Aug. 10, 1954 F. H. BERGH 2,685,928

ROLLER CLAMP FOR PUNCH PRESSES

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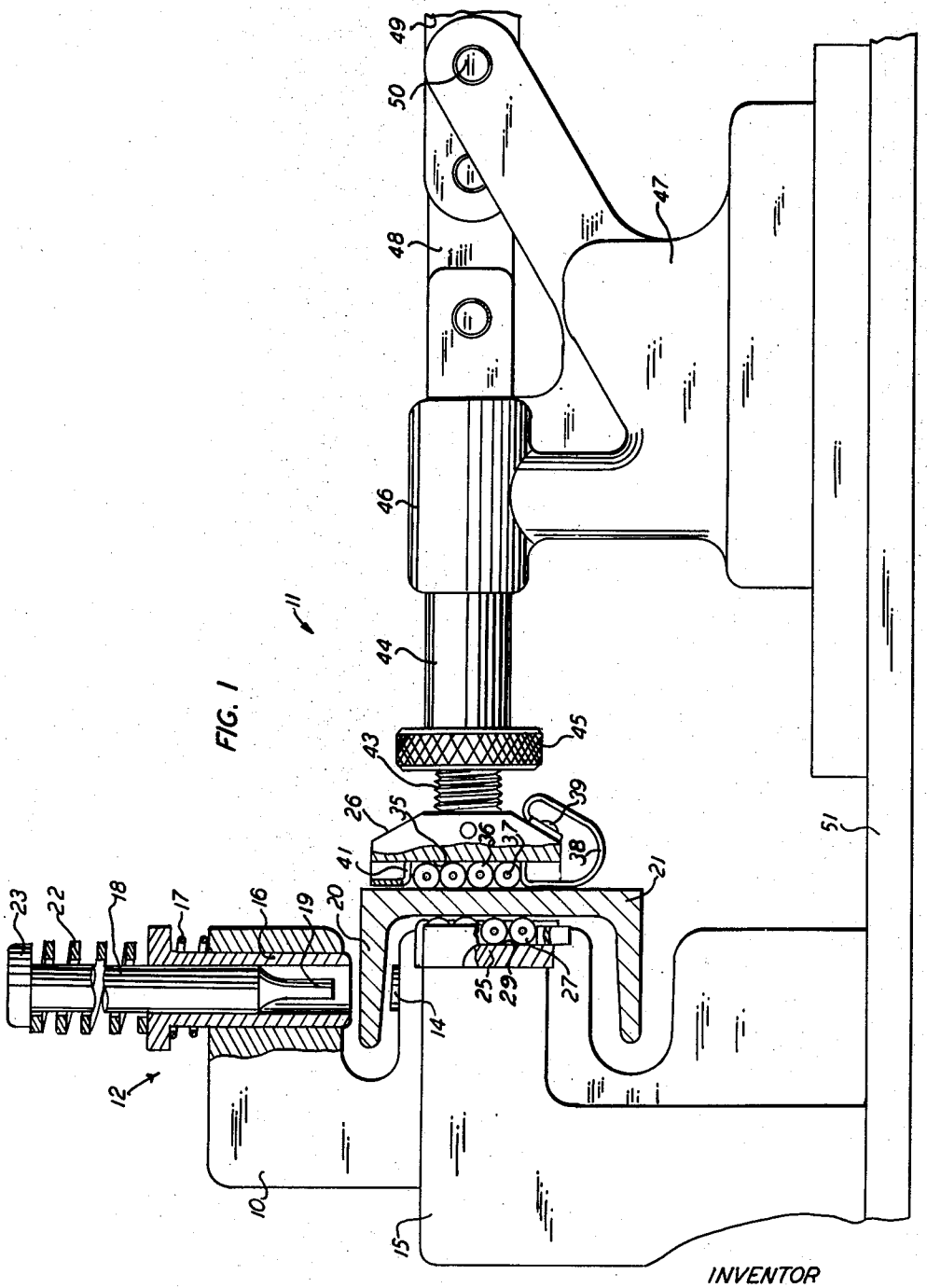


FIG. 1

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FIG. 2

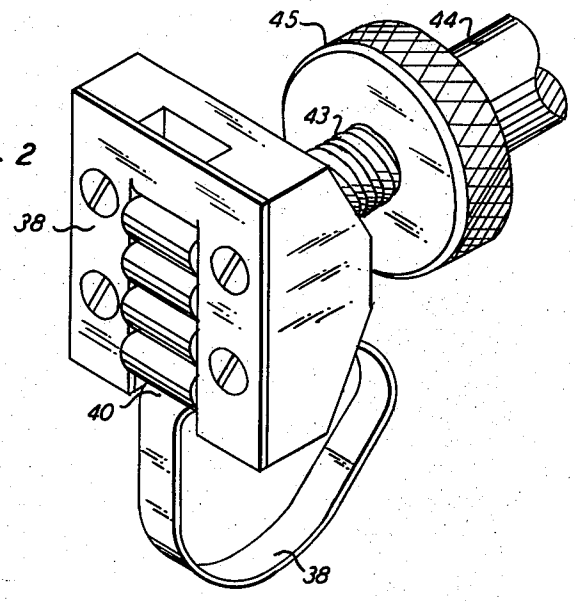


FIG. 3

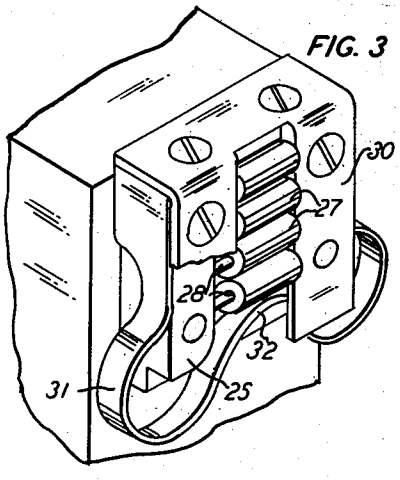
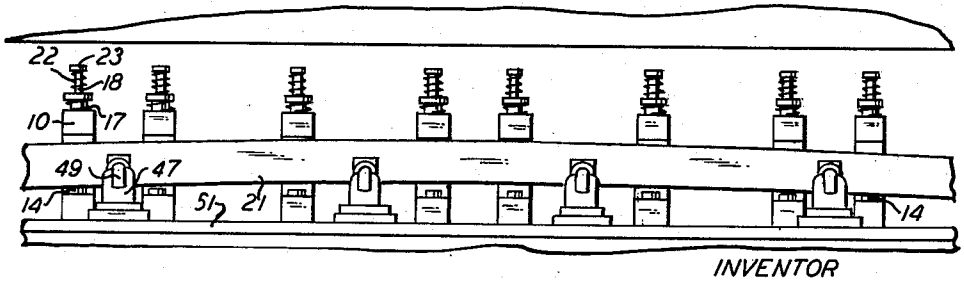


FIG. 4



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ROLLER CLAMP FOR PUNCH PRESSES

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5 Claims. (Cl. 164—110)

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This invention relates to article clamping units and more particularly to units for clamping elongate articles in material working machines.

In the manufacture of certain types of telephone equipment, sturdy metal frames include long metal channel and angle members. These members must be provided with numerous holes which, at the present time, are produced in a perforating machine where thirty-four holes are punched simultaneously. To perform these punching operations successfully without damage to the punch units, the portions of the articles being punched should rest firmly on the die members of the punch units before the punch members are moved into engagement therewith. The present channel and angle members are provided with one hundred thirty-six holes punched in four operations of the press, and it has been found that although the channel and angle members are presumed to be straight, occasionally some of them are bowed making it impossible for the portions to be punched to rest firmly on the die members of the punch units when initially brought into punching position. It is necessary that the channel and angle members be held against displacement laterally of the punch units. With the commercially known clamping means for machines of this type, the channel and angle members were held against movement longitudinally of the punch units resulting in several portions of bowed members being held free of the die members of the punching units causing undesirable perforations and frequent damage to the punches and dies of these units.

The principal object of the present invention is a clamp which will hold an article firmly in one plane while at the same time permit limited movement of the article in one or more directions within the plane.

Another object of the invention is a clamping unit whereby the hold-down members of the punch and die units may move the portions of the article to be perforated into engagement with the die members prior to the punches beginning their perforating operations.

With this and other objects in view, the invention comprises fixed and movable units having parallel surfaces with rollable elements positioned in engagement with their respective surfaces and means to move the movable unit to clamp an article between the units against movement from a plane parallel with the surface planes of the units but movable in its plane.

The clamp is particularly adapted for use in

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a perforating machine having a plurality of punch and die units with the dies mounted in the bed of the machine and hold-down members of the units tending to force the portions of the article to be perforated into close engagement with the die members prior to the punches reaching the article. The clamp includes a fixed position unit having a surface lying in a given plane and a series of rollers normally held in their uppermost positions by a spring but permitted to roll downwardly with an article held in the clamp to position the portion of the article to be perforated in close engagement with the die under the force of the hold-down member in each perforating unit. A head or movable member of the clamp is similar to the fixed position member in that it has a surface parallel to the surface of the fixed member and a series of rollers normally urged upwardly by a spring but adapted to roll downwardly with the article being clamped whereby the article will be held against displacement except in the given plane to assure accurate positioning of the perforations therein, while the article is straightened to accurately position it for the punching operations.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawings wherein:

Fig. 1 is a side elevational view of the clamp shown in clamping position in a perforating machine.

Fig. 2 is an enlarged fragmentary isometric view of the movable portion of the clamp.

Fig. 3 is a fragmentary isometric view of the fixed position member of the clamp, and

Fig. 4 is a schematic front elevational view of a perforating machine including a plurality of the clamping units.

Referring now to the drawings attention is first directed to Fig. 1 which illustrates a fragmentary end view of a perforating machine 10 embodying the clamping unit indicated generally at 11. The perforating machine, as shown in Fig. 4, has a plurality of punching or perforating units 12 including apertured die members 14 mounted in a portion of the frame 15 of the machine. A hold-down member 16 is movably disposed in an aperture of the frame structure 10 and normally urged upwardly by a spring 17. A punch 18, having an end 19 cooperating with the die 14 to perforate a portion 20 of an article 21, is normally urged upwardly by a spring 22 interposed between a head or enlarged portion 23 of the punch and the upper end of the

hold-down member 16. The punch units are operated through the actuation of a single ram of the machine striking the portions 23 of the punches simultaneously and moving them through their perforating cycles.

The clamp 11 includes a fixed position member 25 and a movable member 26. The member 25 has a surface 29 lying in a plane parallel with the center lines of the punch units. A series of rollers 27 having reduced ends 28, or mounted on shafts of the sizes illustrated, are positioned to ride on the surface 29 where they are held against lateral displacement by a bifurcated retaining member 30. The member 30 is mounted on the member 25 while the member 25 is mounted on the main frame of the machine. Resilient means in the form of a spring 31 has its upper ends secured to the member 25 while its central lower portion 32 engages the lowermost roller 27 to normally urge the rollers into their uppermost positions against the upper part of the retaining member 30.

The member 26 is similar in structure to the member 25 in that it is provided with a surface 35 parallel with the surface 29. Rollers 36 disposed adjacent the surface 35 have reduced ends or shafts 37 whereby a bifurcated retaining member 38 mounted on the member 26 will hold the rollers in their proper positions relative to the surface 35. A resilient member 38 has one end fixed at 39 to the member 26 and the other end bent inwardly at 40 to support the rollers 36 and normally urge them upwardly into engagement with a stop portion 41 of the retaining member 38.

The member 26 is mounted on one end of a threaded shank 43 which is receivable in a hollow supporting member 44 and held at any desired adjusted position therein by a nut 45. The member 44 is slidable longitudinally in an apertured portion 46 of a bracket 47 and is connected through a link 48 to a lever 49 which is pivoted at 50 in portions of the bracket. The bracket 47 is mounted at a fixed position on a base 51 of the machine.

Considering now the function of the clamp, particularly in combination with the perforating machine, it will be apparent that elongate articles such as metal channels or metal angles may be positioned between the members of the clamp when the clamp has been moved into its open position through the actuation of the handle 48. When the article 21 is positioned with the leg portion 20 to be perforated located over the die members of the machine, this and all the other clamping units may be moved into closed position with the series of rollers 27 and 36 holding the article in position for the formation of the perforations therein. As illustrated in Figs. 1 and 4, certain portions of the article may not be located in engagement with the die members 14 due to the article being bowed. However, during operation of the perforating machine when the ram engages the heads 23 of the punches 18, the immediate forces will be applied through the springs 22 to the hold-down members 16, forcing them in engagement with the portions of the article 21 and moving them into intimate engagement with their dies 14 prior to the punches 18 or the portions 19 thereof engaging the article. During this action the article, although being held firmly against displacement in any other direction, may move with the rollers in a direction with the punches 18 so that satisfactory punching operations may be performed and damage to the punches eliminoted.

After the perforating or punching operation has been completed, the return of the ram will allow the springs 22 to remove the punches after which the hold-down members will free the article to move in one direction in the clamps. The one or more clamps may be opened a given distance to either remove the article entirely from the machine or to permit its longitudinal movement to position it for another series of perforations. The rollers 27 and 36 will always return to their upper positions through the forces of their resilient members and in moving them downwardly with the article held in the clamp they provide spaced engaging portions controlled by their surfaces, gripping the article to assure firm holding thereof against displacement in all directions except that necessary for the positioning of the portion of the article to be perforated in registration with the die.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. The combination with a perforating machine having a perforating unit including a hold-down member, a punch and a die adapted for holding an article in engagement with the die and then perforating the article, of a clamping unit supported adjacent the perforating unit and comprising a head, means to move the head into and out of clamping position and to cause the head to hold the article in the clamping position, and a rollable element carried by the head to engage the article to hold the article in a given plane and roll with the article while it is moved by the hold-down member into engagement with the die prior to the punch engaging the article to perforate it.

2. The combination with a perforating machine having a perforating unit including a hold-down member, a punch and a die adapted for holding an article in engagement with the die and then perforating the article, of a clamping unit supported adjacent the perforating unit and comprising a head, means to move the head into and out of clamping position and to cause the head to hold the article relative to the punch and die in the clamping position, a rollable element carried by the head for rotary and lateral movement to engage the article to hold the article in a given plane and roll out of its normal position with the article while it is moved by the hold-down member into engagement with the die prior to the punch engaging the article to perforate it and resilient means urging the element towards its normal position without disturbing the rotary and lateral movements of the element.

3. The combination with a perforating machine having a perforating unit including a hold-down member, a punch and a die adapted for holding an article in engagement with the die and then perforating the article, of a clamping unit supported adjacent the punch and die of the perforating machine and comprising a rollable element carried by the machine to be engaged by and locate an article in a given plane in a clamping position, a head, means to move the head relative to the rollable element into and out of clamping position and to hold the

head in the clamping position and a rollable element carried by the head to cooperate with the other element to hold the article in the given plane while it is moved in the plane by the hold-down member into engagement with the die prior to the punch engaging the material to perforate it.

4. The combination with a perforating machine having a perforating unit including a hold-down member, a punch and a die adapted for holding an article in engagement with the die and then perforating the article, of a clamping unit disposed adjacent the perforating unit and comprising a holder mounted on the machine at a given position relative to the unit and having a surface disposed in a given plane, a set of rollers disposed in the holder adjacent the surface, resilient means to normally hold the rollers in given positions and allow them to roll on the surface, a head, means to move the head into and out of clamping position and to hold the head in the clamping position adjacent the holder, the head having a surface parallel with the surface of the holder, a set of rollers disposed in the head adjacent the surface thereof, resilient means to normally hold the rollers in given positions and allow them to roll on their surface and cooperate with the other set of rollers to hold the article in a given plane parallel with the said surfaces for movement of the article by the hold-down member to move a portion of the article into engagement with the die prior to the punch engaging the portion of the article to perforate it.

5. The combination with a perforating machine having a plurality of perforating units each including a hold-down member, a punch and a die adapted to hold an elongate article in engagement with the die and then perforate the article, of like clamping units disposed at spaced positions relative to the perforating units and comprising heads, means to move the heads into and out of clamping positions and to cause the heads to hold the article in the clamping positions, and rollable elements carried by the heads to engage an article to hold the article in a given plane and roll out of their normal positions whereby various portions of the article adjacent the units may be moved by the hold-down members thereof into engagement with their dies prior to the punches engaging the article to perforate it.

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