United States Patent

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[54] SAFETY DEVICE
8 Claims, 2 Drawing Figs.

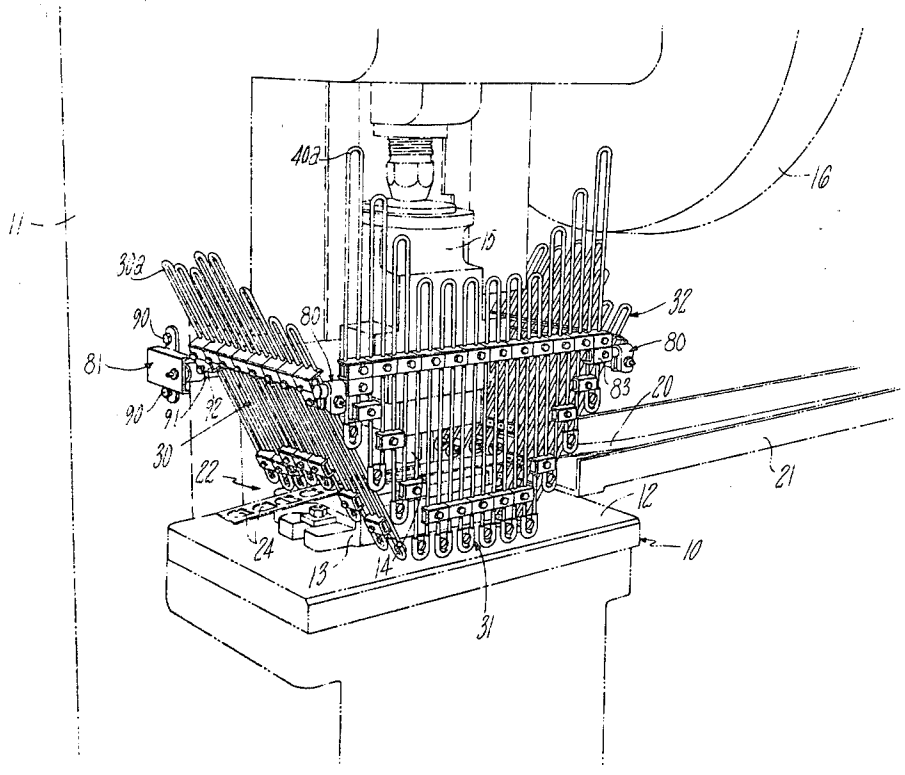
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ABSTRACT: Several U-shaped rods are mounted for longitudinal adjustment on a common lateral support to form a safety barrier for adjustable mounting on a punch press or the like, the adjacent legs of adjacent U-shaped rods being clamped together and the adjacent free ends of each rod being closed by a clamp. Several barriers may be joined to form the desired shape of barrier and the individual rods can be positioned to accommodate tooling and stock flow.



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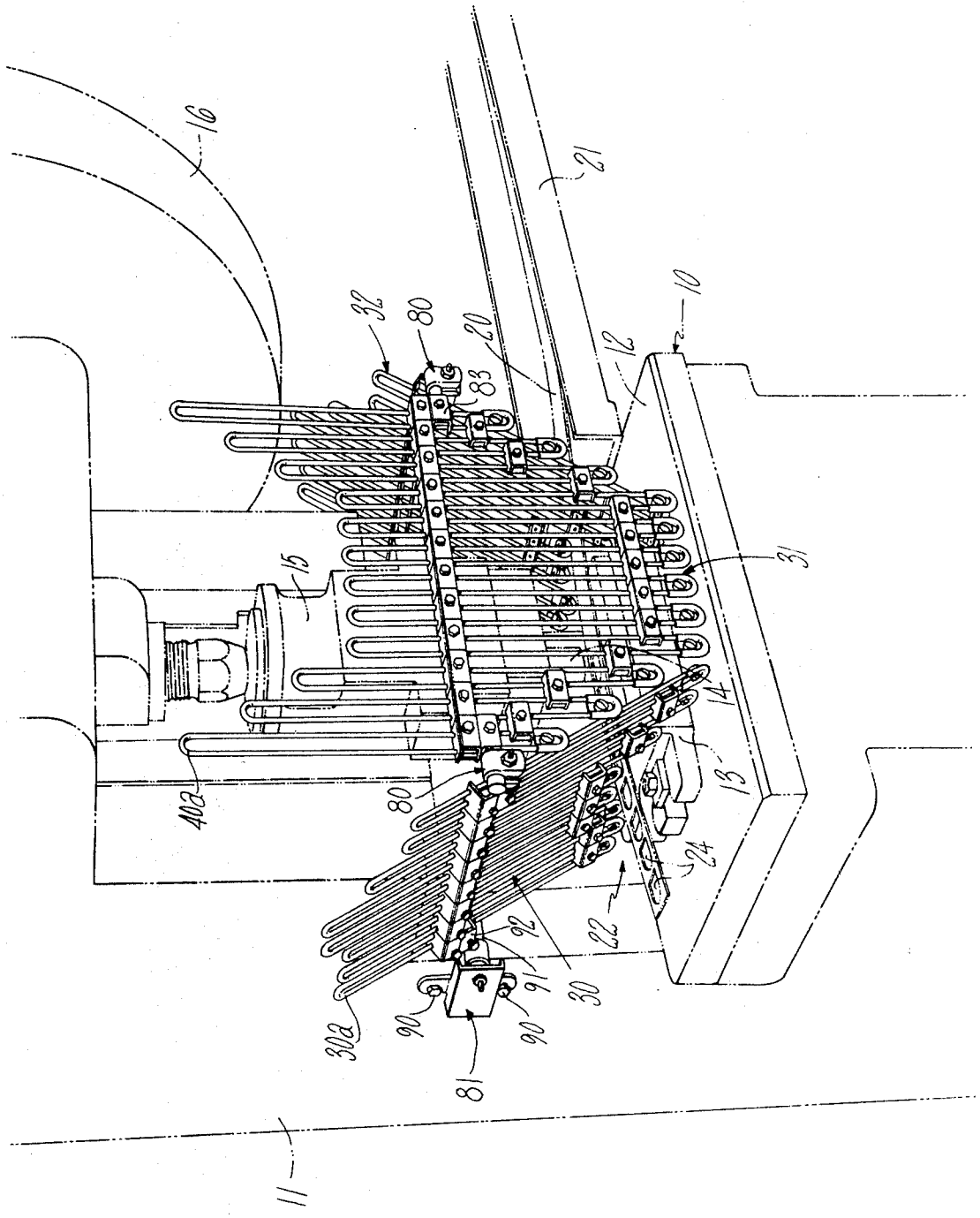


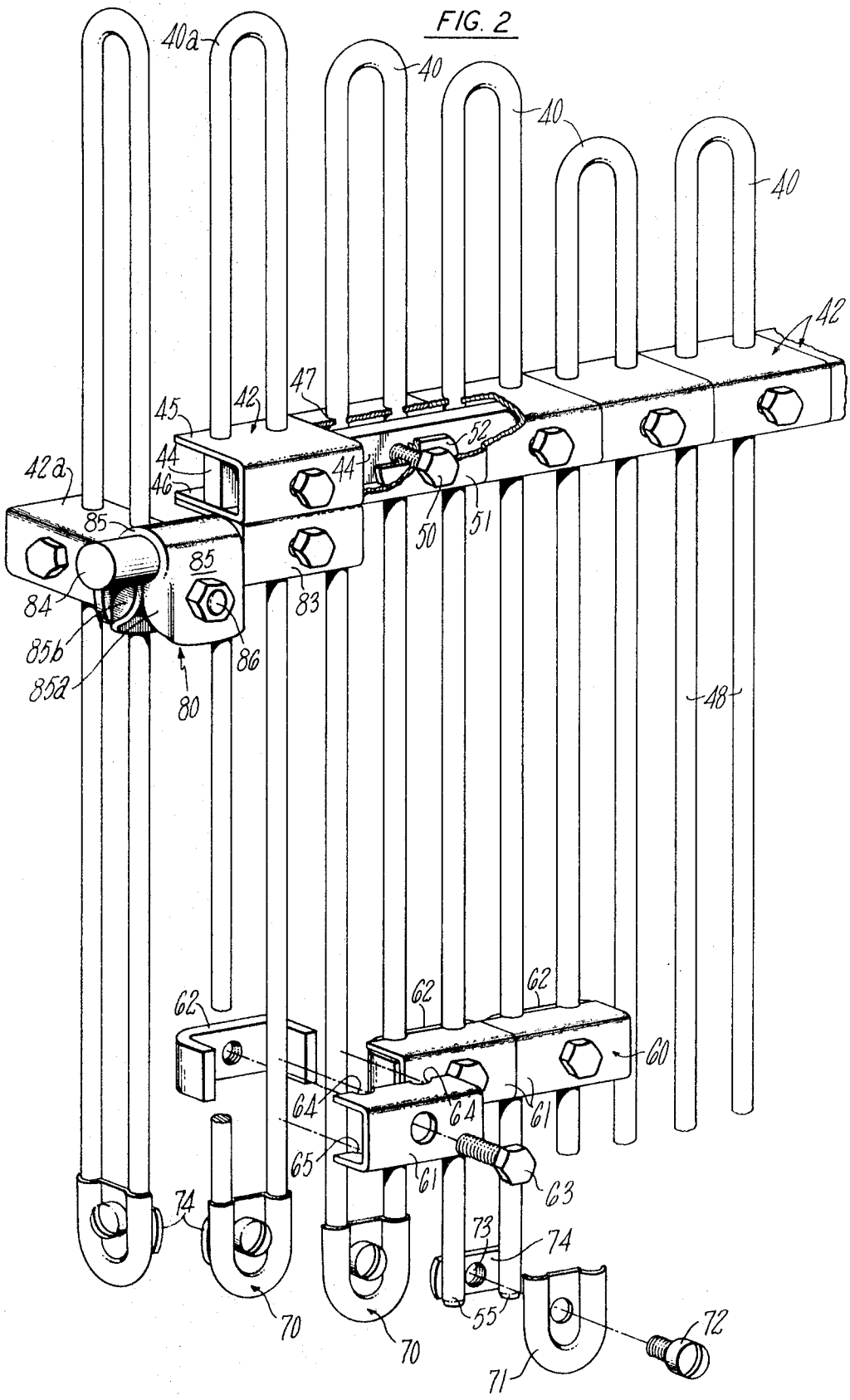
FIG. 1

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FIG. 2


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SAFETY DEVICE

This invention generally relates to safety devices of the barrier type intended to preclude customary injuries to operators of punch presses, shears and similar power-operated machinery and is particularly directed to an improved barrier of the fence type exhibiting increased safety for the machine operator.

It is a principal object of this invention to provide an improved barrier of the fence type wherein the fence itself as well as each of the fence elements can be adjusted in position to provide operator protection for a variety of work area configurations while exhibiting increased fence reliability and rigidity over the entire fence area.

It is a further object of this invention to provide an improved safety fence utilizing a relatively small number of different parts that are easily formed to provide a low-cost easily manufacture fence adaptable to a variety of shapes and sizes while exhibiting improved safety for the machine operator.

It is an additional object of this invention to provide a fence of improved rigidity and other safety characteristics without impairing operators' visibility to the work area.

A still further object of the invention is to provide an improved safety barrier of the fence type wherein individual fence elements are relatively adjustable to accommodate stock feed to the machine work area and removal therefrom while retaining fence rigidity over the entire fence area.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

A better understanding of the objects, advantages, features, properties and relationships of this invention will be obtained from the following detailed description and the accompanying drawings which set forth illustrative embodiments and are indicative of the ways in which the principles of this invention are employed.

In the drawings:

FIG. 1 is a perspective view of a complete fence of this invention showing a typical machine in phantom; and

FIG. 2 is a partial perspective view of a portion of the type of fence shown in FIG. 1, enlarged to show structural detail.

Turning first to FIG. 1 for an overall understanding of this invention, it is seen that a typical power-operated machine 10 is shown in phantom lines as having a frame 11 and a work area including a work surface 12 to which is secured tooling such as die 13 that cooperates with suitable tooling 14 mounted on reciprocating ram 15 driven from a suitable power train including flywheel 16. Sheet metal strip stock 20, also shown in phantom lines is automatically advanced by any suitable means along guide trough 21 for engagement by tooling 13, 14, thereafter to exit at point 22 as scrap stock, the desired workpiece having been removed as at apertures 24. Such machines operate at very high speeds and often exert many tons of force thereby presenting extreme safety hazards to operators who may attempt to clear clogged tooling or otherwise adjust the work area apparatus without first securing personal safety as by stopping the machine. Known barriers of the fence type have been installed with such machines but operators have devised many ways to circumvent the intended safety features only to experience disabling injury, particularly to hands and eyes.

The construction of a preferred embodiment of the safety barrier of the present invention is illustrated in FIGS. 1 and 2 wherein three barrier panels 30, 31, 32 are arranged to enclose the three normally open sides of the work area. Each of the barrier panels is of substantially identical construction and includes in the preferred embodiment a plurality of U-shaped steel rods 40 as barrier elements secured together in generally side-by-side relationships by first fasteners or first clamps 42, one for each barrier element, which engage a common lateral support bar 44. Each first fastener 42 in the illustrated embodiment is a generally U-shaped steel member whose parallel legs 45, 46 are provided with aligned apertures 47 through which the legs 48 of the barrier element are inserted during assembly of the panel. A threaded fastener 50 is inserted through an aperture in the bight portion 51 of the clamp 42 and engages an elongated trapped nut 52 so that advancement of fastener 50 urges common support bar 44 against the legs 48 of the barrier element thereby to securely fasten the barrier element in the desired position.

After insertion of the barrier element 40 through the fastener 42, the free ends 55 are relatively flexible and deflection of the ends by the operator has been found to be a typical hazardous way to avoid the fence. To minimize such deflection while permitting the wide range of adjustability necessary for accommodating various machines, work surfaces, tooling and stock feed conditions, there is provided a plurality of second fasteners 60, each of which includes a U-shaped front member 61 and a U-shaped back member 62 arranged to be assembled in nesting relationships. Front member 61 is centrally apertured to receive threaded fastener 63 and notched at 64 and 65 to receive the legs 48. Back member 62 is provided with a threaded aperture to cooperate with fastener 63 to clamp the legs securely. Each fastener 60 is assembled to clamp the adjacent legs of adjacent barrier elements and is positioned adjacent the free ends of the legs thereby to provide rigidity for adjacent legs as well as the entire barrier panel while preserving the full range of barrier element adjustable.

Because the positioning of particular barrier elements may effectively preclude placement of the second fasteners 60 adjacent the free end of the adjacent legs (see particularly FIG. 1) and because the exposed free ends 55 of the legs themselves can constitute a safety hazard, particularly if the barrier elements are installed with the bight portion in a downward facing position (not shown) improved safety and rigidity are provided by free end closure 70. As best seen in FIG. 2, closure 70 includes a sheet metal front cap 71 contoured to partially embrace the adjacent free ends 55 and to present a smooth, rounded shape to the worker. Cap 71 is apertured to receive fastener 72 which engages the threaded aperture 73 of back member 74 so as to rigidly clamp the free ends together while presenting a safely rounded configuration.

The assembly of fence or barrier panels 30, 31, 32 together and to the machine while providing adjustability of the entire panel and without impairing individual barrier element adjustability is accomplished by suitable mounting brackets 80, 81. Bracket 80 is used to secure adjacent panels together while permitting relative pivotal movement. As best seen in FIG. 2, a clamp 83, similar in construction to clamps 42 is secured to the end element 40*a* adjacent to the end element clamps 42. Clamp 83 includes a projecting rod or stud 84 which is embraced by a sheet metal collar 85 which is pivotally secured by fastener 86 to end element clamp 42*a* of panel 30. Fastener 86 draws the two ends 85*a* and 85*b* of collar 85 together to tightly clamp stud 84 thereby positioning panels 30, 31, 32 in relative adjusted position, as for example shown in FIG. 1.

Mounting of the assembled safety barrier including panels 30, 31, 32 the machine is accomplished by mounting bracket 81 (only one of which is shown in FIG. 1) which is securely fastened to the machine frame by bolts 90. In the illustrated embodiment an adjustable mounting including rod 91 is provided and secured to end element 30*a* by clamp 92, which clamp is similar in construction to clamp 42. The mounting on the opposite side (not shown) of the machine is the same as that just described.

From the foregoing description of the construction and operation of a preferred embodiment of this invention, it is seen that a safety barrier or fence that is rigid throughout its effective area, that is susceptible to a wide variety of adjustments to accommodate tooling, stock feed, etc. without diminishing safety, and which is not a safety hazard itself has been provided. The use of substantial members of identical, easily fabricated parts reduces costs while enhancing the variety of sizes that can be obtained.

As will be apparent to persons skilled in the art, various modifications, adaptations and variations of the foregoing

specific disclosure can be made without departing from the teachings of the present invention.

I claim:

1. A safety device particularly suited for use with presses, shears and the like to preclude access of the machine operator to the work area comprising at least one barrier panel and a support for selectively fixedly positioning said barrier panel relative to the machine work area, said barrier panel including a plurality of elongated generally U-shaped barrier elements, a common lateral support member for said barrier elements, a plurality of first fasteners, each said first fastener engaging one of said barrier elements and said common support member to secure said barrier elements in generally side-by-side, laterally spaced relationship, a plurality of second fasteners, each of said second fasteners engaging the adjacent legs of adjacent barrier elements to fix the relative position thereof, and closure means engaged with the free end of each leg of each barrier element to separately fix the relative position of the legs of each element.

2. The safety device of claim 1 wherein said first fasteners and said second fasteners are adjustable to permit selective positioning of each of said barrier elements relative to said common support member thereby to permit arrangement of the barrier elements to define an opening in said barrier panel.

3. The safety device of claim 1 wherein each said closure member is selectively removable to facilitate assembly of each of said barrier elements to said common support member, said first fasteners and said second fasteners.

4. The safety device of claim 2 wherein each said closure member is selectively removable to facilitate assembly of each of said barrier elements to said common support member, said first fasteners and said second fasteners.

5. The safety device of claim 4 wherein the support for said barrier panel is adjustable and provided with means for mounting on the machine with which it is used.

6. A safety device for enclosing the work area of a machine to preclude machine operator access while permitting feed and removal of stock to be worked comprising a plurality of barrier panels, means for adjustably securing said panels together and for securing the end panels of said plurality of panels to the machine, each of said panels including a plurality of elongated generally U-shaped barrier elements, a common lateral support member for each of said barrier elements, a plurality of first fasteners adjustably securing each said barrier element to said common support member in generally side-by-side, laterally spaced relationship, and a plurality of second fasteners securing the adjacent legs of adjacent barrier elements in fixed relative position at a point spaced from said common support member whereby each barrier element may be adjustably positioned to selectively define access openings to the machine work area while effectively precluding barrier element movement and operator access.

7. The safety device set forth in claim 6 wherein closure means are provided in engagement with the free ends of each leg of each barrier element to separately fix the relative position of the legs of each element.

8. The safety device of claim 7 wherein the bight portion of each barrier element extends away from the work area and wherein said second fasteners are disposed adjacent to the opposite end of said barrier element.