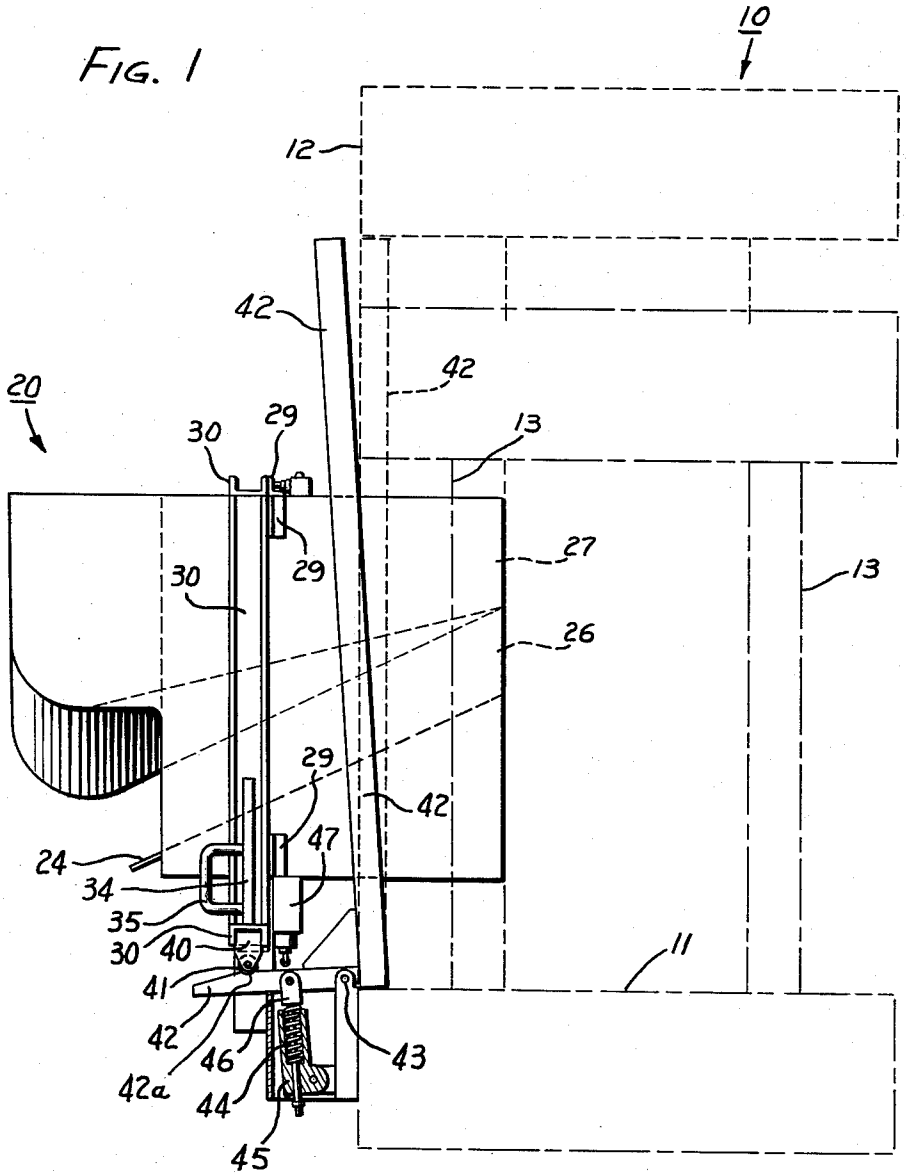
July 4, 1961 F. M. ADAIR ET AL 2,990,578

COMBINED SAFETY AND MATERIAL HANDLING DEVICE

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FIG. 1



INVENTORS
F. M. ADAIR
G. E. HOENIG
BY Robert L. Camp
ATTORNEY

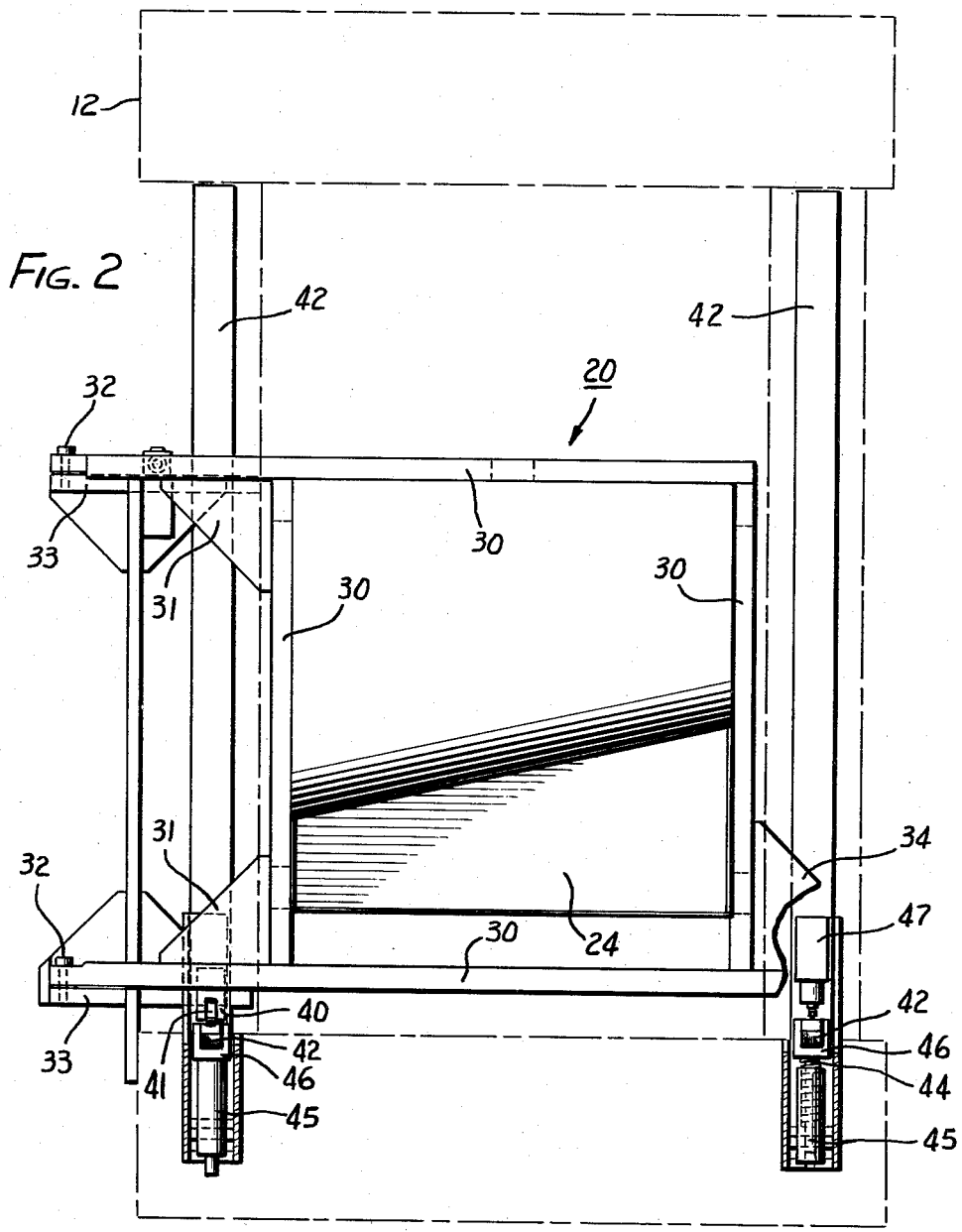
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FIG. 2



INVENTORS
F. M. ADAIR
G. E. HOENIG
BY Robert K. Leavitt
ATTORNEY

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COMBINED SAFETY AND MATERIAL HANDLING DEVICE

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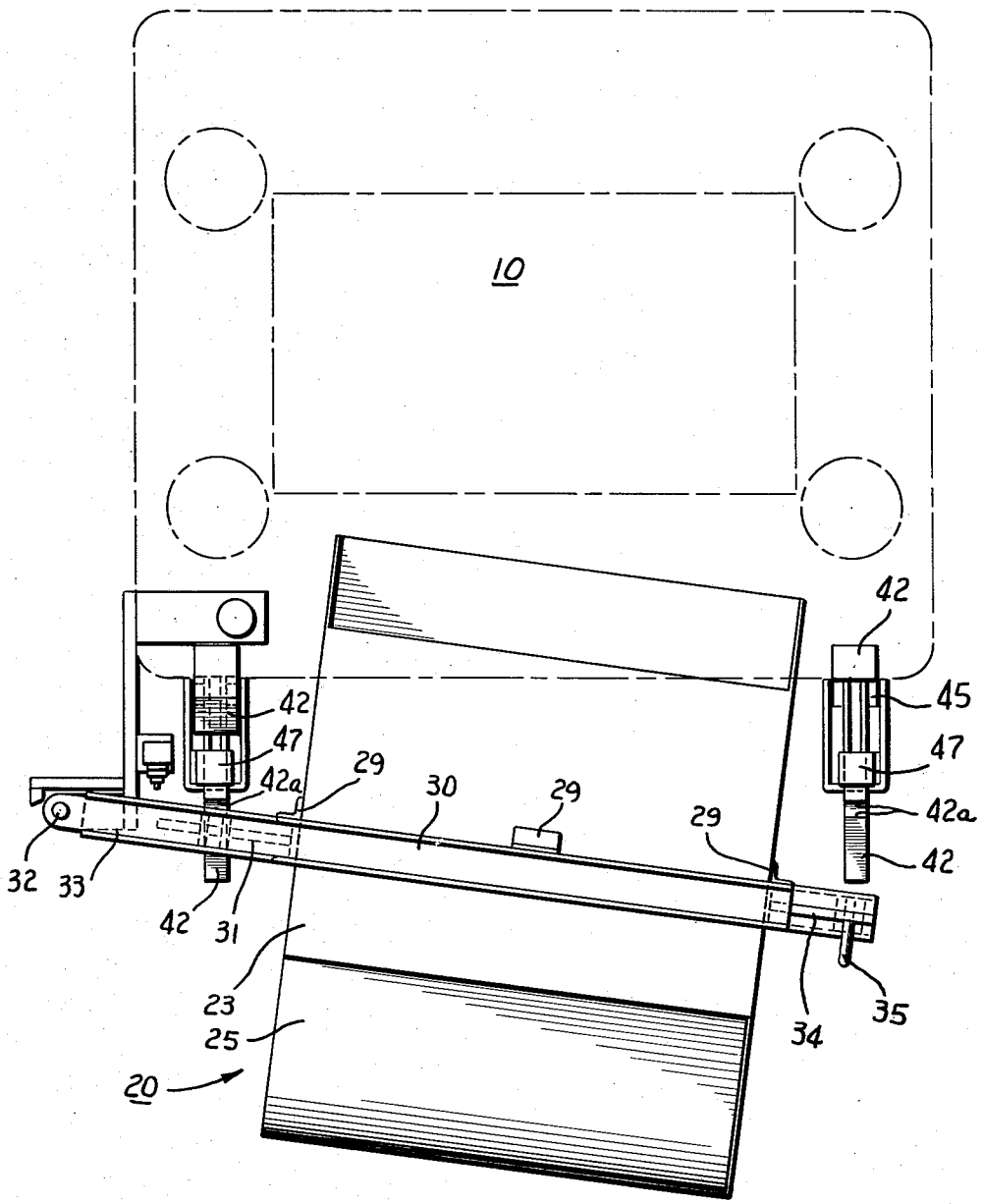


FIG. 3

INVENTORS
F. M. ADAIR
G. E. HOENIG
BY Robert K. Camp
ATTORNEY

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COMBINED SAFETY AND MATERIAL HANDLING DEVICE

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FIG. 5

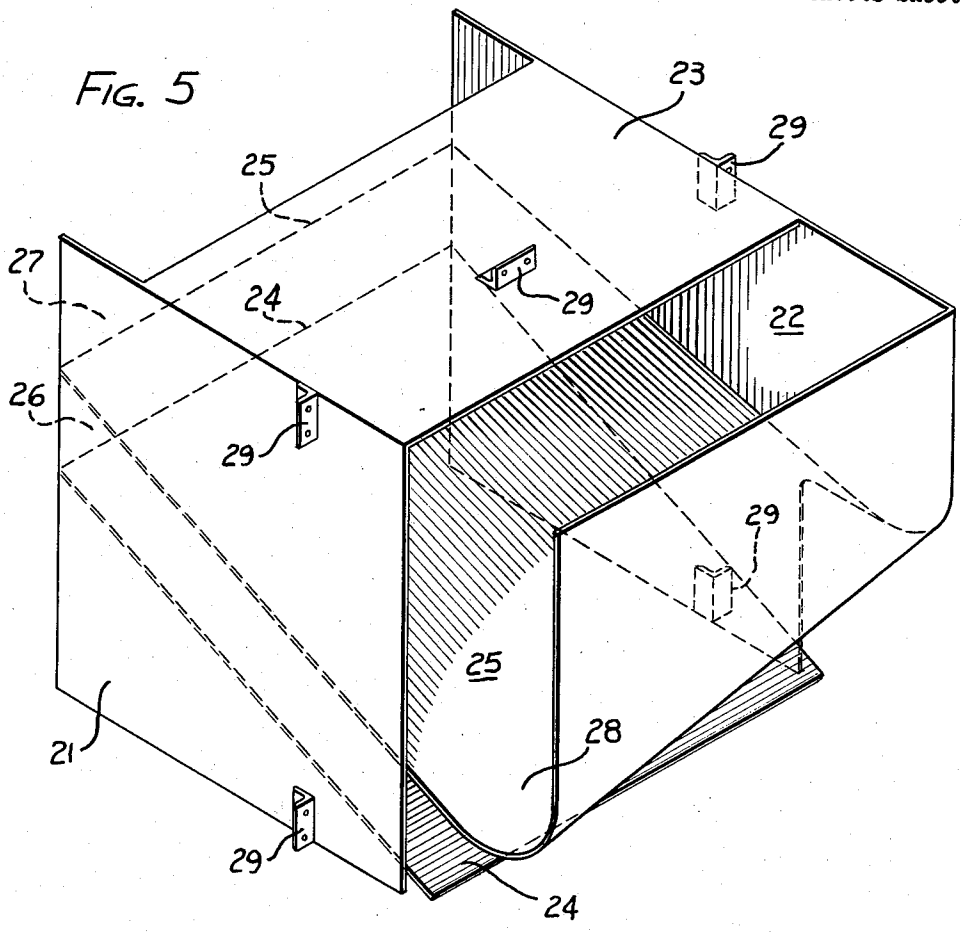
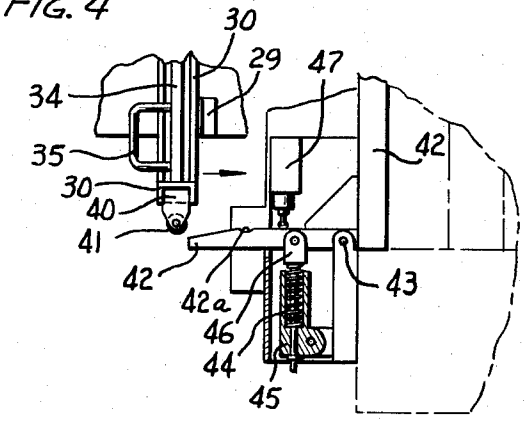


FIG. 4



INVENTORS
F. M. ADAIR
G. E. HOENIG
BY Robert E. Lamp
ATTORNEY

United States Patent Office 2,990,578 Patented July 4, 1961

2,990,578

COMBINED SAFETY AND MATERIAL HANDLING DEVICE

Frank M. Adair and Gerhard E. Hoenig, Indianapolis, Ind., assignors to Western Electric Company, Incorporated, New York, N.Y., a corporation of New York

Filed June 7, 1960, Ser. No. 34,448
5 Claims. (Cl. 18—30)

This invention relates to a combined safety and material handling device for use with an injection molding press. It is an object of the invention to provide improved apparatus of that character.

In certain commercially available and commonly employed vertical injection molding presses, for example, three sides of the press are conveniently guarded by suitable screening against an operator inadvertently inserting his hand into the interior of the press. The remaining or front side is open to permit access to the interior of the machine. Access to the interior of the press from the front side is desired, for obvious reasons, whether the machine is used with automatic operation or with manual operation. It is common practice to employ some form of gate on the front side, which, when closed, bars access to the interior of the press and which cooperates with electric switches or other devices to prevent press operation when the gate is open.

In accordance with the preferred embodiment of the invention, a structure is employed for barring access to the interior of the press which structure serves a second purpose of directing molded piece parts and/or sprues and runners to prescribed conveyors or containers in automatic operation of the press. This novel, dual function structure cooperates with novel, two-fold safety apparatus for preventing operation of the press when the structure is moved away from normal position to permit access to the interior of the press.

Accordingly, it is another object of the invention to provide, for cooperation with an injection molding press, a structure serving the dual function of preventing inadvertent access to the interior of the press and of conveying molded articles away from the press.

It is a further object of the invention to provide such a structure in combination with electrical and/or mechanical safety devices which prevent operation of the press when the structure is removed from its normal position to permit access to the interior of the press.

It is a still further object of the invention to provide such a structure which incorporates two chutes for separately conveying piece parts and sprues away from the press.

Another object of the invention is to provide an improved safety device for preventing operation of an injection molding press when a gate which normally bars access to the interior of the press is moved from its normal position.

A further object of the invention is to provide apparatus having various of the characteristics specified above while being efficient in operation, rugged in construction and economical to manufacture.

A still further object of the invention is to provide, in combination with an injection molding press, combination safety and material handling means comprising a structure normally barring access to the interior of the press, which structure incorporates a chute for conveying molded parts away from the press, and control means preventing press operation when said structure is removed from access barring position.

These and other objects and advantages of the invention will become apparent upon reference to the following description and the accompanying drawings, in which

FIG. 1 is a side elevational view of a combined safety and material handling device, and safety controls operatively thereby, illustrating the preferred embodiment of the invention and shown associated with an injection molding press;

FIG. 2 is a front elevational view of the same apparatus, partially broken away;

FIG. 3 is a top plan view of the same apparatus with the combined safety and material handling device partly opened;

FIG. 4 is a partial side elevational view of the safety controls, the same as shown in FIG. 1 but in released or press-blocking position, and

FIG. 5 is a perspective view of a portion of the combined safety and material handling device comprising two conveyor chutes.

In the drawings a preferred embodiment of the invention is shown applied to an injection molding press **10** having a platform **11**, which supports a fixed molding die (not shown), and a movable platen or ram **12**, which carries a movable mold die (not shown), the movable platen traveling vertically along guide rods **13**. As indicated above, injection molding presses, such as the press **10**, commonly are provided with fixed or movable gates (not shown in the drawings) to guard on three sides against an operator inadvertently inserting his hand into the interior of the press. In accordance with the illustrated embodiment of the invention, the remaining or front side of the press is guarded by a structure generally designated **20** which incorporates a major feature of the present invention.

The principal portion of the structure **20** is the box-like formation of FIG. 5 which consists of two chutes for conveying molded parts and sprues away from the press **10**. This box-like formation includes side walls **21** and **22**, a top wall **23**, a straight sloping lower wall **24** and another sloping wall **25**. This latter wall is turned upwardly at its outer end, as shown, and slopes downwardly not only from rear to front but is warped such that its outer end slopes downwardly from right to left, the latter slope being more clearly seen in FIG. 2. It will be apparent that molded articles or sprues entering an aperture **26** defined by the two sloping walls **24** and **25** and by the two side walls will travel along the upper surface of the sloping wall **24** and be delivered forwardly out the front of the box-like formation. Similarly, molded articles or sprues entering an aperture **27** defined by the side walls and by the top wall **23** and intermediate sloping wall **25** will slide forwardly but will be stopped by the upturned forward end of the sloping wall **25**, following which they will be delivered leftwardly through an opening **28** defined by the sloping wall **25** and the side wall **21**. It will be noted that the side wall **22** extends forwardly beyond the side wall **21** to meet the upturned outer end of the sloping wall **25** and thereby to close the righthand end of the sloping channel formed by the wall **25**.

Arranged along the top and side walls of the box-like formation are a plurality of cleats **29** for securing the box-like formation to frame members **30**, best seen in FIG. 2. It will be noted that the upper and lower frame members **30** extend to the left beyond the box-like formation of FIG. 5 and are reinforced by gussets or webs **31**. At their extreme lefthand ends, these upper and lower frame members are pivotally mounted through pins **32** on arms **33** suitably secured to the press **10** and extending to the left therefrom.

The lower frame member also extends beyond the box-like formation of FIG. 5 to the right and is reinforced by a gusset **34**. A handle **35** is secured to the gusset **34** for convenience in opening and closing the combination safety and material handling structure **20**.

Two brackets 40 which are secured to the lower frame member carry rollers 41 which serve, as best seen in FIGS. 1 and 4, to actuate corresponding bell cranks 42 which pivot about pins 43. The bell cranks are biased in a clockwise direction as viewed in FIGS. 1 and 4 by springs 44 which are received within pivoted housings 45 and operate against plungers 46 which are pivotally connected to the corresponding bell cranks 42.

The upper lefthand edge of the horizontal arm of each bell crank is sloped such that the corresponding roller 41 may wedge the horizontal arm downwardly and pivot the bell crank in a counterclockwise direction. Accordingly, when the structure 20 is in its closed position both bell cranks will be in the position illustrated in FIG. 1. It will be noted that in this fully closed position the rollers 41 enter recesses 42*a* in the bell cranks 42, whereby these safety devices serve to maintain the structure 20 in closed position. However, when the structure 20 is moved a short distance away from the normal, closed position, the rollers 41 will be disengaged from the bell cranks 42 such that they may be moved clockwise to the position shown in FIG. 4 by the springs 44.

When the bell cranks 42 are in the position illustrated in FIG. 4, and shown in phantom lines in FIG. 1, the lower ends thereof rest upon the fixed die platform 11, and the upper ends are arranged directly beneath the movable die platen 12. Accordingly, the movable platen 12 is positively and mechanically prevented from moving downwardly to bring the dies together.

Arranged above the horizontal arms of the bell cranks 42 is a pair of switches 47 which are operable by the corresponding bell cranks 42 as they move between their clockwise and counterclockwise positions. These switches serve to control electrical circuits through which the press 10 is operated. When the bell cranks 42 are in their counterclockwise positions with the structure 20 closed, as shown in FIG. 1, the switches 47 condition the electrical circuitry to permit actuation of the press. However, when the bell cranks 42 are moved by the springs 44 to their clockwise positions by opening of the structure 20, as shown in FIG. 4, the switches 47 prevent press actuating operation of the associated electrical circuitry. Since the electrical circuitry through which the switches 47 may control operation of the press may be of conventional form, well known in the art, and since it does not of itself constitute a feature of the present invention, it is not shown in the drawings or described in further detail herein.

It will now be seen that the structure 20 serves the dual function of guarding the front of the press against an operator inadventently inserting his hand into the interior of the press. At the same time this structure serves the function of delivering molded parts and/or sprues and runners away from the machine and to prescribed locations. It will be appreciated that the press 10 may, for automatic operation, be provided with suitable means for blowing, pushing, dropping or otherwise transporting the molded articles and/or the sprues into the apertures 26 or 27 for delivery out of the front of the box-like formation of FIG. 5.

It has also been shown that this combined safety and material handling structure may cooperate with two-fold safety apparatus providing both electrical and mechanical interlocks to prevent press operation while the structure 20 is in open position.

The mechanical safety device comprising the spring-operated bell cranks 42 distinguishes over prior art injection molding press safety devices in that they provide easily operated and extremely rugged mechanical deterrents to operation of the press. Not only are the bell cranks 42 substantially fool-proof in their operation but they are quite visible whereby failure of these devices to operate may be clearly seen by the operator such that he is warned of the failure of his safety device. These mechanical safety devices are made further fool-proof by virtue of the fact that they will tilt by action of gravity from their counterclockwise positions to their clockwise positions even though the springs 44 should fail.

It will be appreciated by those skilled in the art that the invention is readily applicable to horizontal injection molding presses as well as to the vertical injection molding press to which it is applied above.

It is to be understood that the invention is not limited to the above-described embodiment or embodiments of the invention. Various modifications, some of which will be apparent to those skilled in the art, may be made without departing from the true spirit of the invention which is intended to be covered by the Letters Patent applied for hereby.

What is claimed is:

1. In combination with an injection molding press, combination safety and material handling means comprising, a structure normally barring access to the interior of said press, said structure constituting a chute for conveying molded parts away from said press and being readily movable from normal position to permit access to the interior of said press, and control means operable by movement of said structure to permit operation of said press when said structure is in position to bar access to the interior of said press and to prevent operation of said press when said structure is in position to permit access to the interior of said press.

2. In combination with an injection molding press, combination safety and material handling means comprising, a structure normally barring access to the interior of said press, said structure constituting a pair of chutes for separately conveying molded parts and sprues away from said press and being readily movable from normal position to permit access to the interior of said press, and control means operable by movement of said structure to permit operation of said press when said structure is in position to bar access to the interior of said press and to prevent operation of said press when said structure is in position to permit access to the interior of said press.

3. In combination with an injection molding press having a fixed die platform and a movable die platen, combination safety and material handling means comprising, a structure normally barring access to the interior of said press, said structure constituting a chute for conveying molded parts away from said press and being readily movable from normal position to permit access to the interior of said press, and control means operable by movement of said structure to permit operation of said press when said structure is in position to bar access to the interior of said press and to prevent operation of said press when said structure is in position to permit access to the interior of said press, said control means including a member arranged to be moved to a position between said fixed die platform and said movable die platen, by movement of said structure away from access barring position, to block closing movement of said press.

4. In combination with an injection molding press having a fixed die platform and a movable die platen, combination safety and material handling means comprising, a structure normally barring access to the interior of said press, said structure constituting a chute for conveying molded parts away from said press and being readily movable from normal position to permit access to the interior of said press, and control means operable by movement of said structure to permit operation of said press when said structure is in position to bar access to the interior of said press and to prevent operation of said press when said structure is in position to permit access to the interior of said press, said control means including a bell crank pivotally supported on said fixed die platform and having one leg movable to a position between said fixed die platform and said movable die platen to block closing movement of said press, said bell crank having another leg engageable by said structure upon movement of said structure to access barring position to remove said one leg from the path of said movable die platen.

5. In combination with an injection molding press having a fixed die platform and a movable die platen, combination safety and material handling means comprising, a structure normally barring access to the interior of said press, said structure constituting a chute for conveying molded parts away from said press and being readily movable from normal position to permit access to the interior of said press, and control means operable by movement of said structure to permit operation of said press when said structure is in position to bar access to the interior of said press and to prevent operation of said press when said structure is in position to permit access to the interior of said press, said control means including electric switch means operable to permit press operation only when said structure is in access barring position, and mechanical means normally positioned between said fixed die platform and said movable die platen and removable therefrom by movement of said structure to access barring position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,212,319	Bretsnyder	Jan. 16, 1917
1,418,525	Brower	June 6, 1922
2,198,767	Glasner	Apr. 30, 1940
2,201,244	Root	May 21, 1940
2,584,534	Barnhardtson	Feb. 5, 1952