United States Patent [19]

Smit

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[45] **Nov. 19, 1974**

[54] **SAFETY GUARD FOR PRESSES**

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[73] Assignee: **Leslie E. Tassell,** Grand Rapids, Mich.

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[52] **U.S. Cl.** ..... **192/133,** 100/53, 74/615, 74/612, 192/134, 192/131 R

[51] **Int. Cl.** **F16d 9/00**

[58] **Field of Search** ..... 192/133, 134, 135, 131 R; 100/53; 74/615, 613, 612

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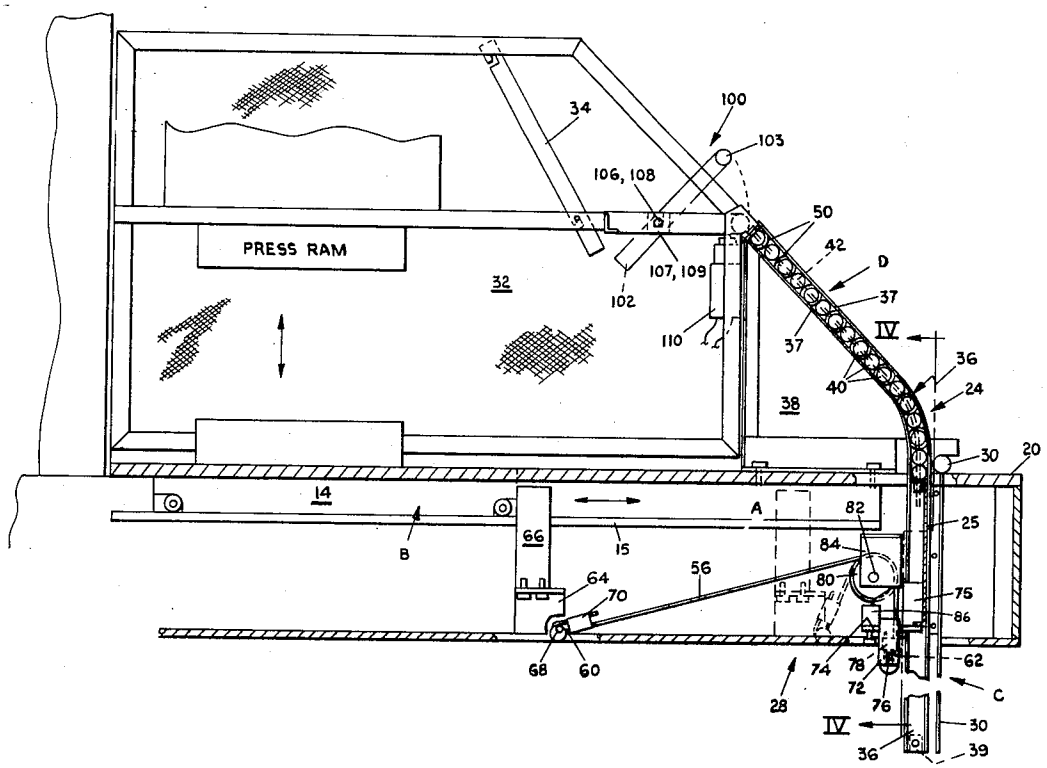
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Assistant Examiner—Randall Heald
Attorney, Agent, or Firm—Price, Heneveld, Huizenga & Cooper

[57] **ABSTRACT**

A safety guard assembly for presses, especially those having traveling bolsters. The assembly includes pulley and cable means for extending a resilient, flexible, movable guard along a curved path in response to movement of the traveling bolster. A second movable guard, including switch means normally in engagement therewith, is mounted adjacent the first guard such that interposition of an object such as the hand or arm of an operator between the two guards prevents further operation of the press.

31 Claims, 9 Drawing Figures



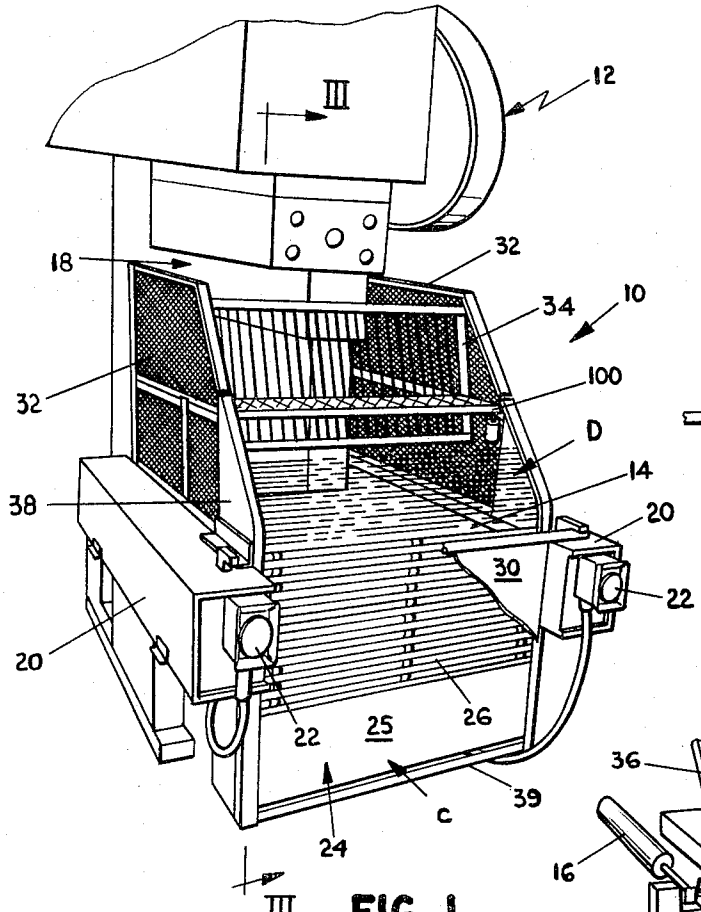


FIG. 1

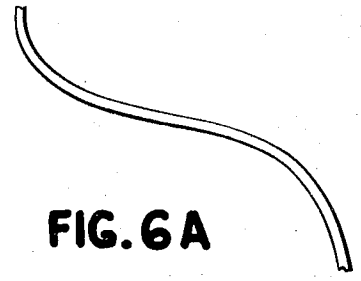


FIG. 6A



FIG. 6B

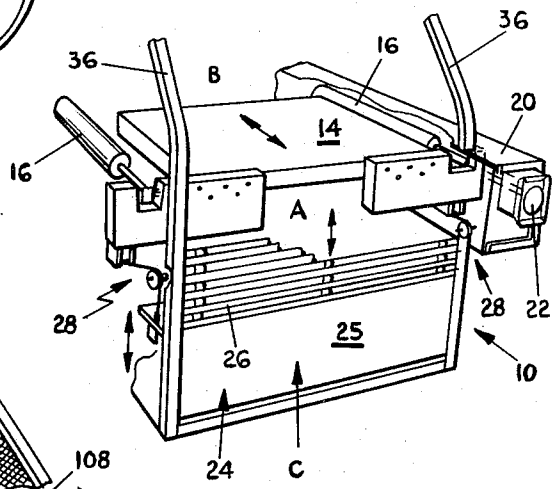


FIG. 2

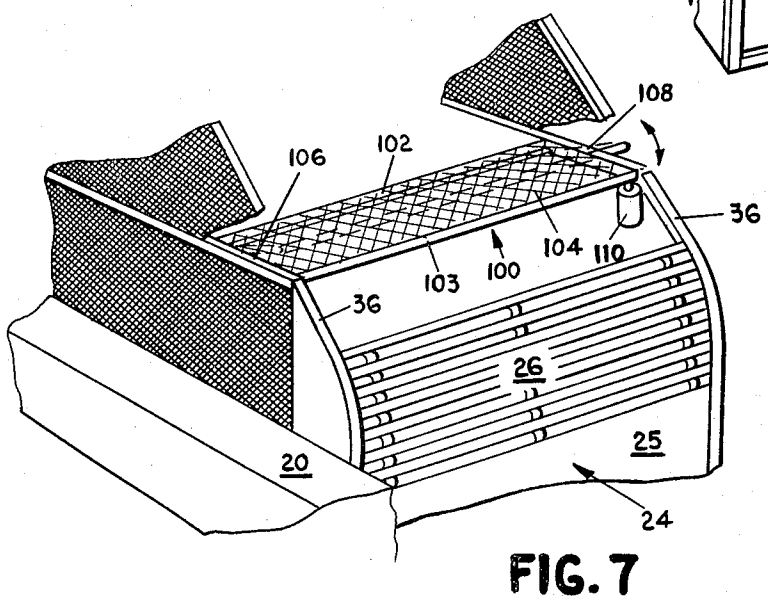


FIG. 7

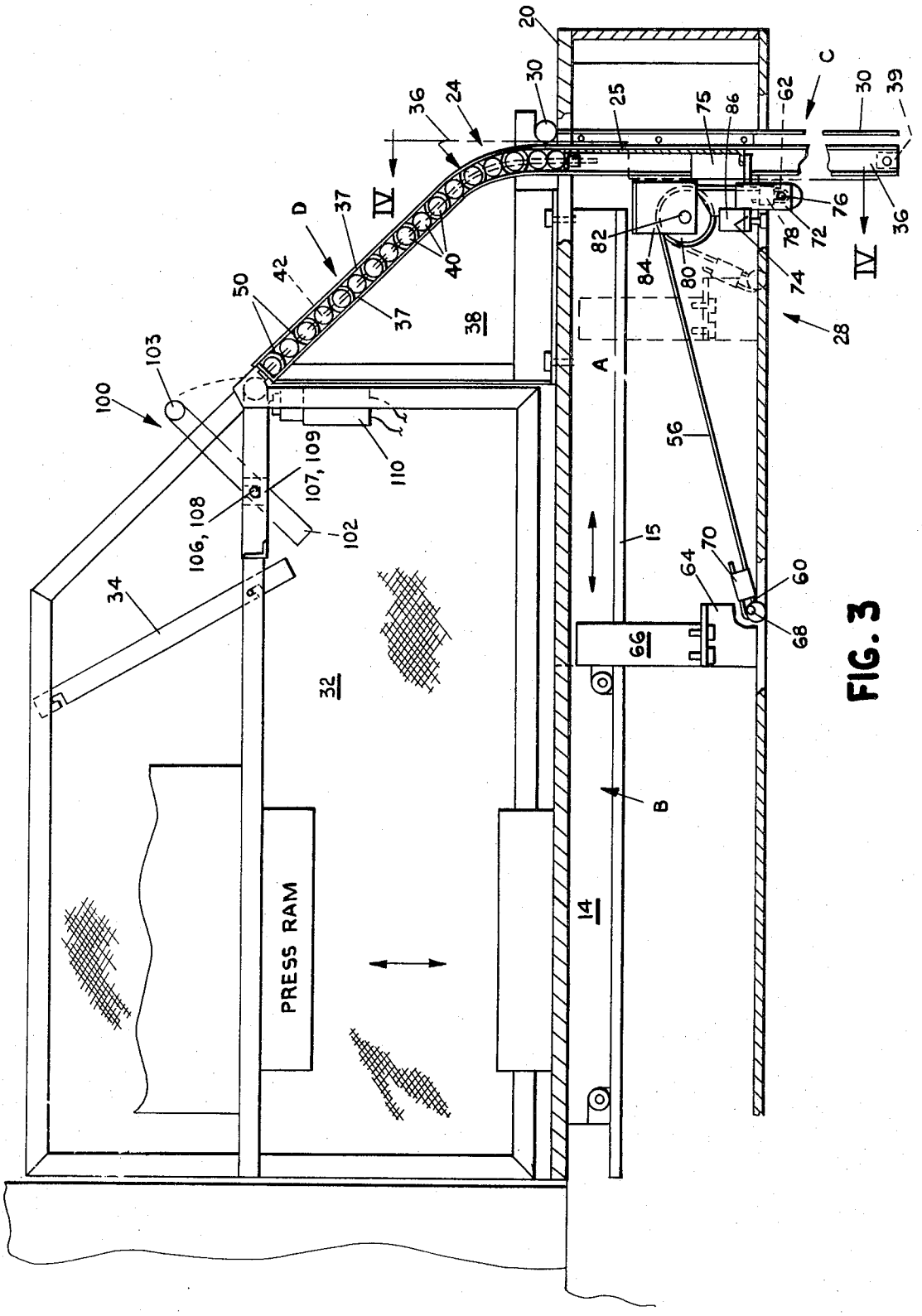

20
30
36
24
25
75
86
62
C
30
39
IV
D
37
40
42
50
37
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82
84
80
74
76
78
72
36
IV
28
A
100
103
56
107, 109
110
106, 108
102
15
70
64
60
68
34
66
32
B
PRESS RAM
14

FIG. 3

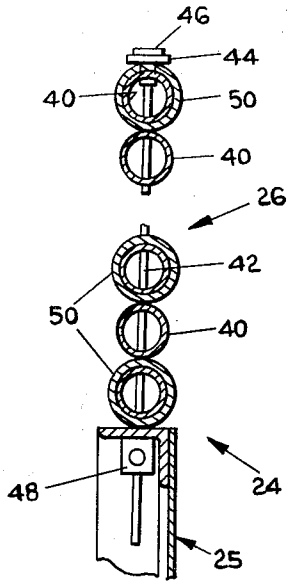


FIG. 5

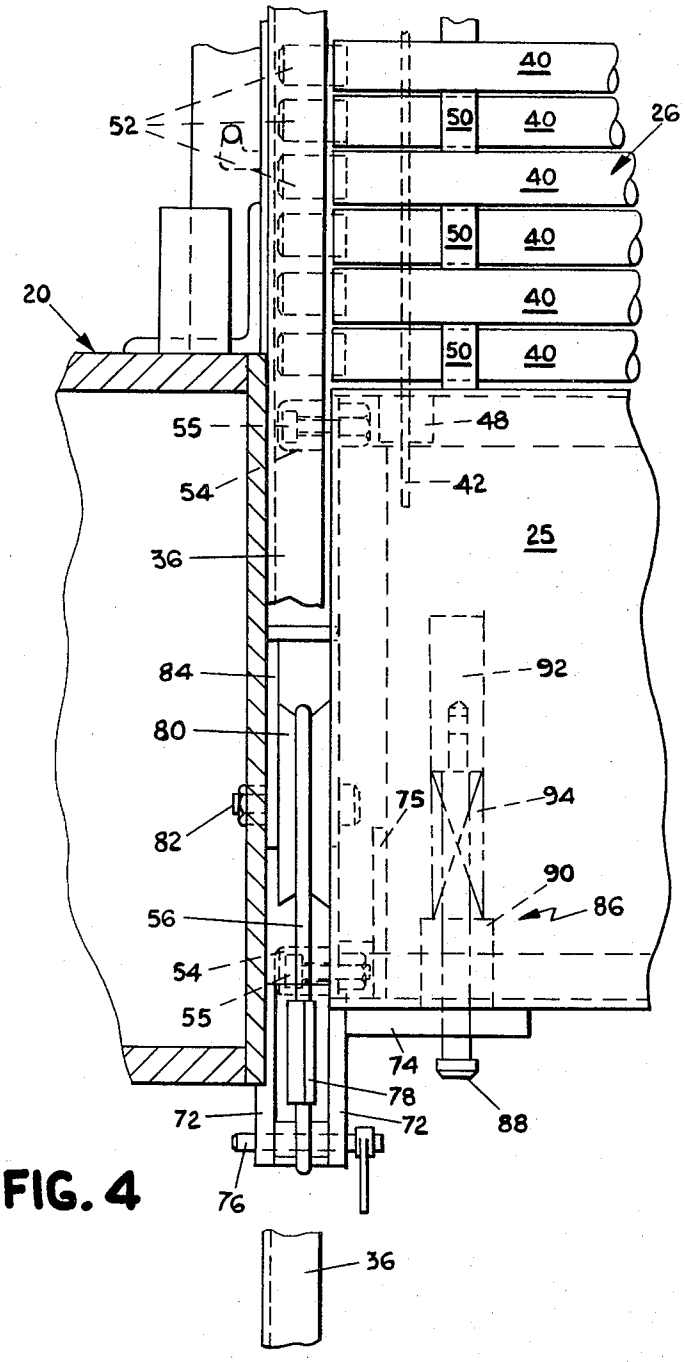


FIG. 4

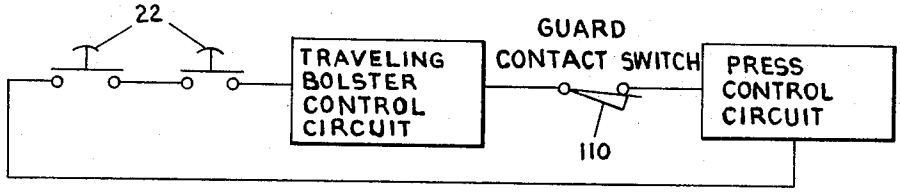


FIG. 8

SAFETY GUARD FOR PRESSES

This invention relates to safety guards for presses and, more particularly, to safety guards for presses including traveling bolsters in which a guard is moved into and out of a protective position in response to movement of the traveling bolster. It further relates to guards which are adapted to prevent further operation of the press should an object such as the arm or hand of an operator of the press be forced into contact therewith.

BACKGROUND OF THE INVENTION

Guards for power presses are very well known. Typical prior known guards for presses have included various means for moving the guard away from the working area around the press arm as well as means for returning the guard to its protective position prior to the working cycle of the press. The increased emphasis on industrial safety standards in recent years has accentuated the need for effective, efficient press guards.

Certain types of power presses incorporate traveling bolster plates which reduce the chances of injury to an operator of the press. Such traveling bolsters are moved between a loading position remote from the ram of the press, where work pieces are loaded on a die carried by the bolster, and a working position wherein the bolster is beneath the ram and away from the operator. The provision of efficient guards for presses including such traveling bolsters has caused several problems.

First, a guard must be capable of completely covering and protecting the work area of a press from outside the normal limits of movement of the traveling bolster in order to effectively prevent injury to operators. However, the guard must be capable of being withdrawn from such a protective position in order to allow the operator sufficient freedom of movement to load and unload the bolster efficiently. Provision of such movable guards which occupy as little space as possible and therefore are not extremely bulky has been especially difficult.

Secondly, the guard itself must not operate in a manner which would by itself cause injury to an operator. In this respect, prior known guards have moved vertically in paths adjacent the position where an operator normally stands. Accordingly, the risk of the guard striking the operator during its movement has been great. Also, the mechanism or means which operate the guard for movement into its protective position have in the past been hazardously exposed in a manner which also exposes a press operator to the possibility of injury.

Thus, there has been a pronounced need for safe, efficient, and effective guards for presses and, especially presses incorporating traveling bolsters, which are designed to prevent the press mechanism and the mechanisms of the guard itself from injurying an operator and yet provide sufficient room for operating the press.

SUMMARY OF THE INVENTION

Accordingly, it is an object and purpose of the present invention to provide a safety guard assembly for presses, and especially presses incorporating traveling bolsters, in which the guard is movable between an extended position in which it effectively prevents injury from both the press and traveling bolster mechanisms and a withdrawn position in which a press operator is

provided sufficient room to load and unload the press and traveling bolster. The movable safety guard assembly of the present invention incorporates a resiliently flexible guard which takes little space in its withdrawn position and yet may be moved into a protective position through a curved path away from the press operator thereby preventing the possibility of injury from its own operating mechanism. Further, the movable guard includes a simple operating mechanism which efficiently raises and lowers the guard in response to the movement of the traveling bolster whereby the guard is located in its protective position prior to any working operation of the press ram. The present safety guard may also include means for preventing operation of the press ram should an operator's hand, arm, or other extremity be caught and carried by the guard as it is moved into its protective position.

In the preferred embodiment, the safety guard assembly of the present invention includes a flexible, resilient, movable guard. The guard is guided in a curved path from a generally vertical position below the level of a traveling bolster on a press to a position above the level of the traveling bolster and over the working area of the press generally between the ram and the press operator. The assembly includes a cable and pulley means in which the cable is connected to the traveling bolster such that when the bolster is moved beneath the press ram, the movable guard is simultaneously pulled and guided upwardly to its protective position.

The guard, which can be adapted for use on other than traveling bolster type presses, preferably includes a flexible, tambour-like panel having a plurality of elongated, rigid members flexibly secured in parallel relation to one another. Such flexibility allows movement of the guard through a curved path to its protective position. The flexibility further allows the guard to be mounted in a minimum of space on the press.

A separate feature of the invention is the provision of a second movable guard adjacent the upper edge of the first guard when the latter is in the extended position. Switch-type contact means are provided in engagement with the second guard such that if the first guard catches and carries the hand or arm of an operator or another object into contact with the second guard, the second guard will be moved out of contact with the switch thereby cutting off power to and preventing actuation of the press ram.

These and other objects, advantages, purposes, and features of the invention will become more apparent from a study of the following description taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the safety guard assembly incorporated in a typical power press having a traveling bolster;

FIG. 2 is a fragmentary, perspective view, with portions broken away, schematically illustrating the operating mechanisms of the safety guard assembly;

FIG. 3 is a broken, sectional side elevation of the safety guard assembly taken along plane III—III of FIG. 1;

FIG. 4 is an end elevation of a portion of the operating mechanism and guard assembly taken along plane IV—IV of FIG. 3;

FIG. 5 is a fragmentary, broken, side elevation of the movable safety guard;

FIG. 6A is a schematic illustration of an alternate curved path through which the movable guard may be guided;

FIG. 6B is a schematic illustration of another alternative path through which the movable guard may be guided;

FIG. 7 is a fragmentary, perspective view of the safety guard assembly illustrating the movement of the second movable guard; and

FIG. 8 is a schematic electrical diagram of the operation of the switch means associated with the second movable guard.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in greater detail, FIGS. 1 and 2 illustrate the safety guard assembly 10 of the present invention mounted on a typical power press 12 incorporating a traveling bolster 14. The traveling bolster assembly is of the type disclosed in this inventor's copending U.S. Pat. application entitled Safety Apparatus For Presses, Ser. No. 263,147, filed June 15, 1972, invented by Henry Smit, the disclosure of which is incorporated by reference herein. As is best seen in FIG. 2, the traveling bolster is mounted for movement over the bed of the press 12 between a loading position A and a working position B. At loading position A, the operator of the press loads materials on a die positioned on the bolster. Following the loading operation, the traveling bolster is moved via fluid cylinders 16 to working position B beneath and in alignment with the ram 18 of the press 12. The fluid cylinders 16 and other operating mechanisms for the traveling bolster are located in housings 20 on either side of the bolster 14. Palm switches 22 are located on the ends of the housings 20 in the operator position remote from the press ram. Switches 22 are connected such that both must be actuated simultaneously to operate the bolster and press, thereby preventing the operator from reaching beneath the ram when the press is operated.

The safety guard assembly 10 includes a movable guard 24 having a rigid panel 25 and a flexible panel 26 mounted generally between the standing position of an operator and the forwardmost or loading position A of the traveling bolster. The guard 24 is raised via a pulley and cable means 28 secured to the traveling bolster. The guard is moved between a withdrawn or retracted position C (FIGS. 1, 2 and 3) generally below the level of a traveling bolster to a raised or extended position D (FIG. 3 and phantom lines in FIG. 1) generally above and over the traveling bolster. A pivotal guard 100 is positioned adjacent the extended position of guard 24 to prevent further operation of the press assembly should a foreign object propelled by guard 24 pivot it out of its normal, horizontal position. A releasable, stationary guard 30 (shown broken away in FIG. 1) may be positioned beyond the lowered or withdrawn position of the guard 24 to provide further safety for the operator. Additional stationary guards 32 and 34 (FIGS. 1 and 3) are positioned along the side boundaries of the working area of the press and over the remaining upper portion of the working area beyond the guards included in the present safety guard assembly 10. Stationary guards 34 include wire mesh screening for protection of the operator while guards 43 include substantially vertical, spaced bars. Accordingly, when the safety guard of the present invention is raised to its extended position D, the working area around both the press ram and the traveling bolster is completely enclosed for the operator's safety.

Referring now to FIGS. 2 through 5, the guard 24 is mounted for sliding movement between its extended and retracted positions between a pair of parallel channels or tracks 36. The channels have flanges 37 extending inwardly and forming openings into which the opposite edge of the guard extend. The flanges restrain the guard from moving perpendicularly with respect to the direction of extension of the channels. That is, the guard is restrained from moving in a direction normal or transverse to the planes which are tangential to the curved tracks at points along the length of the tracks. The lower portions of the tracks extend substantially vertically downwardly from the top level of housing 20. A bar 39 is mounted between the bottoms of the tracks to space them apart and to limit the downward movement of the guard. The upper portions of the tracks curve inwardly toward the press ram in parallel curved paths to a level well above the bed of the press. Triangular shaped guards 38 are secured via suitable securing means to the top of housing 20 and extend thereabove to help support tracks 36 above the working area. Thus, since guard 24 is moved in curved path away from the operator toward the press ram as it is being raised, risk of injury is reduced since the guard will not strike the operator even if he or she is leaning over the press bed.

The guard 24 includes a rigid panel 25 as well as the resilient, flexible, tambour-like panel 26 secured to the top edge thereof. The tambour-like portion 26 includes a plurality of elongated, cylindrical, steel tubes 40 each forming a rigid member extending between the two tracks 36. The several rigid members 40 are secured parallel to one another and in lateral alignment by a pair of flexible wires or cables 42. Each cable 42 extends diametrically through suitable apertures adjacent one end of each of the rigid tubes 40 as is best seen in FIGS. 4 and 5.

An elongated capping plate 44 is secured over the final tube 40 by a securing member 46 attached to one end of the cable 42, while another securing member 48 is secured on the opposite end of the cable in abutment with the upper flange of the rigid panel 25 thereby holding the several rigid tubes in their parallel, aligned relationship. In order to space the rigid tubes 40 slightly apart and to prevent them from scraping against one another during movement, flexible, resilient rings 50, which are preferably sections of a suitably sized rubber hose, tube or the like, are slid over every other one of the rigid tubes 40 adjacent either end and at the center thereof.

The several rigid tubes 40 are slidably mounted between tracks 36 via lubricious plastic cylindrical inserts 52 press fitted in both ends of each tube such that they all extend into the channels provided in the tracks 36. Similarly, the rigid panel 25 is slidably mounted in the same tracks by plastic cylindrical members 54 secured by suitable recessed bolts or other securing means 55 at each of the four corners of the rigid panel. Inserts and members 52 and 54 are preferably formed from a long-wearing, tough, resilient durable, lubricious plastic such as nylon or the like.

As will now be apparent, the guard 24 may be raised and lowered in tracks 36 with the flexible, resilient, tambour-like panel 26 following the prescribed curva-

ture of the tracks above the level of the bolster **14.** The rigid panel **25** is moved to the top of the generally vertical portion of the tracks **36** but generally moves no farther than the level of the top of the housing **20** as shown in FIG. **3.** The tambour-like panel of the guard **24** is rigid in generally all dimensions except one which is generally transverse to the longitudinal axes of each of the several elongated rigid tubes. That one flexible dimension allows the tambour-like panel to follow the curvature of the tracks **36** thereby providing the advantage of allowing the guard to be designed to fit any desired path of movement. Alternative curved paths of movement are shown in FIGS. **6A** and **6B**. Hence, the guard may be moved first vertically, then horizontally, and then vertically again as in FIG. **6A**. The guard may be moved vertically and then horizontally as in FIG. **6B**. As is apparent to those skilled in the art, the guard may also be mounted with the rigid members extending substantially vertically or at other angles such that the guard is moved horizontally around the working area of the press instead of up and over that working area as in the preferred embodiment. Accordingly, the guard can be mounted on virtually any press.

Movement of the guard **24** between its extended and retracted positions is accomplished in a preferred embodiment by a pulley and cable means **28** best seen in FIGS. **3** and **4.** The pulley and cable means **28** only one portion which is illustrated, includes a pair of actuating cables **56** each secured at one end **60** to a portion of the traveling bolster **14** and at their opposite ends **62** to opposite sides of the bottom of the movable guard **24.** The bolster ends **60** of cables **56** are secured to brackets **64** mounted on the bottom of bolster arm **66** which, in turn, is secured to the front of the traveling bolster **14.** Removable retaining bolts or pins **68** are passed through the opposing sides of the brackets **64** while the cable is looped therearound with their free ends secured to themselves by clamps **70.**

Similarly, the opposite ends **62** of cables **56** are secured to brackets **72** welded to a mounting plate **74** extending at right angles from and across the entire bottom of rigid panel **25.** Plates **74** are braced by gussets **75** for additional strength. Removable retaining bolts or pins **76** are passed through the opposing sides of brackets **72** with the ends **62** of cables **56** looped therearound and clamped to themselves by clamps **78.**

Cables **56** are passed over pulleys **80** intermediate their ends, the pulleys being secured on suitable bearings on axle bolts **82** between the opposing sides of brackets **84** welded to the sides of housings **20.** Accordingly, as the traveling bolster **14** moves between its loading and working positions A and B as shown in phantom and solid, respectively, in FIG. **3,** the movable guard **24** is raised to its extended position by the corresponding movement of the cable which transfers the motion of the traveling bolster to the guard. The guard, in the embodiment illustrated is returned to its retracted position by gravity on withdrawal of the bolster, the latter movement providing the necessary slackening of cable **56.** Springs or a closed loop cable arrangement may be utilized, if necessary, to assist in this retraction. The use of a relatively heavy rigid panel **25** facilitates return of the guard to its withdrawn position without jamming.

In order to stop the guard in its raised position and prevent it from slamming against the supporting mechanisms of the traveling bolster, spring-biased abutment blocks or shock absorbers **86** are secured to the mounting plate **74** adjacent the pulley and cable mechanisms near either lateral edge of rigid panel **25.** The abutment blocks extend substantially vertically upwardly and include elongated bolts **88** extending upwardly through blocks **90** and into abutment blocks **92.** Springs are mounted between blocks **90** and **92** biasing blocks **92** away from blocks **90.** When the guard **24** is raised via the pulley or cable means **28,** blocks **92** engage the undersides of the rails **15** supporting traveling bolster **14** thereby compressing springs **94.** The resistance of the springs stops and absorbs the motion of the guard as it reaches its raised position.

As shown in FIGS. **1, 3,** and **7,** a second movable guard **100** is mounted adjacent the upper edge of the guard **24** when it is in its extended position D. Guard **100** comprises a rigid, rectangular framework **102** including a resilient, wire mesh screen or the like mounted between the sides of the framework. The guard **100** is pivotally mounted in a generally horizontal position between the removable guard **34** and the upper limit of the guard **24** in its extended position. Stub axles on the lateral edges of the framework provide axially aligned pivot points **106** and **108** and are spaced rearwardly of the center of each of the lateral sides of the framework **102** such that the guard is slightly off-balance. The guard **100** may be removed by lifting it vertically such that the stub axles slide out of supporting brackets **107** and **109** respectively. This unbalanced mounting causes the front bar **103** to be pivoted downwardly into contact with the plunger-type, electrical switch **110** which supports the guard **100** in its horizontal position. Switch **110** is a normally open switch which is held closed by the weight of the guard **100** pressing thereagainst.

As will now be appreciated, should any object such as the hand or arm of an operator or a tool or other similar object be caught and carried by the upper edge of the guard **24** into contact with guard **100** as guard **24** is being raised, the movement of guard **24** into its extended position will force the object to pivot guard **100** out of its horizontal position as shown by the phantom lines in FIGS. **3** and **7.** Pivotal movement of guard **100** thereby moves the guard out of contact with and closes switch **110.**

As is shown schematically in FIG. **8,** the switch **110** is electrically positioned in the control circuit intermediate the control circuit for the traveling bolster and that of the press control circuit. Accordingly, when palm switches **22** are depressed to begin operation of the traveling bolster, the traveling bolster will move into its working position B beneath the press ram and will simultaneously move the guard **24** into its extended position D. Should a foreign object be interposed between the guard **24** and guard **100** in the manner described above, guard **100** will be pivoted out of its horizontal position thereby releasing and opening switch **110** and preventing the press control circuit from actuating movement of the press ram through its working cycle. Thus, the second guard **100** works in conjunction with the movable guard **24** to prevent further operation of the press should any object, and especially the hand or arm of an operator, force guard **100** away from movable guard **24** in its extended position.

As will now be understood, the present safety guard apparatus may be adapted for use with any press to cover the working area thereof. However, it is espe-

cially useful for presses including traveling bolster assemblies such that it can be actuated directly in response to the movement of the traveling bolster. It includes a tambour-like, flexible, panel which can be adapted to follow any desired path and can be mounted such that it is extendable either vertically, horizontally or at other angles. Further, the mechanisms adapted to extend and retract the guard are themselves housed and protected from injuring an operator of the press. Finally, pivotal guard **100** provides an effective means for preventing operation of the press should any foreign object, including an extremity of an operator, not be completely removed from the working area as guard **24** reaches its extended position.

While several forms of the invention have been shown and described, other forms will now be apparent to those skilled in the art. Therefore, it will be understood that the embodiments shown in the drawings and described above are merely for illustrative purposes, and are not intended to limit the scope of the invention which is defined by the claims which follow.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A safety guard for presses comprising a tambour-like panel including a plurality of elongated, rigid members; flexible means for securing said rigid members adjacent and parallel to one another; and means for movably securing said guard to a press.

2. The safety guard of claim **1** wherein said rigid members each have a longitudinal axis, said axes of all said rigid members being parallel to one another, said resilient, flexible means extending generally transverse to said longitudinal axes of said rigid members.

3. The safety guard of claim **2** wherein said flexible means includes a flexible wire and securing means on either end of said wire for holding said members together along said wire.

4. The safety guard of claim **1** wherein said rigid members are spaced slightly apart by resilient members secured thereto.

5. The safety guard of claim **1** wherein said means for movably securing said guard include means on said rigid members for engaging means for guiding the movement of said guard.

6. The safety guard of claim **5** wherein said rigid members each include an elongated cylinder; said resilient means including a resilient flexible wire and securing means on either end of said wire for holding said members together along said wire; said means for movably securing said guard including lubricious, plastic cylinders extending from either end of said elongated cylinders, said lubricious plastic cylinders adapted to slidingly engage tracks adjacent both ends of said plurality of elongated cylinders for guiding said guard for movement in a predetermined path.

7. The safety guard of claim **6** wherein every other of said elongated cylinders includes a resilient ring extending therearound and spacing said elongated cylinders slightly apart.

8. A safety guard assembly for presses comprising a movable guard; means for guiding the movement of said guard between an extended position wherein said guard covers at least a portion of the working area of said press and a retracted position in which said guard is withdrawn from said covering position; and means for moving said guard between said extended and retracted positions; said guard including a tambour-like panel which is flexible in one dimension but which is rigid in the remaining dimensions whereby the guard may be extended in a predetermined path and will obstruct the passage of articles therethrough at points along said path.

9. The safety guard assembly of claim **8** wherein said means for guiding the movement of said guard include track means located adjacent opposing edges of said movable guard.

10. The safety guard assembly of claim **8** wherein said means for moving said guard include a pulley and cable means secured between one portion of said movable guard and a traveling bolster included on the press, the bolster being movable between loading and working positions remote from and in alignment with the ram on the press whereby movement of the traveling bolster causes said movable guard to be extended and retracted along said predetermined path.

11. The safety guard assembly of claim **8** wherein said tambour-like panel includes a plurality of parallel, elongated rigid members each having a longitudinal axis; and flexible means for securing said rigid members together; said one dimension in which said panel is flexible being generally transverse to said longitudinal axes of said rigid members.

12. The safety guard assembly of claim **11** wherein said elongated rigid members each comprise a cylinder; said flexible means extending diametrically through each of said cylinders.

13. The safety guard assembly of claim **12** wherein said cylinders comprise hollow tubes; every other one of said tubes including at least one resilient ring thereabout and spacing said tubes slightly apart; said tubes further including lubricious, plastic, cylindrical inserts in the ends thereof for engaging tracks adjacent opposing edges of said movable guard; said flexible means comprising at least one wire having securing means on either end thereof for holding said tubes together.

14. A safety guard assembly for a power press having a traveling bolster, which bolster is adapted to move between a loading position remote from the ram of the press and a working position beneath the press ram, said assembly comprising a safety guard mounted for movement generally in the area between the loading position of the bolster and the position of an operator who operates said press and bolster while standing; pulley and cable means for moving said guard in response to the movement of the bolster between its loading and working positions from a first position wherein said guard is withdrawn from between said loading and operator positions and a second position wherein said guard extends between said loading and operator positions.

15. The safety guard assembly of claim **14** including track means for guiding the movement of said guard between said first and second positions.

16. The safety guard assembly of claim **15** wherein said guard includes a flexible portion which can flex in one dimension; said track means extending in parallel, curved paths adjacent opposing edges of said guard whereby said guard is oriented generally vertically in said first position and is oriented generally at an angle with the vertical in said second position.

17. The safety guard assembly of claim **15** wherein said track means extend generally from a level gener-

ally below the level of the traveling bolster to a level generally above the bolster level.

18. The safety guard assembly of claim **14** wherein said pulley and cable means include at least one pulley located adjacent the loading position of the bolster and a flexible cable extending over said pulley; one end of said cable being connected to a portion of the bolster and the other end connected to securing means at the bottom of said guard.

19. The safety guard assembly of claim **18** wherein said pulley is located below the level of said bolster.

20. The safety guard of claim **19** including two pulleys each positioned below the level of said bolster; one of said pulleys located adjacent either lateral edge of said guard; a flexible cable extending over each of said pulleys; said cables being connected between portions of said bolster adjacent either lateral edge thereof and portions of said guard adjacent either lateral edge near the bottom thereof.

21. The safety guard assembly of claim **18** wherein said guard includes biased abutment means for engaging a stationary abutment in said first position of said guard.

22. The safety guard assembly of claim **14** including a guard separate from said movable guard; means for movably mounting said separate guard for movement in a position adjacent an edge of said movable guard in said second position thereof; contact means for engaging said separate guard which prevent operation of the press ram when said separate guard is moved out of contact with said contact means.

23. The safety guard assembly of claim **22** wherein said mounting means for said separate guard include means for pivotally mounting said separate guard generally horizontally adjacent an upper edge of said movable guard such that one edge of said separate guard is immediately adjacent said upper edge of said movable guard in said second position of said movable guard; said contact means including a switch means for cutting off power to the means which actuate the press ram when said separate guard is pivoted out of contact therewith.

24. The safety guard assembly of claim **23** wherein said separate guard includes a rigid framework and a screen mounted on said framework.

25. A safety guard assembly for presses comprising a first movable guard means and a second movable guard means; means for mounting said first guard means for movement between an extended position generally between the location of an operator in position to operate the press and the ram of the press and a retracted position withdrawn from between the operator location and press ram; means for mounting said second guard means for movement adjacent said first guard means in said extended position; means for moving said first guard in response to operation of the press; and contact means engaging said second guard means for preventing operation of the press when an object is interposed between said first guard means and said second guard means when said first guard means is extended whereby said second guard means is moved out of engagement with said contact means.

26. The safety guard assembly of claim **25** wherein said first guard includes flexible panel means for enabling said guard to be moved in a curved path.

27. The safety guard assembly of claim **25** wherein said second guard includes a rigid framework mounted for pivotal movement about a generally horizontal pivot axis; said contact means including a switch means for cutting off power to the means which actuate the press ram when said framework of said second guard means is pivoted out of engagement therewith.

28. A safety guard assembly for presses comprising a movable guard having a flexible panel; curvilinear guideways for guiding movement of said movable guard between a first position wherein said guard extends generally between the ram area of a press and the location of an operator in position to operate the press and a second position wherein said guard is withdrawn from said first position, said guideways curving away from the position of the operator and including means for restraining said movable guard from movement in directions generally transverse to the planes which are tangential to the guideways at the various points along the length of said guideways; means for moving said guard along said guideways; and means responsive to activation of the press for moving said guard along said guideways between said first and second positions.

29. The safety guard assembly of claim **28** wherein said flexible panel is a tambour-like panel including a plurality of elongated rigid members flexibly secured in parallel relation to one another.

30. The safety guard of claim **28** wherein said guideways include a pair of parallel, curved channels having flanges extending along the length thereof and defining an opening in each facing toward the opposite channel; said movable guard extending into said openings and between said channels; said restraining means including said flanges on said channels.

31. The safety guard assembly of claim **28** wherein said means responsive to activation of the press for moving said guard include pulley and cable means connecting said guard with a portion of the press which is moved during the working cycle of the press; said means for moving said guard including securing means for attaching a cable from said pulley and cable means to said guard.

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