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(54) **Improvements in and relating to tile making machines.**

(57) A cutting mechanism for a tile making machine comprises a pair of knives (10, 11) mounted by pivots (20, 21) on a cutter carriage (12). The actual position of the leading face (32) of a web (33) of each tile pallet is sensed by a sensor (28) which drives a Bourdon cable (31) to set the position of the knives (10, 11) relative to the carriage (12) for the next cut. Thus, the cuts are always made at the correct position relative to the ends of the pallets (3). The sensor (28) is mounted on a sensor carriage (24) secured to the knife carriage (12), and the sensor carriage (24) is movable along tracks (26) by a ram (25) to move the sensor out of engagement with the pallets (3) between each cutting cycle.

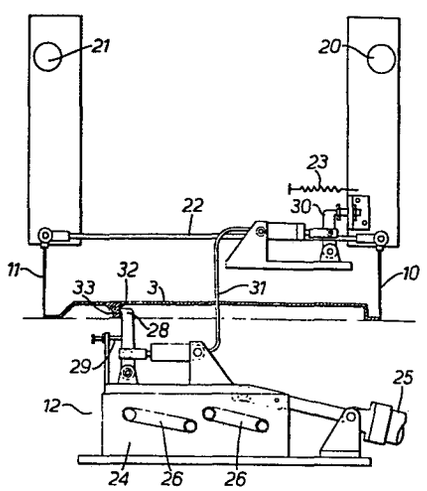

FIG. 3.

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"IMPROVEMENTS IN AND RELATING TO TILE MAKING MACHINES"

This invention is concerned with improvements in and relating to machines for making roofing tiles.

It is known to make roofing tiles by passing a stream of pallets, each having an upper surface corresponding to the shape of the under surface of a tile, in end-to-end abutting relationship beneath an outlet of a hopper in which is a supply of cement mix. Thereby a ribbon of mix is extruded on to the stream of pallets, the upper surface of the ribbon being of transverse profile constant lengthwise of the stream.

The stream continues from the region of extrusion of the ribbon to a cutting station. A number of forms of cutting mechanism are known but one which is widely used comprises a knife carriage movable along a path parallel with the path of the stream of pallets. The knife, which extends transversely of the path of the stream, is actuated to move up and down on the carriage. The knife carriage is reciprocally driven, suitably from a crank coupled to the driving mechanism which advances the stream of pallets. That driving mechanism operates to engage the under or rear face of each successive pallet offered to it and the knife carriage drive and the knife actuating mechanism are operable in synchronism with the pallet driving mechanism. By reciprocating the knife carriage, the carriage and therefore the knife, can be brought to travel parallel with, in the same direction and at the same speed as the stream and hence the extruded ribbon and with the knife above abutting ends of two pallets. The knife then operates and cuts the ribbon, is raised and the knife carriage reverses to be repositioned for the next stroke. As well as carrying a knife, the knife carriage may carry a pin for creating a nail hole used when hanging a tile, and this will reciprocate with the knife to penetrate the ribbon.

Instead of a single knife the carriage may carry two parallel knives reciprocable together to simultaneously cut the ribbon at both ends of a pallet.

These arrangements work reasonably satisfactorily but variables in the condition of the stream can occur. Pallets may

wear and overall dimensions end-to-end may produce a cumulative error, the mix may vary in consistency resulting in varying end loading on the pallets and hence slight distortion again bringing changes in end-to-end dimensions. Dirt may penetrate between pallet ends with similar result. Therefore the knife when it penetrates the ribbon may be out of register with the abutting pallet ends where the cut should be made. That can result in a tile end rib which is too narrow and therefore not of the specified strength as well as in a tile end being misshapen because the tile which is cut beyond the end of its pallet will have no support when the pallets are separated. Also an exposed tile end overhanging a pallet end is liable to damage by reason of its exposure. Not only will a tile end suffer by virtue of failure of a knife to register with abutting pallet ends, but also the pin to form a nail hole will be out of register with a hole provided in the pallet. This will result in a misshapen pin hole and can result, as will the failure of the knife to register correctly, in the tile not having a neat, accurate appearance when hung, the exposed lower edges having a slightly castellated appearance.

According to an aspect of this invention there is provided a cutting mechanism for cutting an extruded ribbon of mix carried on a stream of end-to-end pallets in a machine for making tiles, the cutting mechanism comprising a knife carriage reciprocable along a path parallel with the path of the stream, means to reciprocate the carriage, a sensor mechanism on the carriage and movable relative to the carriage toward and away from the path of the stream between a first position in which a sensor is in the path of a forwardly directed face of a pallet and a second position in which the sensor lies out of the path of such face, at least one knife on the carriage movable toward and away from the path to effect a cutting action on the ribbon, and movable so as to vary the position of the knife blade longitudinally of the carriage, the sensor being displaceable longitudinally relative to the carriage by the face on the pallet and means being provided by which the knife is

adjusted longitudinally of the carriage in accordance with the position of the sensor.

In order that the invention may be well understood there will now be described an embodiment thereof given by way of example only, reference being made to the accompanying drawing which is a diagrammatic side elevation of a cutting mechanism for a tile making machine.

Figure 1 is a diagrammatic side elevation of a tile making machine

Figure 2 is an end elevation of the machine of Figure 1 viewed from the end nearest to the cutting mechanism, and

Figure 3 is a diagrammatic side elevation of the cutting mechanism.

The Figures are to different scales to facilitate illustration.

The machine illustrated in Figures 1 and 2 is illustrated and described in U.S. Patent No. 3,677,686 and is shown purely as an example of a tile making machine. Suffice it here to say that it includes a main frame 1, to a track 2 of which pallets 3 (Fig. 2) are fed by a feed conveyor 4. The pallets in the form of a stream of end-to-end pallets are pushed along the track through the machine by a drive mechanism which is indicated at 5, the drive mechanism comprising spaced drive members 6 on a chain which carries each of those members up to a position in which the member engages a rearwardly directed (to the right in Fig. 1) pallet face on the underside of the pallet to thrust that pallet, and thereby those ahead of it, forward. The stream will pass beneath a hopper 7 of mix and a roller 8 will with the upper pallet faces form a ribbon of mix whose upper surface is of constant contour longitudinally, set by the shape of the roller and whose underface is moulded by the upper faces of the pallets.

The continuous stream and ribbon pass thereafter to a cutting station 9 where a pair of parallel knives 10,11 extending across the ribbon will cut the ribbon in register with abutting pallet end faces. The knives are mounted for vertical

reciprocal motion on a knife carriage 12 and are driven by jacks 14 and carriage 12 is mounted for horizontal reciprocal motion on guides 15 by means of a driving rod 16 coupled to a crank 17 driven by the pallet drive mechanism so that the knives will be movable in a direction parallel to the ribbon and achieve ribbon speed at a moment when control valves actuate the knife jacks and each knife is in register with a pair of abutting pallet ends. In the illustrated example a double Roman tile is being produced and two pins 18, vertically reciprocal with the knives, are provided to make nail holes in the ribbon.

As already explained the pallet stream may not always be so accurately positioned that each knife is in register with the abutting faces of a pair of adjacent pallets in the stream.

To reduce inaccuracy in this respect, the cutting edges of the knives are adjustably mounted longitudinally of their carriage either by making the knives adjustable along guides or by making the knives pivotal. By providing a displaceable sensor on the knife carriage which will be positioned relative to the carriage by a pallet, the knives can be caused to be positioned in accordance with the sensor position and thereby accurately relative to the pallet and thereby the end faces thereof.

One arrangement can be understood from Figure 3 where the pallet stream is shown running left to right. The knives 10,11 are pivotable at 20,21, are coupled by a link 22 and are biased clockwise by a spring 23. A sensor carriage 24 is mounted on the knife carriage 12 and is movable relative to that carriage by a jack 25, which, because the sensor carriage is mounted on tracks 26 inclined relative to the knife carriage, will result in the sensor carriage not only moving longitudinally relative to the knife carriage but also vertically relative thereto. A sensor 28 is pivotally mounted on the sensor carriage, is spring biased anticlockwise as viewed in Figure 3 and is set by a stop 29. Extending between the sensor 28 and a knife adjustment member 30 pivotally carried on the knife carriage

is a Bowden cable 31 so that, if sensor 28 is pivoted clockwise as viewed in Figure 3 against its bias, a corresponding motion will be imparted to the knives anti-clockwise about their pivots 11,12 by the member 30.

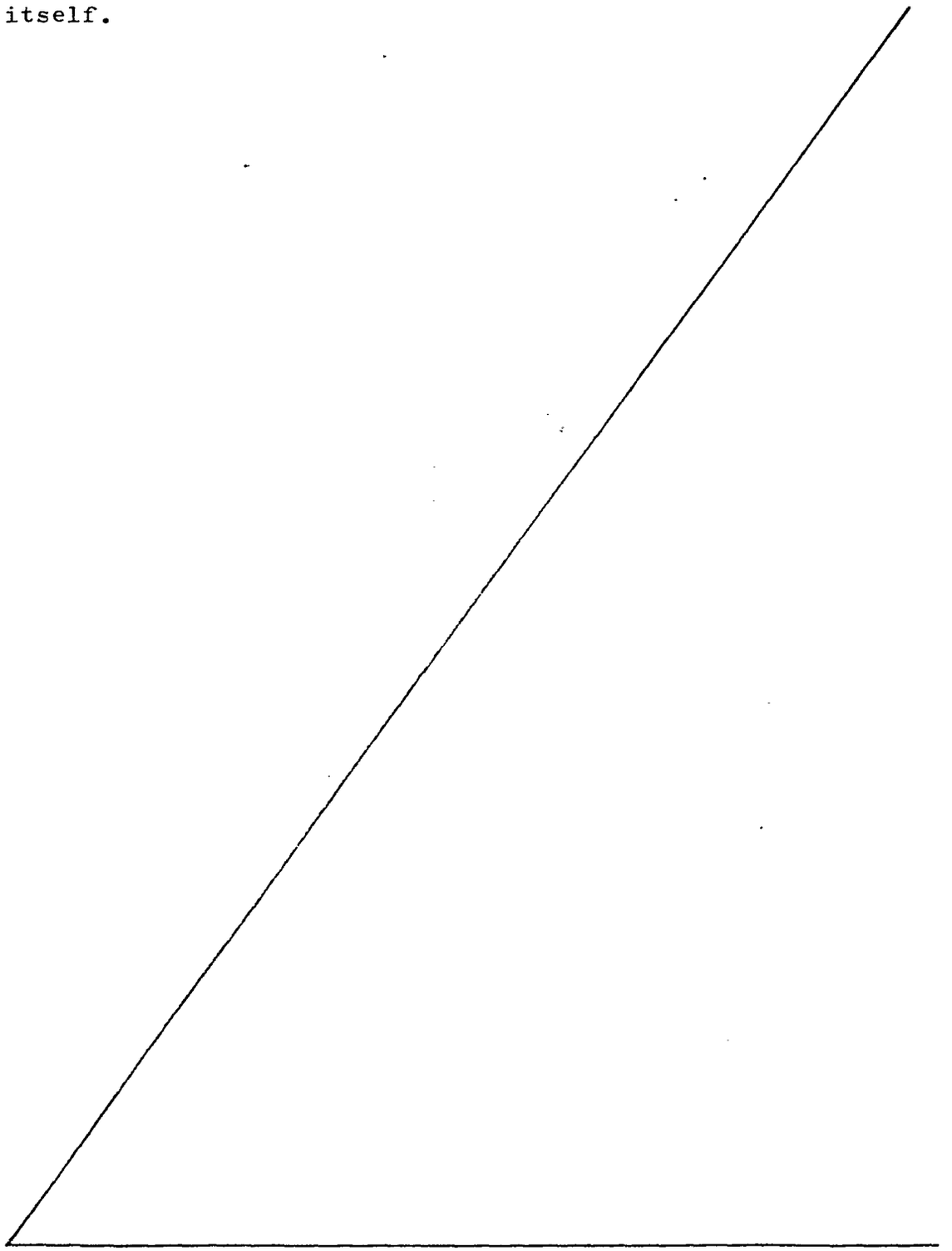
In the upper position of sensor carriage 24 the sensor 28 projects into the path of a suitable face such as leading face 32 of a web 33 on the underface of each pallet, while in the lower condition of sensor carriage 24 the sensor is clear of the pallets.

To operate the cutting mechanism the knife carriage starts at its rearmost position (extreme right hand position in Figure 1). The crank 17 and rod 16 thrust it forward. A control switch, not shown, will, in response to a cam track (not shown) on the machine frame, extend jack 25 and will bring the sensor into the path of a face 32 on a pallet. The speed of the knife carriage will be such that the face 32 reaches the sensor and displaces it clockwise (as shown). The extent of that displacement will be reproduced at the knife edges and since the face 32 is fixed relative to the ends of its pallet, both knives will fall, when actuated, to the end edges of that pallet. At a point determined by the cam track, the jack 25 will retract, take the sensor beneath the pallet path and the knife carriage will stop and then reverse to its starting position. The cycle will repeat.

There may be only a single knife instead of a pair and the machine and its drive may be of various forms. The sensor carriage could be movable simply vertically without the movement longitudinally of the knife carriage. Also where two knives are provided each may have its own adjustment mechanism and sensor.

In an alternative arrangement (not shown) the sensor is operative to adjust the position of the knife carriage relative to its driving mechanism, for example by adjusting the length of driving rods 16, in response to the detected actual position of each palet. With such an

arrangement the knives are longitudinally fixed relative to the knife carriage and adjustment of the position of each cut is made by adjusting the position of the carriage itself.



CLAIMS

1. A cutting mechanism for cutting a ribbon of material carried on a stream of end-to-end pallets through a machine the mechanism comprising: a carriage reciprocable along the path of the stream; cutter means carried on the carriage and operable to cut the ribbon of material; a sensor for sensing the actual position of a pallet in the stream relative to the carriage; and means responsive to the sensor for varying the longitudinal position of the cutter means and thereby the position, relative to the pallet, of the next cut made by the cutter means.

2. A cutter mechanism according to claim 1 wherein the cutter means are longitudinally movable relative to the carriage and the means responsive to the sensor is operative to vary the longitudinal position of the cutter means relative to the carriage.

3. A cutter mechanism according to claim 2 wherein the cutter means is a single knife blade mounted for movement on the carriage.

4. A cutter mechanism according to claim 2 wherein the cutter means comprises a plurality of knife blades mounted for longitudinal movement on the carriage, the knife blades being linked to each other for conjoint movement in response to a single sensor.

5. A cutter mechanism according to claim 2 wherein the cutter means comprises a plurality of knife blades mounted for longitudinal movement on the carriage, each knife blade being movable in response to a respective sensor.

6. A cutter mechanism according to any preceding claim wherein the or each sensor comprises an input member engageable with a predetermined face of the pallet to determine the position of the pallet.

7. A cutter mechanism according to claim 6 wherein the predetermined face of the pallet is a leading face of the pallet; wherein the input member is movable by the leading face upon engagement therewith, and wherein the means responsive to the sensor comprises an output member mechanically coupled to the input member and to the cutter means and powered by said movement of the input member.

8. A cutter mechanism according to any preceding claim wherein the cutter means is pivotally mounted on the carriage for longitudinal movement by the means responsive to the sensor.

9. A cutter mechanism according to claim 1 wherein the cutter means comprises at least one knife blade fixed relative to the carriage, and wherein the means responsive to the sensor is operative to vary the position of the carriage relative to its associated driving mechanism.

10. A cutter mechanism according to any preceding claim wherein the sensor is mounted on a sensor carriage which in turn is mounted on the cutter carriage and which is movable relative to the pallet stream between an operative position in which the sensor intercepts the pallet stream and an inoperative position in which the sensor is spaced from the pallet stream.

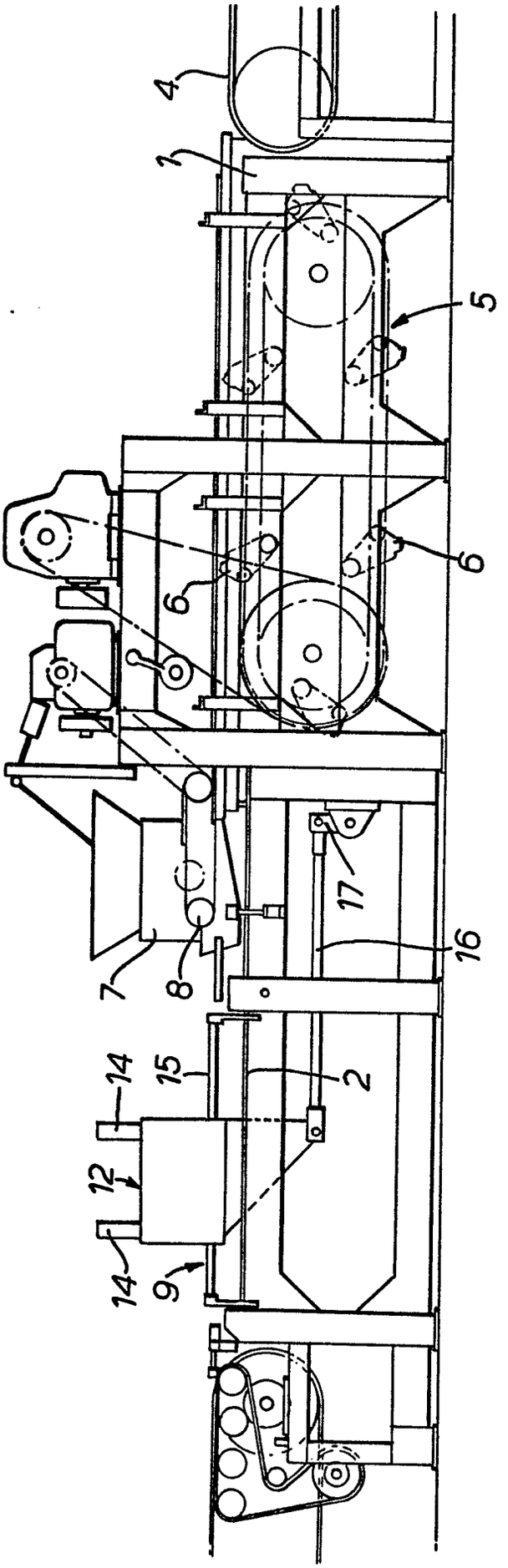


FIG. 1.

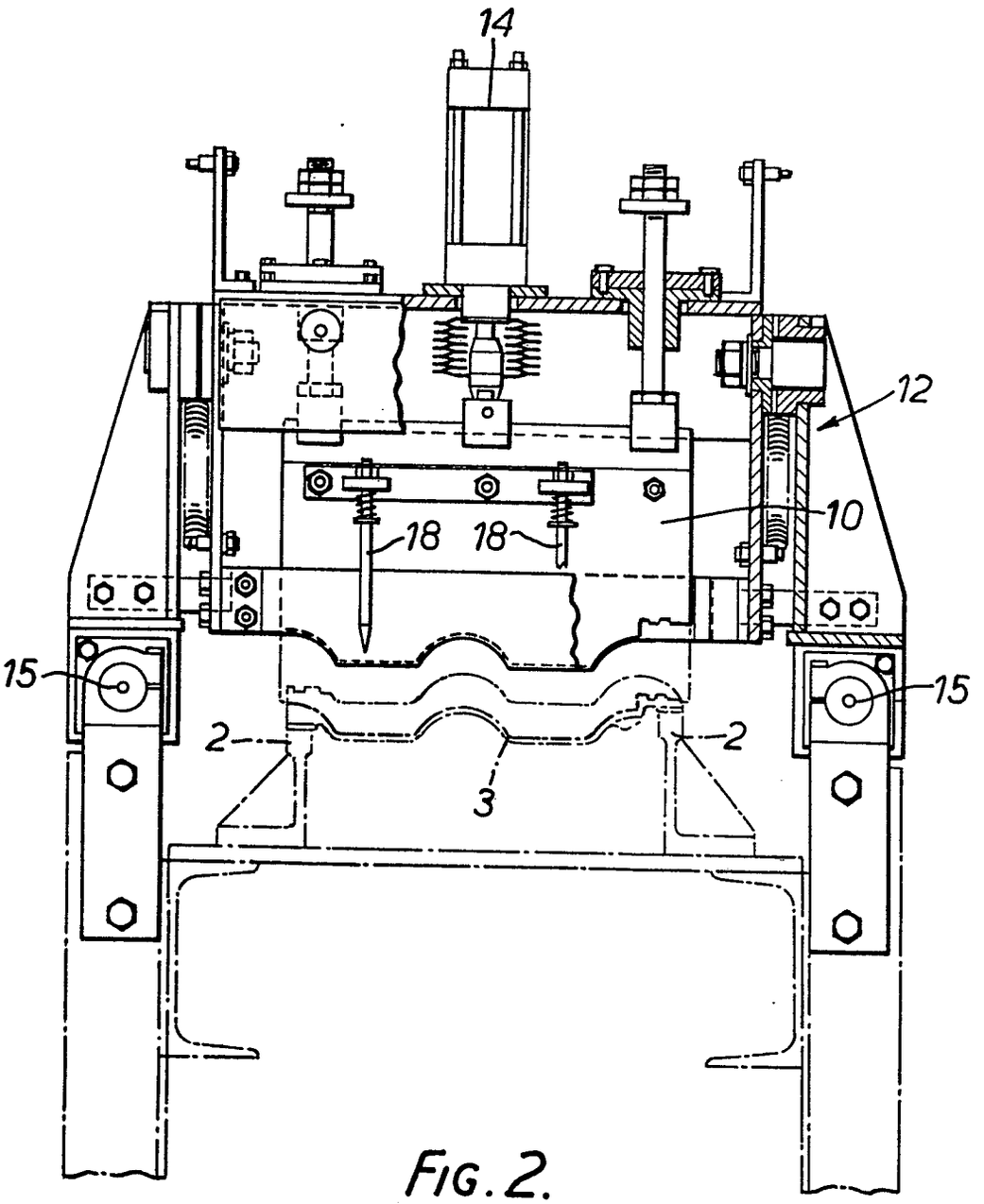


FIG. 2.

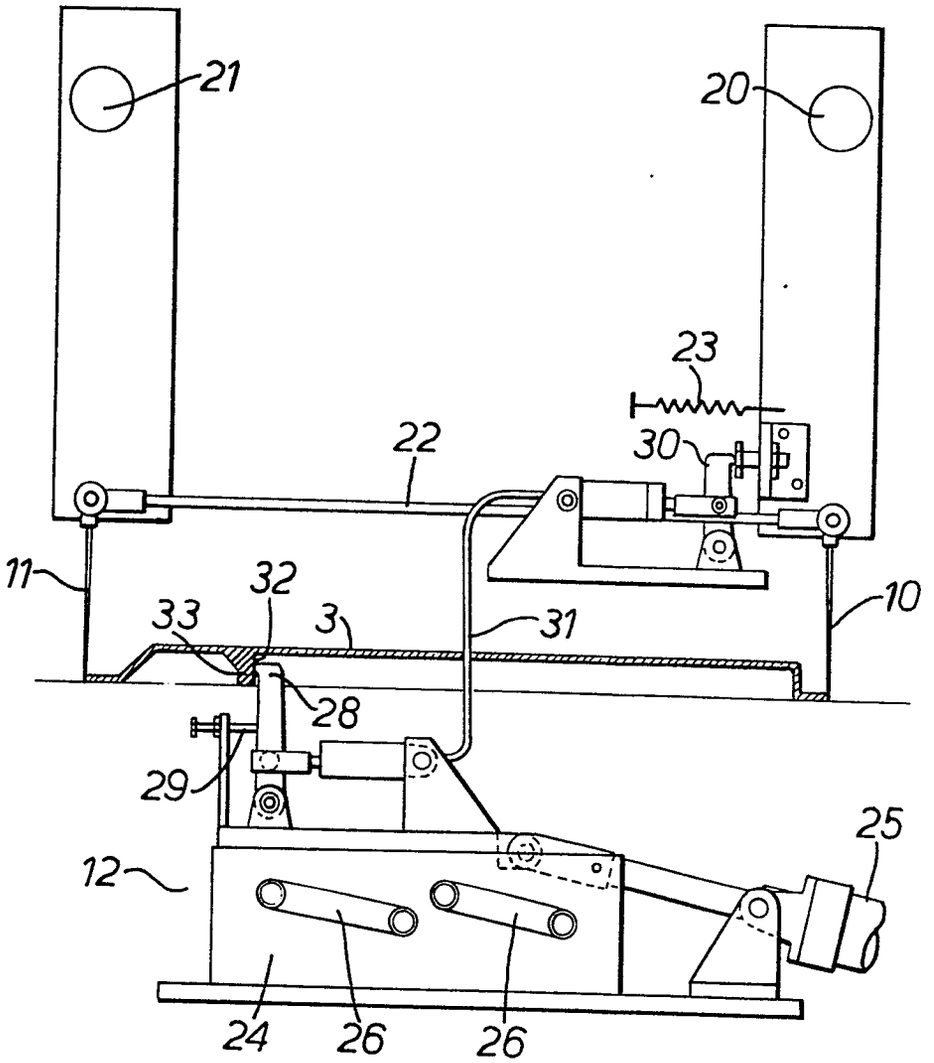


FIG. 3.