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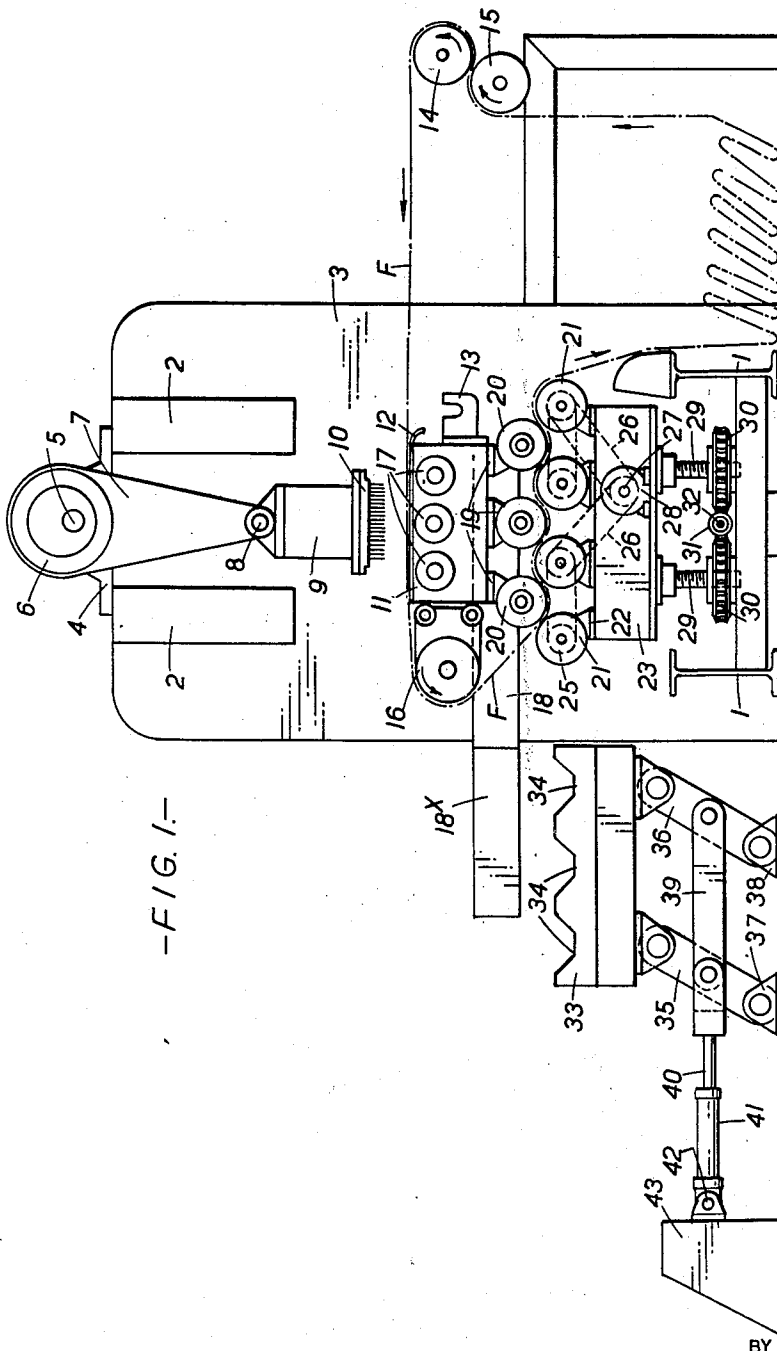
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3,117,359

NEEDLE PUNCHING MACHINES

Filed April 30, 1962

3 Sheets-Sheet 1



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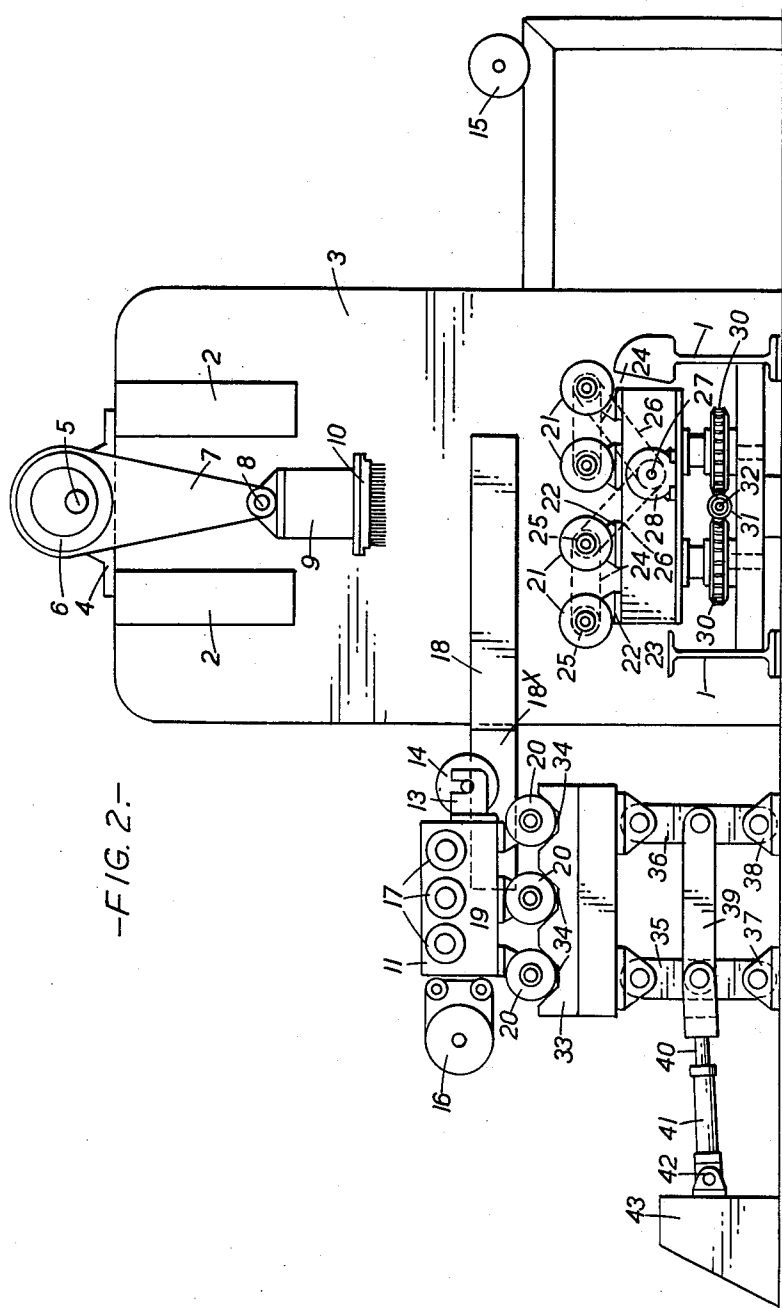
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NEEDLE PUNCHING MACHINES

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3 Sheets-Sheet 2



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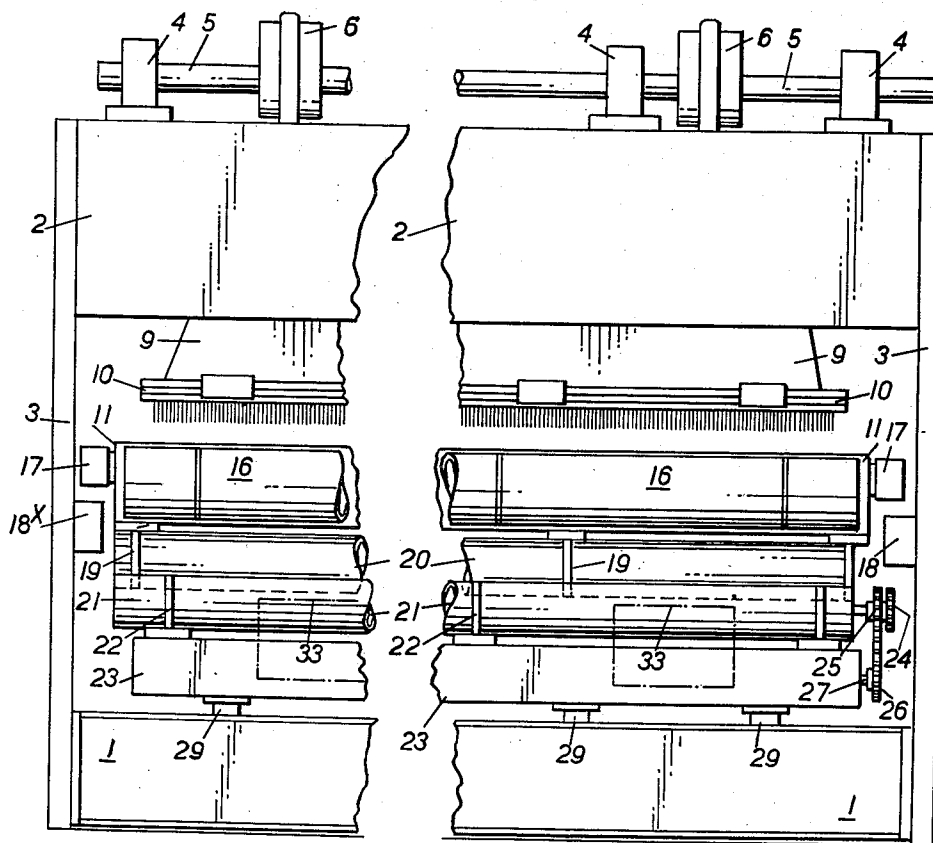
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NEEDLE PUNCHING MACHINES

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-FIG. 3-



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NEEDLE PUNCHING MACHINES

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5 Claims. (Cl. 28-4)

This invention relates to needle punching machines for use, for example, in needling endless woven felts such as are used in the paper-making industry. Felts and like endless materials of greatly increased widths are now required to be needled, but these greater widths reach a figure which renders it difficult or impossible to cope with them on needle punching machines of known construction, since they involve new considerations relating to the span of the machine, the weight of the needle bed beneath which the endless felt passes, and the provision for inserting and withdrawing the felt.

In constructing a machine for dealing with such extra wide felts, for example up to (say) 450" or more, a difficulty arises in supporting the needle bed in such a way as to permit the endless felts to be inserted and withdrawn and to pass beneath the bed and yet to support such bed with the rigidity and stability which are necessary to ensure an accurate and efficient punching operation and prevent sagging or distortion of the bed due to its own weight and great length.

To meet the above-mentioned difficulty it is proposed to construct a machine in which the needle bed is below the needle board and is arranged to be supported intermediate of its ends upon a lower bed by means of sets of bearing rollers between which sets the felt passes, the lower bed being supported rigidly on the machine base or foundation.

The needle bed carrying an upper set of bearing rollers may be mounted in frame members at each end and arranged to be withdrawn rearwardly to permit a felt to be inserted and withdrawn.

In order that the invention may be clearly understood and readily carried into effect the same will now be more fully described with reference to and by the aid of the accompanying drawings, which illustrate diagrammatically and merely by way of example one construction of machine embodying the invention. In these drawings:

FIGURE 1 represents an end elevation of the machine with the needle bed in position for needling;

FIGURE 2 represents a similar view to FIGURE 1 but with the needle bed withdrawn rearwardly and temporarily supported there; and

FIGURE 3 represents a broken rear elevation of the machine omitting the temporary support for the needle bed.

In these drawings the machine is represented as having longitudinal bottom beams 1, 1 and top beams 2, 2 supported between end frames 3, 3. Mounted on the top of this frame structure are a series of bearing housings 4 supporting an eccentric driving shaft 5 on which is drivably mounted a series of eccentric devices 6. Each eccentric device operates an arm 7 pivotally connected at 8 to a bracket 9 which supports the needle board 10, the latter being guided for vertical reciprocation. The shaft 5 may be driven in any suitable manner, this part of the machine being well known and forming no novel part of the invention.

The needle bed 11 carries the bed plate 12 (shown only in FIGURE 1); it also carries support brackets 13 for a removable roller 14 which co-operates with a roller 15 to guide the endless felt F (shown only in FIGURE 1) into the machine; and it further carries a rear roller 16 which may be driven as is well known

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to act as a draw-through roller for the felt. The needle bed 11 carries at each end a horizontal row of carrier wheels 17 arranged to be lowered on to and to roll along a horizontal support rail 18 which projects rearwardly from and is secured to the end frame 3 as will hereinafter be explained. One of these rails has a vertically hinged outer extension 18^x which can be locked in extended position.

Secured to the underside of the needle bed 11 are brackets 19 carrying a horizontal row of freely rotatable upper bearing rollers 20 extending the full length of the bed. During needling of felts or the like in the machine, these rollers 20 rest upon a horizontal row of similar lower bearing rollers 21 carried in brackets 22 mounted on a lower bed 23. These rollers 21 are shown as being coupled at one end of the machine in pairs by chains 24 passing around chain wheels 25, one of each pair being driven by a chain 26 from a chain wheel on a shaft 27 which is driven in any suitable manner from a motor 28. The various rollers rotate in the direction of the arrows indicated on FIGURE 1, and the upper and lower bearing rollers are relatively staggered as shown.

The lower bed is supported rigidly from the machine bed or its foundation by a series of screw jacks 29 arranged to be operated by worm gears 30 through worms 31 on a common shaft 32 in well known manner, the shaft 32 being suitably driven, this part of the machine also forming no novel part of the invention in so far as this mechanism is known for adjusting the working height of the bed to adjust the depth of penetration of the needles.

At the rear of the machine and located a few feet from each end thereof (see dotted lines in FIGURE 3) is a temporary support for the needle bed when this is withdrawn rearwardly. Each support consists of a table 33 having channels 34 to receive and locate the upper bearing rollers 20, this table being mounted pivotally upon two pairs of parallel links 35, 36 whose lower ends are pivoted in brackets 37, 38 secured to the machine bed or foundation. Pivotaly connected to both pairs of links intermediate of their ends is an actuating bar 39 pivotally connected to the ram rod 40 of a hydraulic ram cylinder 41 which is pivoted at 42 to an anchorage 43.

The operation of the mechanism above described is as follows. When an endless felt F is in the machine it passes between the upper and lower sets of bearing rollers 20, 21 through which the needle bed 11 is supported upon the lower bed 23. Owing to the staggered arrangement of these rollers the pressure upon the felt is spread over an area with a view to minimising as far as practicable their crushing tendency. Also, by driving the lower set of rollers these act to draw the felt through the machine, although it is preferred also to drive the roller 16. By using such a construction the needle bed is supported along its whole length upon the rigid lower bed through the co-operating sets of support rollers whilst still permitting the passage therebetween of the felt as needling proceeds.

When it is desired to remove a felt from the machine, the roller 14 is transferred to the brackets 13 and the jacks 29 are operated to lower the lower bed 23 and with it the needle bed 11 until the carrier rollers 17 rest upon the rails 18 and support the bed 11. Continued operation of the jacks lowers the lower support rollers clear of the upper ones as shown in FIGURE 2, enabling the needle bed to be run along rails 18 to a position above the two temporary support tables 33 (see FIGURE 2). The endless felt can now be drawn along the bed 11 and bunched up at one end beyond the adjacent support table 33 so as to be clear of and to the rear of the lower bed 23. The tables 33 are then moved by actuation of their ram rods 40 from the FIGURE 1 position to the FIGURE

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2 position so as to raise the bed 11 off the rails 18 and support it temporarily in a safe condition. The rail extension 18^x is then unlocked and folded forwards outside the adjacent end frame, leaving a gap between such frame and needle bed so that the felt can be pulled off the now free end of the bed.

With the parts of the machine in the same position, another endless felt can be looped in bunched-up condition over the freely projecting end of the needle bed and the above-described procedure repeated in reverse.

It is to be understood that any necessary locking, control and safety devices will be provided to ensure correct movement of the parts and to guard against accidents, and these may include power operation of the rolling needle bed and/or the movable support rail.

It will be seen that, although the needle bed is supported only near its ends during insertion and removal of a felt, it is supported intermediate of its ends through the rollers 20, 21 on the rigid lower bed 23 during needling operation of the machine.

The rollers 20, 21 preferably extend the full span of the machine and may be each in one length or (as shown in FIGURE 3) in adjoining sections, or they may be in sections suitably spaced apart across the span of the machine but sufficient in number to support the bed with the necessary rigidity.

I claim:

1. In a needle punching machine for treating endless felts and the like and having a needle board arranged for vertical reciprocation above a needle bed, the combination of a first set of bearing rollers carried on said needle bed, a lower bed, means for supporting said lower bed rigidly on the machine base, a second set of bearing rollers carried on said lower bed, means for supporting said needle board intermediate of its ends by said first set of rollers resting upon said second set, and means for passing between said two sets of rollers an endless material to be needled.

2. In a needle punching machine for treating endless felts and the like and having a needle board arranged for vertical reciprocating above a needle bed, the combination of a first set of bearing rollers carried on said needle bed, a lower bed, means for supporting said lower bed rigidly on the machine base, a second set of bearing rollers carried on said lower bed, means for supporting said needle board intermediate of its ends by said first set of rollers resting upon said second set, means for passing between said two sets of rollers an endless material

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to be needled, means permitting said needle bed to be withdrawn rearwardly clear of said lower bed to allow an endless material to be inserted around said needle bed for needling and to be removed therefrom, and means for temporarily supporting said needle bed when in its withdrawn position.

3. In a needle punching machine for treating endless felts and the like and having a needle board arranged for vertical reciprocation above a needle bed, the combination claimed in claim 2 including the mounting of the said two sets of rollers on their respective beds with such a disposition that when the needle bed is in position for needling the rollers of one set are staggered relative to those of the other set whereby their axes lie in different vertical planes, and means for lowering said lower bed and its rollers to permit horizontal withdrawal of said needle bed.

4. In a needle punching machine for treating endless felts and the like and having a needle board arranged for vertical reciprocation above a needle bed, the combination claimed in claim 3 including end members forming part of the machine frame, horizontal support rails mounted upon each of said end members, carrier wheels rotatably mounted on each end of said needle bed and arranged to support said bed and to permit it to be withdrawn thereon rearwardly when said lower bed is lowered, tables arranged to receive and temporarily support the withdrawn needle bed by engaging it at positions near but short of the ends of said bed, means for raising and lowering said tables to lift said needle bed off said rails and deposit it back thereon, and means for temporarily moving the outer portion at least of one of said rails when said needle bed is supported on said tables whereby a felt can be moved over said needle bed.

5. In a needle punching machine for treating endless felts and the like and having a needle board arranged for vertical reciprocation above a needle bed, the combination claimed in claim 1 including power means for rotatably driving at least some of the rollers of said second set of bearing rollers whereby they act in conjunction with rollers of said first set as draw-through rollers for the material being treated.

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