensate for the mechanical movement of the slide 10 through the actuation of the bell crank 24 by the cams 21 and 22.

Aside from the modifications noted the structure of Fig. 2 will be otherwise the same as that diagrammatically illustrated in Fig. 1.

It will be apparent that while the foregoing description deals specifically with the operation of trimming tools, that this is done simply to illustrate one adaptation and use of the invention. The means for applying the hydraulic power to mechanically operated parts at a predetermined stage in the operation of said part is applicable to other uses where it is desirable to produce a final motion through hydraulically actuated means, and particularly in arranging the hydraulic actuated means between the part to be moved and the mechanical means for imparting motion thereto.

It will also be apparent that the particular type and kind of trimming tools employed will depend entirely upon the casting or workpiece which is being trimmed.

It will also be understood that in both forms of construction disclosed the cams engage the toggles to form backings in the hydraulic actuation of the trimming tool.

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

1. A trimming attachment for die casting machines, comprising a pair of tool supporting members, mechanical means for each of said members adapted to move said members toward and from each other during a trimming operation, and means actuated hydraulically and independently of said mechanical means, for operating one of said members in performing the trimming operation on said workpiece.

2. A trimming attachment for die casting machines, comprising a pair of tool supporting members, mechanical means for each of said members adapted to move said members toward and from each other during a trimming operation, means actuated hydraulically and independently of said mechanical means, for operating one of said members in performing the trimming operation on said workpiece, and said last named means being interposed between one member and the mechanical means for actuating said member.

3. A trimming attachment for die casting machines, comprising a pair of tool supporting members, mechanical means adapted to move said members toward and from each other during a trimming operation, hydraulically actuated means for operating one of said members in performing the trimming operation on said workpiece, said last named means being interposed between one member and the mechanical means for actuating said member, the mechanical means actuating said members comprising bell cranks in operative engagement with said members, and cams for actuating said bell cranks.

4. A trimming attachment for die casting machines, comprising a pair of tool supporting members, mechanical means adapted to move said members toward and from each other during a trimming operation, means actuated hydraulically and independently of said mechanical means, for operating one of said members in performing the trimming operation on said workpiece, said last named means being interposed between one member and the mechanical means for actuating said member, said hydraulic actuating means comprising a cylinder, a piston in said cylinder, means coupling the piston with the hydraulically actuated member, means admitting a hydraulic element to the cylinder to advance the piston therein in the trimming stroke of said member, and other means for moving the piston in the cylinder in the oposite direction.

5. A trimming attachment for die casting machines, comprising a pair of tool supporting members, mechanical means adapted to move said members toward and from each other during a trimming operation, means actuated hydraulically and independently of said mechanical means, for operating one of said members in performing the trimming operation on said workpiece, said last named means being interposed between one member and the mechanical means for actuating said member, said hydraulic actuating means comprising a cylinder, a piston in said cylinder, means coupling the piston with the hydraulically actuated member, means admitting a hydraulic element to the cylinder to advance the piston therein in the trimming stroke of said member, other means for moving the piston in the cylinder in the opposite direction, and the coupling between the piston and said member comprising a toggle linkage.

6. The combination with two members mounted for movement toward and from each other, of separate means for actuating said members, each of said means comprising mechanical means for separating said members and for providing limited movement of the members toward each other, and at least one of said members having means actuated hydraulically and independently of said mechanical means, for imparting additional movement to said member.

7. The combination with two members mounted for movement toward and from each other, of separate means for actuating said members, each of said means comprising mechanical means for separating said members and for providing limited movement of the members toward each other, at least one of said members having means actuated hydraulically and independently of said mechanical means, for imparting additional movement to said member, and said hydraulically actuated means being interposed between the mem-

ber and the mechanical means for actuating said member.

8. The combination with two members mounted for movement toward and from each other, of means for actuating said members, said means comprising mechanical means for separating said members and for providing limited movement of the members toward each other, at least one of said members having means actuated hydraulically and independently of said mechanical means, for imparting additional movement to said member, said hydraulically actuated means being interposed between the member and the mechanical means for actuating said member, and said hydraulically actuated means being movable to compensate for mechanical movement of said member.

9. The combination with two members mounted for movement toward and from each other, of means for actuating said members, said means comprising mechanical means for separating said members and for providing limited movement of the members toward each other, at least one of said members having means actuated hydraulically and independently of said mechanical means, for imparting additional movement to said member, said hydraulically actuated means being interposed between the member and the mechanical means for actuating said member, and said hydraulically actuated means comprising a toggle linkage.

10. The combination with two members at least one of which is movable toward and from the other, of means for mechanically actuating said movable member to positively actuate the same toward and from the other member and for limiting movement of the member in the direction of the other member, and means actuated hydraulically and independently of said mechanical means, for imparting additional movement of said member in the direction of the companion member.

11. The combination with two members at least one of which is movable toward and from the other, of means for mechanically actuating said movable member to positively actuate the same toward and from the other member and for limiting movement of the member in the direction of the other member, means actuated hydraulically and independently of said mechanical means, for imparting additional movement of said member in the direction of the companion member, and said hydraulically actuated means comprising parts movably coupled with said member and the mechanical means for actuating said member.

12. The combination with two members at least one of which is movable toward and from the other, of means for mechanically actuating said movable member to positively actuate the same in a first movement toward and from the other member and for limiting movement of the member in the direction of the other member, means actuated hydraulically and independently of said mechanical means, for imparting an additional and second movement of said member in the direction of the companion member, said hydraulically actuated means comprising parts movably coupled with said member and the mechanical means for actuating said member, and means for backing up the part coupled with said mechanical means in the operation of said hydraulically actuated means.

13. The combination with two members adapted to perform an operation on a work piece at least one of said members being movable toward and from the other, of means for mechanically actuating said movable member to positively actuate the same and move it into operative relation with the other member and for limiting movement of the member in the direction of the other member, means actuated hydraulically and independently of said mechanical means, for imparting additional movement of said member in the direction of the companion member to perform said operation on the work piece, said hydraulically actuated means comprising parts movably coupled with said movable member and the mechanical means for actuating said member, and said parts comprising the links of a toggle structure.

14. The combination with two members at least one of which is movable toward and from the other, of means for mechanically actuating said movable member to positively actuate the same toward and from the other member and for limiting movement of the member in the direction of the other member, hydraulically actuated means for imparting additional movement of said member in the direction of the companion member, said hydraulically actuated means comprising a cylinder and a piston operating in said cylinder, means connecting said mechanical means with the cylinder and means connecting the movable member to said piston.

15. In an apparatus employing a member with first means positively moving said member in opposite directions, second means imparting a second and further movement to said member in one directional movement thereof, and said second means being actuated independently of said first means and interposed between said member and first means.

16. In an apparatus employing a member with means positively moving said member in opposite directions, means imparting further movement to said member in one directional movement thereof, and said last named means being interposed between said member and first named means for actuating said member and comprising parts movably and independently coupled with said member and first named means.

17. In an apparatus employing a member with means positively moving said member in opposite directions, means imparting further movement to said member in one directional movement thereof, said last named means being interposed between said member and first named means for actuating said member and comprising parts movably and independently coupled with said member and first named means, and said parts being movable relatively to each other.

18. The combination with trimming tools, of mechanically actuated means moving at least one tool toward and from the other tool in positioning a workpiece between the tools preparatory for a trimming operation, and means actuated hydraulically and independently of said mechanical means, for operating said tool in performing the trimming operation on the workpiece.

19. The combination with trimming tools, of means moving at least one tool toward and from the other tool in positioning a workpiece between the tools preparatory for a trimming operation, hydraulically actuated means for operating said tool in performing the trimming operation on the workpiece, said last named means being interposed between the tool and the first named means, and said last named means being inde-

pendently movable to compensate for movement of the tool by said first named means.

20. The combination with two members at least one of which is movable toward and from the other, of mechanism for imparting two movements, in sequence and consonance with each other, to said movable member, a first movement to bring said members into operative relation, and a second movement to perform an operation, said mechanism comprising mechanical means to effect said first movement and means, interposed between said member and said mechanical means, and actuated hydraulically and independently of said mechanical means, for effecting said second movement.

LOUIS H. MORIN.