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[54] **SAFETY GUARD DEVICE FOR POWER PRESSES AND THE LIKE**

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[51] **Int. Cl.** **F16d 71/00**

[58] **Field of Search** 192/134; 74/612–617; 100/53; 72/3, 26; 83/DIG. 1, 544–546, 397; 49/197, 203

[56] **References Cited**

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[57] **ABSTRACT**

A safety guard device for a power press having a space constituting a path for inserting and taking out workpieces. A movable gate is arranged in the path and a photocell device outside the gate is arranged with the control zone thereof transverse to the longitudinal direction of the path. The gate is provided with driving and control members and the photocell device is provided with control circuits which together mechanically constitute a unit pivotally arranged at the press in such a way that the unit can be moved to a position so that the tool space of the press is easily accessible. An electrical connection is provided between the operation system of the press and the operation control circuit of the unit, which connection is such that it becomes disconnected when moving the unit.

6 Claims, 2 Drawing Figures

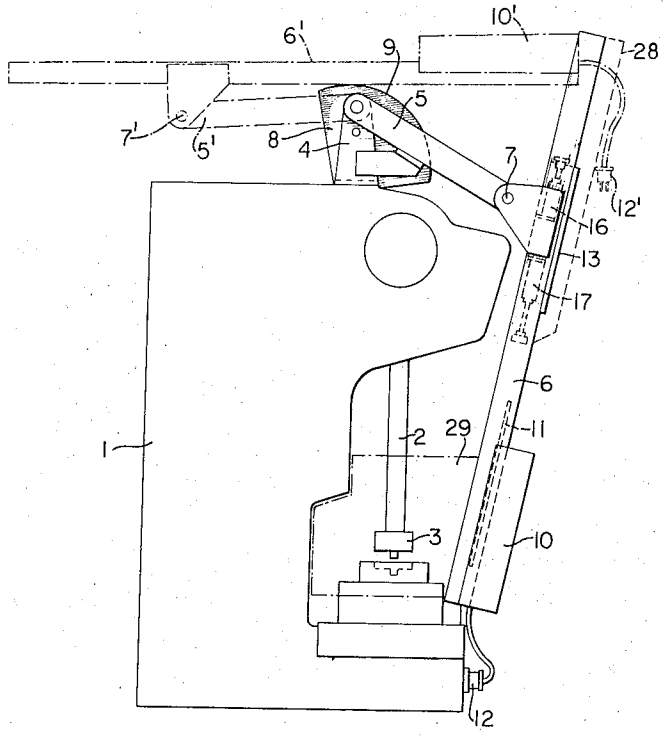


FIG. 1

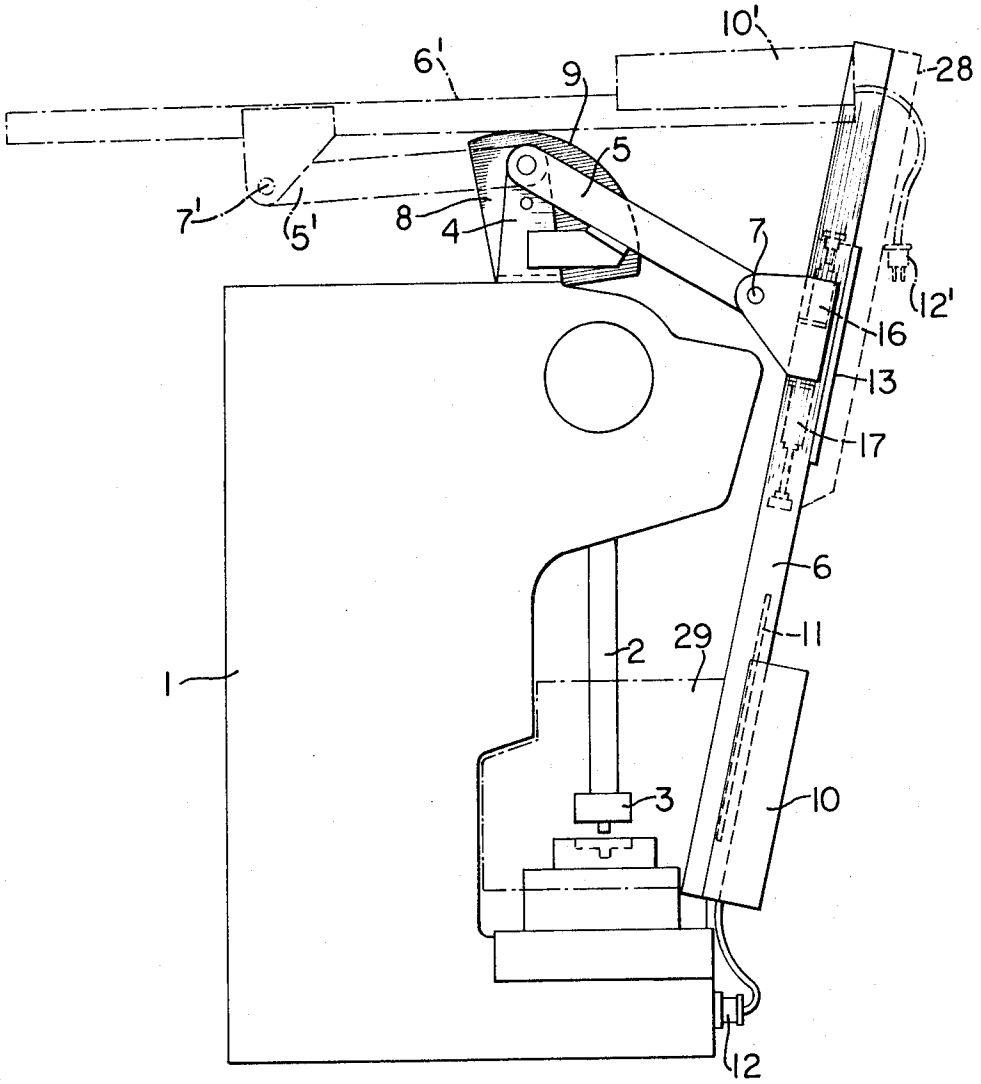
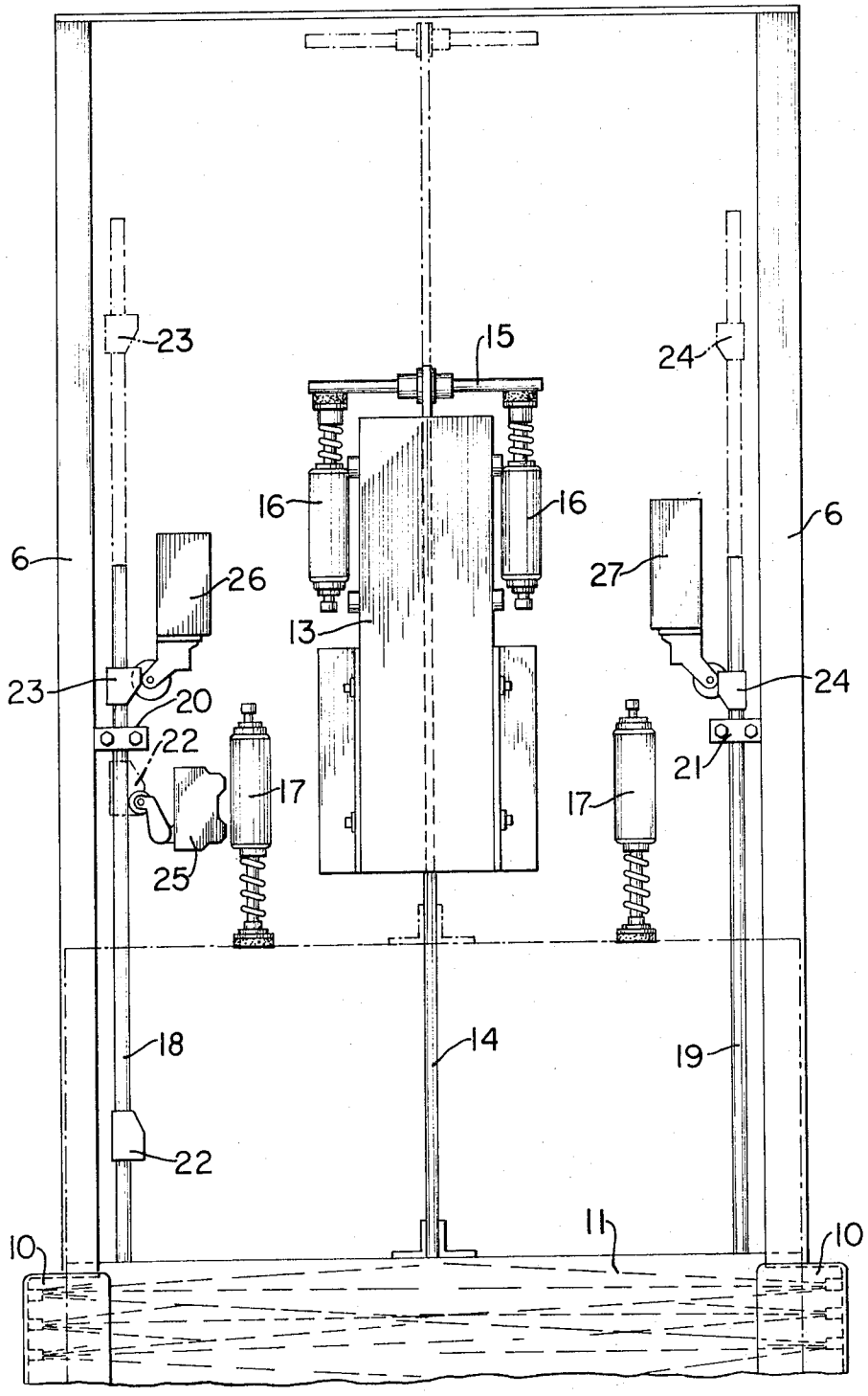


FIG. 2



SAFETY GUARD DEVICE FOR POWER PRESSES AND THE LIKE

The present invention refers to improvements in and relating to safety guard device for power presses and the like.

In modern industry there is a rapidly increasing demand for efficient safety guard devices, especially in connection with high speed power presses and the like. It is a common trend to avoid devices at which the operator has to actuate certain push-buttons for releasing the working operation of the press. Prior art includes a lot of push-button safety devices as well as gate safety guard mechanisms or photocell controlled light screen devices in the path for inserting work pieces onto the press tool and taking out the same. At devices of the last mentioned kind it is always a problem to obtain safety conditions during press tool adjusting intervals, i.e. it must not be possible to operate the press when changing or adjusting the press tools. There is also a problem of accessibility, since all kinds of safety guard devices take a lot of space around the area of the press tool which makes adjusting and changing of press tools difficult.

The object of the present invention is i.a. to avoid the above mentioned drawbacks and present a simple and safe guard device for power presses and the like. A safety guard device in accordance with the present invention intended for power presses and the like having a space constituting a path for inserting and taking out work pieces comprises a movable gate arranged in the path for inserting and taking out work pieces and a photocell device outside the gate having the control zone thereof transversally to the longitudinal direction of said work piece path, wherein the gate is provided with driving and control members and the photocell device is provided with control circuits which together mechanically constitute a unit pivotally arranged at the press in such a way that the unit can be moved to a position so that the tool space of the press is easily accessible and an electrical connection being provided between the operation system of the press and the operation control circuits of the said unit which connection is such that it becomes disconnected when moving said unit.

According to an embodiment of the invention the said unit is constituted by a frame structure including guide bars for guiding the gate during the displacement thereof which guide bars are provided with nibs for cooperation with switches connected to the control circuits of the press which switches are arranged remote from the gate inaccessible to the operator.

According to a further embodiment of the invention the said unit frame structure is movably connected with the press by means of levers at the upper portion of the press stand, wherein at least one guide member is arranged at said upper portion of the press stand which guide member is partly curve shaped and constituting a guiding surface for cooperation with the said frame structure when moved up to an idle position and wherein said guide member constitutes a support to said frame structure in the said idle position.

According to a further embodiment of the invention the electrical connection between the said unit and the operation system of the press is such that when disconnecting the same the press is unable to make any working stroke.

In accordance with a still further embodiment of the invention the driving mechanism of the gate is constituted by a linear induction motor for high speed operation of the gate wherein there are buffer means provided for braking the movements of the gate and defining the end positions thereof.

In a still further embodiment of the invention the unit is provided with side screens for screening off the press tool area and thus making it inaccessible to the operator during the operation of the press.

Other and further objects of the invention are those inherent in the apparatus herein illustrated, described and claimed.

In the drawings and description hereinafter given the invention is shown as applied to a common form of power press but it should be understood that the illustrated installation is not a limitation upon the usefulness of the invention which is applicable with equal facility and usefulness to power presses of other design as well as to power shears, power brakes and the like whether driven by flywheels or by air steam or hydraulic pressure. With this understood the invention is herein illustrated with reference to the drawings in which corresponding numbers refer to the same parts and in which

FIG. 1 is a side elevation view of an illustrative power press to which the safety guard device of the present invention has been applied and showing said safety guard device in side elevation;

FIG. 2 is a front elevational view corresponding to FIG. 1 and showing a portion thereof in an enlarged scale. In order not to complicate the said figure no parts of the press are shown in said figure.

The power press shown in FIG. 1 is designated 1 and comprises a press mechanism (not shown) and a press rod 2 and a press tool 3. On the upper portion of the press stand bearing brackets 4 are arranged which rotatably carry levers 5 which are connected to a frame 6 by means of bearing brackets 7. At the said upper portion of the press stand 1 close to the bearing brackets 4 are arranged guide members 8 which have a curved guiding surface 9 for cooperation with the frame 6 which is described in detail hereinafter. In the upright position of the frame shown in FIG. 1 the lower portion of the frame is supported by the tool attachment. Said lower portion of the frame 6 carries a box like structure 10 which at the vertical side frame thereof includes lamps which cooperate with photocell devices for obtaining a so called light screen. The frame 6 also carries a gate 11 which is displaceable in the longitudinal direction of the frame. The frame 6 is also intended to include electrical operation control circuits and circuit arrangements for cooperation with the operation circuit of the press. The connection between the circuits of the press and those of the frame unit 6 includes a multipole connection plug 12. The box 10 has an opening through which, when the gate 11 is elevated, the work pieces may be inserted and taken out.

For changing tools and adjusting the press the frame 6 and all the means connected therewith may be moved upwards and may finally take the position shown by broken lines in FIG. 1. Before the frame 6 is moved up to the said position the connection plug 12 has to be disconnected. When disconnected the operation circuits to the press are cut and it is thus impossible to start any operation of the press. Because of the fact that

the said electrical connection has to be disconnected before the frame, including all safety guard means for the press, can be moved upwards, a very high degree of safety is thereby achieved. When moving the frame **6** the operator first moves the same upwards and there will at first be a movement defined by the levers **5**. When the levers **5** are in an almost upright position the frame **6** will take a slightly slanted position and the rear side thereof will come into engagement with the curved surfaces **9** of the guiding members **8**. When further pushing the lower portion of the frame **6** said frame will slide on the said curved surfaces **9** until an essentially horizontal position, as shown in FIG. **1**, broken lines, has been obtained. The weight distribution of said frame **6** in the position **6'** is such that it will remain in the position shown only resting on said guiding members **8**. In practice it is suitable to make the upper edge surfaces of the members **8** essentially flat thus constituting resting surfaces for said frame **6**. It is apparent that when in the said position **6'–10'** the press and the press tool area is easily accessible.

FIG. **2** shows how the gate **11** is guided along the longitudinal side beams of the frame **6**. It is further apparent how the light screen is arranged in the side frame pieces of the box like structure **10**. The displacement of the gate **11** is obtained by a so called linear induction motor **13** cooperating with a traction rod **14** which is connected to the upper edge of the gate **11**. The upper end of the traction rod **14** is provided with a cross bar **15** for cooperation with two buffer means **16** located on each side of the motor **13** for braking the movement of the gate at the displacement thereof to an upper position. There are two further buffer means **17** arranged for cooperation with the upper edge of the gate. At each side edge of the gate **11** there are guide bars **18,19** arranged which follow the movement of the gate and which are guided by bearings **20** and **21** respectively. The bar **18** carries two nibs **22,23** and the bar **19** carries a nib **24**. The nib **22** is adapted for cooperation with a lever actuated switch **25** and the nib **23** is adapted for cooperation with a similar lever actuated switch **26**. The nib **24** is adapted for cooperation with a further lever actuated switch **27**. The above mentioned switches as well as the motor circuits constitute an integrated part of the electrical operation control system included in and carried by the frame structure **6**. The said motor **13** as well as the switches **25,27** are covered by a lid **28** shown in FIG. **1** in broken lines and they are thus inaccessible to the operator.

In practice it is suitable to provide the lower portion of the frame **6** with side screens **29** for screening off and protection of the tool area of the press in question. The area around the tools will thus be effectively protected partly by the press stand itself and partly by said side screens **29**, the frame **6** and gate **11**. When the frame **6** is moved away to the position **6'** the side screens **29** follow the said frame and the entire tool area of the press is thus exposed and easily accessible.

It is to be understood that the operation of the gate as well as the press may be controlled by the said light screen photocell device entirely or in combination with other suitable means which make no part of the present invention.

What is claimed is:

1. A safety guard device for power presses and the like having a space constituting a path for inserting and taking out work pieces, comprising a movable gate arranged in the path for inserting and taking out work pieces and a photocell device outside the gate having the control zone thereof transversally to the longitudinal direction of said work piece path, wherein the gate is provided with driving and control members and the photocell device is provided with control circuits which together mechanically constitute a unit pivotally arranged at the press in such a way that the unit can be moved to a position so that the tool space of the press is easily accessible and an electrical connection being provided between the operation system of the press and the operation control circuit of said unit which connection is such that it becomes disconnected when moving the said unit.

2. A safety guard device in accordance with claim **1**, characterized in that said unit is constituted by a frame structure including guide bars for guiding the gate during the displacement thereof which guide bars are provided with nibs for cooperation with switches connected to the control circuit of the press which switches are arranged remote from the gate inaccessible to the operator.

3. A safety guard device in accordance with claim **2**, characterized in that the driving mechanism of the gate is constituted by a linear induction motor for high speed operation of the gate, wherein there are buffer means provided for braking the movement of the gate and defining the end positions thereof.

4. A safety guard device in accordance with claim **1**, characterized in that said unit is constituted by a frame structure which is movably connected with the press by means of a lever means at the upper portion of the press stand, wherein at least one guide member is arranged at said upper portion of the press stand which guide member is partly curved shaped constituting a guiding surface for cooperation with said frame structure when moved up to an idle position and wherein said guide member constitutes a support to said frame structure in the said idle position.

5. A safety guard device in accordance with claim **1**, characterized in that the electrical connection between the said unit and the operation system of the press is such that when disconnecting the same the press is unable to make any working stroke.

6. A safety guard device in accordance with claim **1**, characterized in that the said unit is provided with side screens for screening off the press tool area and thus making it inaccessible to the operator during the operation of the press.

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