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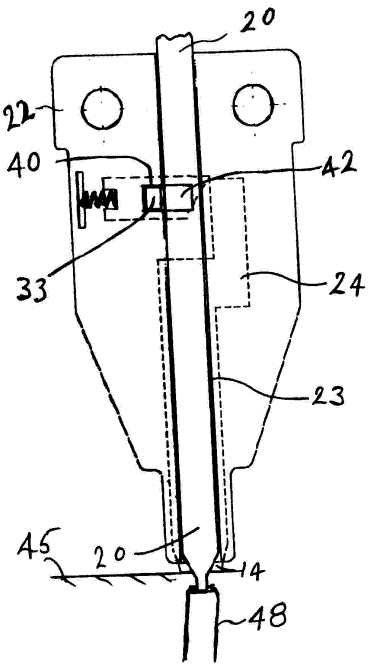
Remarks:
The references to drawings 1 -3 are deemed to be deleted (Rule 43 EPC).

(54) Safety mechanism for fastening machine

(57) A safety mechanism for a fastening machine (10) of the type wherein fasteners are ejected along a guide channel (23), out of the device and into the required fastening position, by means of a driver (20) with an automated actuating mechanism. A mechanical blocking element (33), normally interposed between the driver and the fastener in the guide channel, prevents said fastener being struck by the driver. This blocking element can be moved to an inoperative position, allowing the driver to strike the fastener out of the guide channel, by an actuator which projects from the device adjacent the exit from the guide channel but can be pushed into the device to deactivate the blocking mechanism when the fastening machine is placed against a substrate into which a fastener is to be inserted.

FIG. 4



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Description

[0001] This invention relates to a safety mechanism for a fastening machine of the type wherein fasteners, such as nails, staples or the like are ejected along a guide channel. Such devices are used for example for stapling furniture panels or flooring.

[0002] Fastening machines of the type to which the invention relates typically have a magazine which receives a stack of fasteners such as staples or nails, the stack being urged by a compression spring or the like along the channel so that a first fastener is located in a guide channel for ejection from the device. The device has an electric power supply and a solenoid-operated hammer or other actuator which, upon actuation of an electric switch, slides down the guide channel from above the fastener to drive the fastener out of the channel and into a substrate to be secured.

[0003] Mains power supplies are occasionally subject to random fluctuation which can cause a voltage "spike" to enter an electrically operated device. In devices such as that to which the invention relates, such a voltage spike can cause unwanted actuation of the hammer, with possibly dangerous consequences. To guard against such an occurrence, electric fastening machines typically have a safety switch which normally interrupts the power supply to the solenoid. The switch is actuated by a tongue projecting alongside the exit from the guide channel for the fasteners and is spring biased into such a projecting safety position. When the fastening machine is placed against a substrate for the application of a fastener, the tongue is pushed back into the device, against the spring bias, operating the switch to connect the solenoid to the power supply so that a fastener can be applied.

[0004] There remains however the possibility that a faulty switch or other electrical fault could render such a safety device inoperative, or that a voltage spike could arc through the switch. It is therefore an object of the present invention to provide a mechanical safety device for a fastening machine, which does not depend on electrical or electronic components.

[0005] The present invention provides a safety mechanism for a fastening machine of the type wherein fasteners such as nails, staples or the like are ejected along a guide channel, out of the device and into the required fastening position, by means of a driver with an automated actuating mechanism, wherein a mechanical blocking device is normally interposed between the driver and the fastener in the guide channel, to prevent said fastener from being struck by the driver, and wherein the blocking device can be moved to an inoperative position, allowing the driver to strike the fastener out of the guide channel, by an actuator which projects from the device adjacent the exit from the guide channel but can be pushed into the device to deactivate the blocking mechanism when the fastening machine is placed against a substrate into which a fastener is to be inserted.

[0006] In a preferred embodiment of the invention, a blocking element is moveable transversely to the guide channel between a safety position wherein a block is inserted between the driver and the fastener in the channel, and an operative position in which the block is pushed laterally out of the guide channel to leave a path clear for the driver. In one preferred embodiment, the blocking device has a cam surface against which a sliding tongue element can bear, whereby when the machine is placed against a substrate one end of the sliding tongue engages the substrate and is pushed into the machine, its other end bearing against the cam surface to push the blocking element out of the guide channel, against a spring bias. When the machine is moved away from the substrate, the spring causes the blocking element to move back into its blocking position and at the same time to push the slide tongue into its safety position in which it projects from the device adjacent the exit from the guide channel.

[0007] Preferred embodiments of the invention will now be described with reference to the accompanying drawings wherein:

Figure 1 is a perspective view of a fastening machine incorporating a safety mechanism in accordance with the present invention;
Figure 2 is an exploded perspective view of the safety mechanism;
Figure 3 is a rear view of the front portion of the safety mechanism of figure 2; and
Figure 4 shows schematically how the safety device moves into its operative position.

[0008] Figure 1 illustrates a fastening machine generally indicated by 10, having at its forward end a safety mechanism in accordance with the invention. The machine comprises a magazine 13 with a supply of staples, urging each staple in turn into a vertical guide channel located behind a front plate 12. A fastener positioned in the guide channel can then be struck into position by a driver or hammer operated by an electric solenoid located within a housing 17, upon actuation of a trigger switch 15.

[0009] The safety device 12 is secured to the forward end of the magazine, at the bottom of the guide channel, by screws or rivets 16, and includes a projecting slide tongue 14, shown in its safety position in figure 1. This tongue is slidable into the device parallel to the guide channel when the device is placed against a substrate for the insertion of a staple. When this occurs, a red marker appears through an aperture 18 in the front plate 12. In the safety position shown in figure 1, the surface behind the aperture 18 appears white.

[0010] Referring now to Figure 2, a driver or hammer 20 is mounted slidably in a guide channel 23 defined between plates 21, 22 located immediately behind the front plate 12. Although shown as separate plates, these components could be integrally formed at the forward end of the machine housing.

[0011] Apertures 29b are formed in the plates 21, 22, and positioned to align with respective apertures 29a formed through the front plate 12, to enable these components to be secured to the forward end of the machine housing by screws or the like.

[0012] The driver 20 is actuatable by an electric solenoid (not shown), but in the position shown in Figures 2 and 3 its passage down the guide channel 23 is blocked by a blocking element 33 mounted on a horizontal slide member 25. This slide member is biased into the position shown in Figures 2 and 3 by a compression spring 27, the opposite end of which engages a plate 28 which is received in a recess defined between the front facing surface of the plate 22 and the rearward facing surface of front plate 12 as shown in Figure 3.

[0013] As can be seen in Figure 3, the horizontal slide member 25 is located in a recess 35 formed on the rear side of the front plate 12. This slide member is slidable against the bias of compression spring 27 from the blocking position shown in Figures 2 and 3 to an operating position in which the blocking element 33 is moved laterally out of the guide channel 23, allowing the driver 20 to pass.

[0014] The horizontal slide member also has formed on it an indicator disc, which is preferably red and which as shown in Figure 2 is concealed behind the front plate. When the horizontal slide is moved to its operative position, this red disc is aligned with the aperture 18 so as to be visible through it to indicate that the machine is in its operative state.

[0015] The horizontal slide member 25 has at its end remote from the spring a diagonal cam surface 31 which engages one end of a sliding tongue 24. This component is also located in the recess 35 and comprises a flat plate with a dogleg configuration. Its upper end 32 engages the cam surface 31, whereby the slide tongue is normally held in the position shown in Figures 2 and 3 by the bias of spring 27. In this position, the opposite end 14 of the slide tongue projects from the machine housing adjacent the exit from the guide channel for the staples.

[0016] The operative configuration of the machine is shown in Figure 4, wherein the forward end of the stapling machine has been placed against a substrate 45, being engaged by the tongue 14 of slide 24 (shown in broken lines) which is pushed back into the device, the engagement of its upper end 32 with the diagonal cam surface 31 of the horizontal slide member 25 causing the latter to move sideways against the bias of spring 27. The blocking member 33, which is guided by a slot 42 in the machine housing immediately behind the guide channel 23, is moved laterally on the slide member 25 to clear the guide channel. The driver 20 is thus unblocked, and can be actuated by the solenoid to drive a staple such as 48 out of the guide channel and into the substrate. This operation is triggered by squeezing the trigger switch 15 shown in Figure 1, and following release of this trigger the solenoid draws the driver back up to its standby position shown in Figure 2. Lifting the machine from the substrate 45 then releases the tongue 14, and the slide 24 can then be pushed down by the horizontal slider 25, urged by the spring 27. The blocking element 33 thus returns to the blocking position, preventing further actuation of the driver 20.

[0017] As the driver 20 returns to its standby position, a further staple can be urged forward from the magazine into the guide channel, to await insertion the next time the machine is used.

[0018] In a further development of the invention either the slide 24 or the horizontal slide member 25 can also be arranged to actuate a safety switch, to disconnect power to the solenoid while the horizontal slide 25 is in its blocking position. This provides additional protection against unwanted actuation of the machine.

[0019] The operator can, as a matter of routine, always check the aperture 18 to ensure that the red disc is not showing and that the passage of the driver 20 is therefore blocked in the safe state of the device.

Claims

1. A safety mechanism for a fastening machine (10) of the type wherein fasteners are ejected along a guide channel (23), out of the device and into the required fastening position, by means of a driver (20) with an automated actuating mechanism, **characterised by** a mechanical blocking element (33), normally interposed between the driver and the fastener in the guide channel, to prevent said fastener being struck by the driver, which blocking element can be moved to an inoperative position, allowing the driver to strike the fastener out of the guide channel, by an actuator which projects from the device adjacent the exit from the guide channel but can be pushed into the device to deactivate the blocking mechanism when the fastening machine is placed against a substrate into which a fastener is to be inserted.

2. A mechanism according to claim 1 wherein said blocking element (33) is movable transversely to the guide channel (23) between a safety position wherein a block is inserted between the driver (20) and the fastener in the channel, and an operative position in which the block is pushed laterally out of the guide channel to leave a path clear for the driver.

3. A mechanism according to claim 1 or claim 2, wherein said actuator comprises a sliding tongue element (24) and wherein said blocking element (33) is mounted on a slide member (25) which has a diagonal cam surface (31) against which one end of the sliding tongue element (24) can bear, whereby when the machine is placed against a substrate one end of the sliding tongue element engages the substrate and is pushed against the machine, its other end bearing against the cam surface to push the blocking element out of the guide channel.

4. A mechanism according to claim 3 wherein the slide member (25) is located in a recess (35) formed on the rear side of a front plate (12) of the fastening machine.

5. A mechanism according to claim 3 or claim 4 wherein said slide tongue element is slidable into the device parallel to the guide channel.

6. A mechanism according to claim 5 wherein the sliding tongue element (24) has a dogleg configuration, comprising a lower portion adjacent the guide channel (23) and an upper portion offset therefrom to engage the cam surface.

7. A mechanism according to any one of claims 3 to 6 wherein the sliding tongue element is slidable against the bias of a compression spring (27) from the blocking position.

8. A mechanism according to claim 1 wherein said slide member (25) also has formed on it an indicator disc, positioned so that when the horizontal slide is moved to its operative position, the disc is aligned with an aperture (18) in the device so as to be visible through it to indicate that the machine is in its operative state.

FIG. 4