

April 14, 1931.

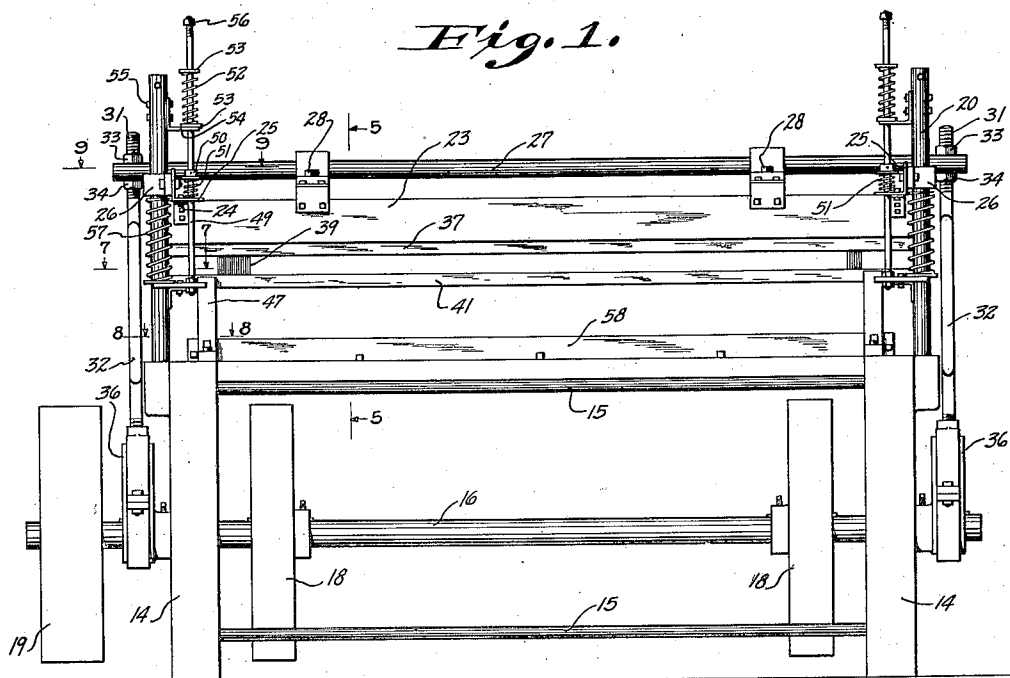
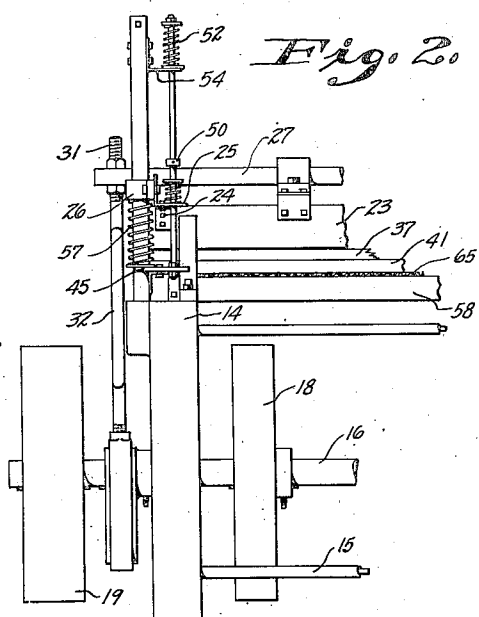
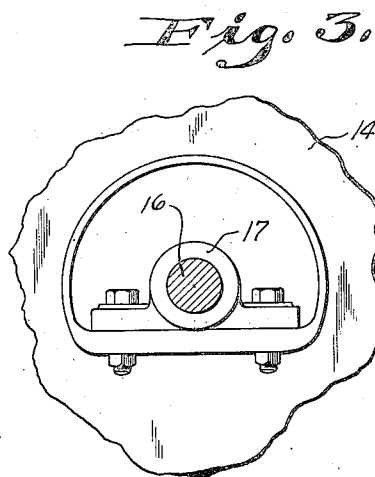
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1,800,499

FELT PUNCHING MACHINE

Filed Feb. 3, 1927

4 Sheets-Sheet 1



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Fig. 4.

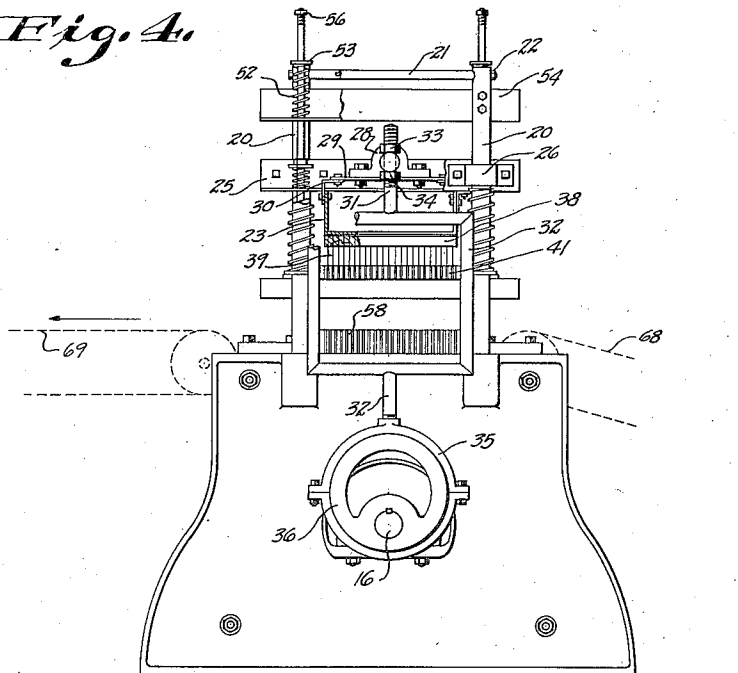
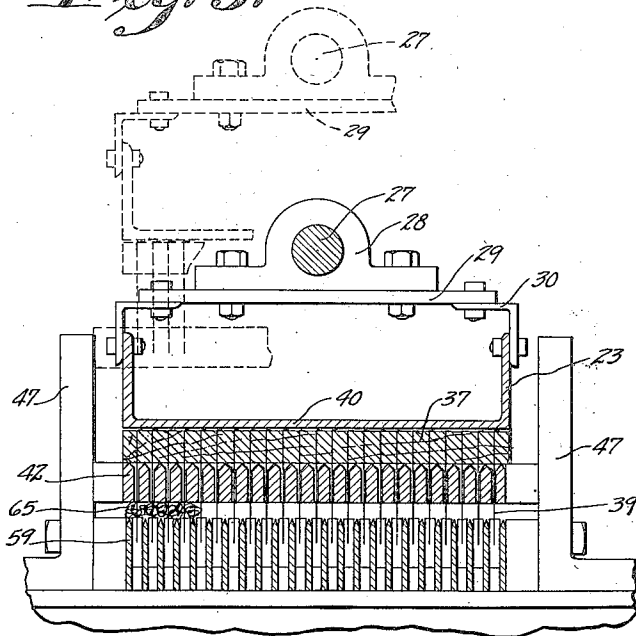


Fig. 5.



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Fig. 6.

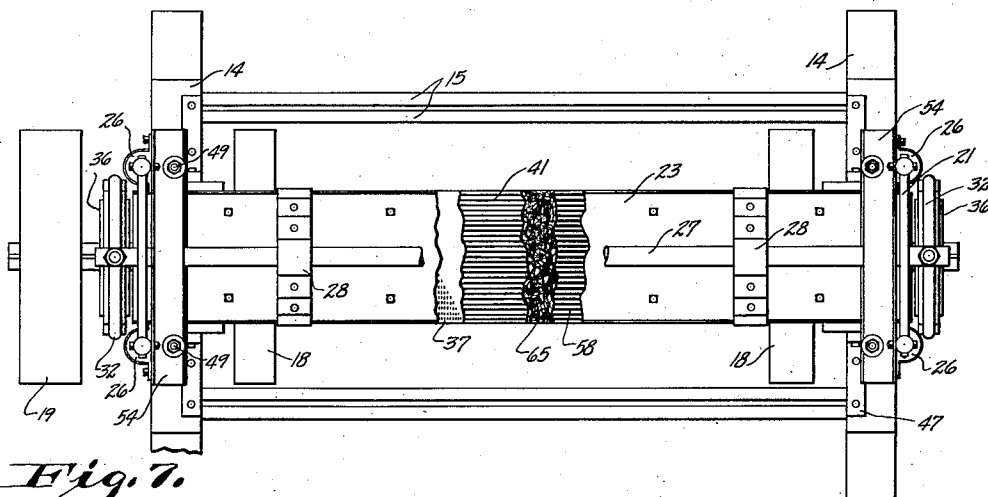


Fig. 7.

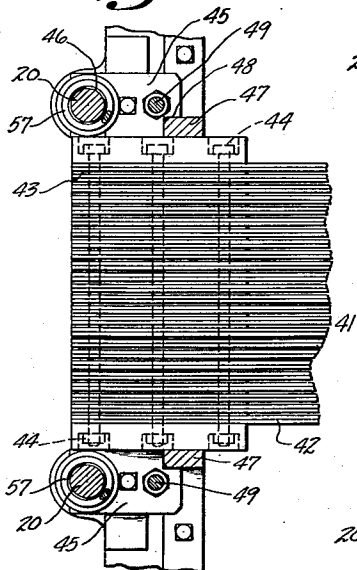


Fig. 8.

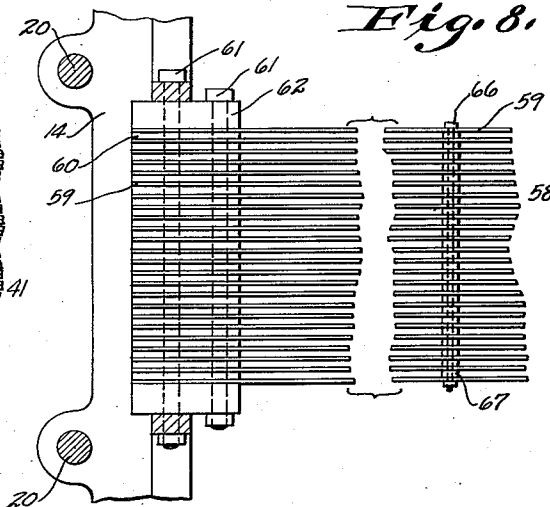
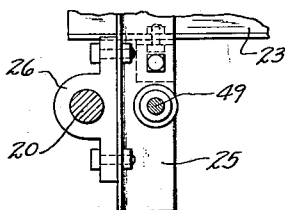


Fig. 9.



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Fig. 13.

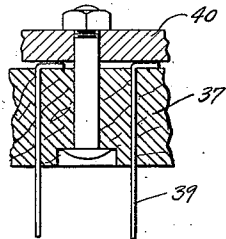


Fig. 12.

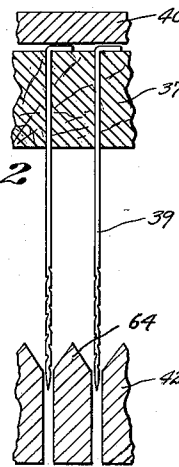


Fig. 11.

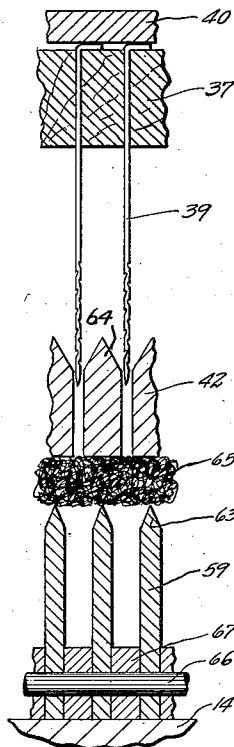
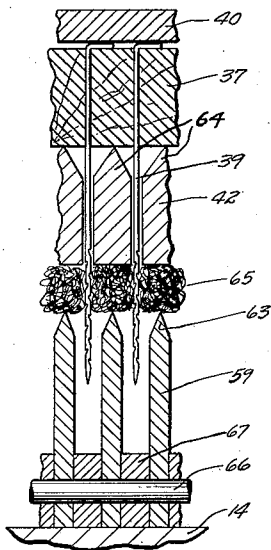
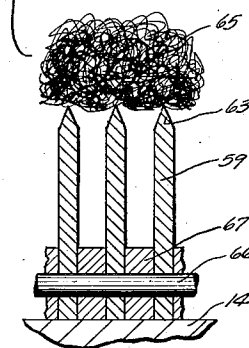


Fig. 10.



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UNITED STATES PATENT OFFICE

PERCY R. BETTISON, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN HAIR & FELT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE

FELT-PUNCHING MACHINE

Application filed February 3, 1927. Serial No. 165,651.

The invention relates to felt-punching machines.

Prior to this invention, in order to satisfactorily make a punched-felt product with the machines now in use, it has been necessary to punch the felt to a burlap or other backing sheet and this has prohibited the use of punched-felt in many fields where the burlap or backing sheet was not required and unduly increased the expense of the product or was detrimental. The object of the present invention is to punch-felt together a bat or felt during its passage through the machine, and more particularly to provide a construction in which the bat is held between two relatively movable grids during the punching operation whereby the bat may be formed into a punched-felt product without the use of a backing or intermediate reinforcement of burlap or other material.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings Fig. 1 is an elevation view of a machine embodying the invention;

Fig. 2 is a detail elevation view similar to Fig. 1 showing the parts in another position, with parts of the machine broken away;

Fig. 3 is a detail side elevation view of a part of the frame and the drive shaft bearing;

Fig. 4 is a side elevation view with parts broken away and parts shown in section.

Fig. 5 is an enlarged detail sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is a plan view of the machine with parts broken away;

Fig. 7 is a section taken on the line 7—7 of Fig. 1 to show the upper grid and its guides;

Fig. 8 is a section taken on the line 8—8 of Fig. 1 showing a part of the lower grid;

Fig. 9 is a detail sectional view taken on the line 9—9 of Fig. 1;

Fig. 10 is an enlarged sectional view through the needle-board and grids showing them in one position;

Fig. 11 is a view similar to Fig. 9 showing the parts in another position;

Fig. 12 is a view similar to Fig. 9 showing the parts in another position;

Fig. 13 is a detail sectional view through the needle-board and carrier.

Referring to Figs. 1, 4 and 6, the numeral 14 designates the side frame members of the machine which are secured together by transverse tie-rods 15 to form a rigid frame upon which the grids and the needle-board are supported. A drive shaft 16 is mounted in bearings 17 secured to the upright side of frame members 14 and has two fly-wheels 18 mounted thereon between said frame members and a drive pulley 19 adapted to be connected by a belt with any suitable source of power. Upright rods 20, mounted at their lower ends in bosses on the frame members 14, are arranged in pairs at each end of the machine and are braced at their upper ends by transverse tie-rods 21 clamped thereto by nuts 22.

A carrier frame in the form of a wide steel channel 23 has angle bars 24 secured to its sides adjacent its ends to which are connected a transversely disposed angle bar 25 at each end of the machine and these angle bars carry guide blocks 26 which are slidably mounted on the guide rods 20. A shaft 27 extends lengthwise of the machine and is mounted in bearings 28 secured to the channel 23 in each instance by a plate 29 and angle plates 30, these plates being suitably bolted together. Each end of the shaft 27 is apertured to receive the upper threaded end 31 of a connecting-rod 32, said rod being adjustably secured to the shaft 27 by nuts 33 and 34 on the threaded end thereof on opposite sides of said shaft, and these nuts, because of their adjustment, permitting the relative length of the connecting-rod to be varied so as to change the operating position of the carrier 23.

The lower big end bearing 35 of the connecting-rod is mounted on an eccentric 36 secured to the shaft 16. The intermediate portion of one of the connecting-rods is preferably in the form of a rectangular frame of a width substantially the same as the needle-board so as to permit the insertion or withdrawal of said board from this end of the machine.

From the foregoing description it will be noted that as the shaft 16 rotates the eccentrics 36 impart motion to the connecting-rods 32 at each end of the machine and cause the carrier 23 to be moved up and down and slide upon the frame rods 20. The needle-board 37 having the needles 39 mounted therein is bolted or otherwise suitably secured to the web 40 of the carrier or channel 23 and hence the needle-board moves with the carrier.

An upper grid 41 is associated with the carrier and comprises a series of rods or thin bars 42 suitably spaced apart by blocks 43 and secured together by bolts 44 connected with end plates 45 at each end of the machine. This upper grid is guided in its movement by the rods 20, with which the notched portions 46 of the plates 45 slidably engage, and by upwardly extending guides 47 secured to the side frame members and operating within the notched front portion 48 of the plates 45. The grid thus formed and doubly guided is yieldingly suspended from the carrier 23 by means of rods 49 secured in pairs at one end to the plates 45 and extending through the laterally extending leg of the angle bars 25 and provided with a collar 50, a spring 51 being interposed between said collar and the angle bars 25, with the result that when the carrier and needle-board move up and down the upper grid will move therewith through the spring suspension provided but at the same time have movement relative to said needle-board. The springs 51 are used to absorb the shock on the upward movement of the grid 41. Thus, when the needle-board and grid are in their upper position the upper grid hangs from the springs 51 and as the needle-board moves down and engages the stock, as hereinafter described, the rods 49 slide upwardly, moving the collars 50 upwardly, as shown in Fig. 2, so that after the upper grid strikes the stock there is a further downward movement of the needle-board.

As the parts of this machine are heavy and the speed is quite high, means are provided to relieve the parts of undue shock from vibration, consisting of the springs 51 and springs 52 through which the rods 49 pass and are mounted between washer plates 53, the lower washer plate seating on the laterally-extending leg of a transverse angle member 54 secured by bolts 55 to the upper ends of the rods 20, a nut 56 on the upper end of the rod 49 engaging the upper washer 53 and putting the spring 52 under compression as the grid moves to its lower position and tending to absorb the shock as the grid nears the end of its downward movement. A spring 57 is interposed between each of the slide blocks 36 and the plates 45 and this spring forms a yielding transmission pressure connection between the carrier 23 and the grid 41.

The lower grid 58 is formed of a plurality of narrow bars 59 spaced apart by spacing blocks or strips 60 clamped together at each end by bolts 61 extending through upright brackets or bosses 62 formed on the side frame member 14. The upper ends 63 of the grid bars 59 are preferably pointed or beveled and the upper ends 64 of the grid bars 42 are similarly pointed or beveled. The beveling of the upper ends 63 and 64 is for the purpose of preventing the possibility of breakage of needles as these beveled ends act to deflect the needles, should they strike against the grid members. The lower grids are also shown as held together intermediate their ends and at the lower side thereof by bolts 66 and spacing blocks 67.

The stock, in the form of a loose bat received from the carding machines and formed in known manner, may be introduced into the machine in any suitable manner, for example, by means of an endless conveyor 68.

The feed of the stock from the conveyor 68 acts to push the punched stock through the machine though it will be understood that this may be further assisted by a belt conveyor 69 upon which the punched stock is carried and which tends to pull the punched stock away from the machine.

The operation of the machine is best shown in Figs. 10 to 12, inclusive. When the needle board 37 is in its upper position the grid 41 is also in its upper position and a relatively large opening is provided between the grid 41 and the grid 58 into which the bat is introduced. As the needle-board 37 starts on its downward movement the grid 41 moves with it, through the spring drive previously described, and moves in advance of the needles and strikes the stock 65 and before the needles have moved down through the grid member 41 into the stock the grid 41 is moved down to a position where the stock is compressed between the grids 41 and 58, the compression increasing as the pressure builds up in the springs 57 until the bars 42 of the grid 41 reach a stop position which, occurring as it does through only a part of the stroke of the carrier 23, permits the needles 39 to move down through the spaces in the grid bars 42 into and through the stock 65 during the remainder of the downward movement of the carrier 23. Then, as the carrier moves upwardly during the first part of this movement, the stock is still held between the upper and lower grid bars through the continued compression of the springs 57, with the result that the needle-board 37 moves upwardly relative to the upper grid bar and causes the needles to be stripped from the stock. By the time the needles 39 are freed from the stock the pressure of the springs 57 is released, with the result that the grid 41 moves upwardly to its initial position to complete the cycle of operations. As these

cycles of operations are repeated the stock is advanced through the machine and the barbed needles, repeatedly engaging the stock as it moves through the grids, act to interlace the fibres of the stock together to produce the completed product.

I desire to be understood that this invention is not to be limited to any particular form or arrangement of parts except insofar as such limitations are specified in the claims or necessitated by the prior art.

What I claim as my invention is:

1. In a felt-punching machine, the combination with a movable needle-board and its needles, of a grid movable relative to said needle-board and in advance of the same, means for moving said grid and exerting a positive pressure thereon to compress the felt bat during the punching operation of the needles, and means for feeding the felt bat alone directly through the machine.

2. In a felt-punching machine, the combination of relatively movable grids, means for moving said grids relative to each other to compress the felt bat directly between them, a movable carrier provided with punching needles and a yielding drive connection between said carrier and one of said grids to permit said needles to move relative to said grids to needle-punch the fibres of the stock itself together while held between said grids, and means for feeding the felt bat alone directly through the machine.

3. In a felt-punching machine, the combination of a vibratory carrier provided with punching needles, a grid yieldingly connected with said carrier for movement therewith and relative thereto, another grid cooperating with said first-named grid for holding the felt bat directly therebetween as the needles punch the fibres thereof together during the relative movement of said carrier and first-named grid, and means for feeding the felt bat alone directly through the machine.

4. In a felt-punching machine, the combination of a pair of grids, means for moving said grids relative to each other to intermittently receive a felt bat therebetween and intermittently positively compress and hold the felt bat alone directly therebetween, a needle-board provided with punching needles, means for moving said board to force the needles into and out of the stock while compressed by said grids, and means for feeding the felt bat alone directly through the machine.

5. In a felt-punching machine, the combination of a support, a grid mounted thereon, guides on said support, a movable grid slidably mounted on said guides, a needle-board provided with needles, a carrier for said movable grid and needle board, means for suspending said movable grid from said carrier for movement relative thereto, a spring interposed between said movable grid and carrier

whereby said grid and carrier move together and pressure is exerted directly upon the felt bat between the grids, means for guiding said carrier, means for reciprocating said carrier, and means for feeding the felt bat alone directly through the machine.

6. In a felt-punching machine, the combination of a pair of relatively movable grids, a carrier, a needle-board removably secured to the carrier, means for reciprocating the carrier and needle-board including rods having bifurcated portions to permit the insertion into or withdrawal of the needle-board from the machine, and means for suspending one of said grids from the carrier to move with the needle-board and permit the needle-board to move relative thereto.

7. In a felt-punching machine, the combination of relatively movable grids for receiving and holding a felt bat alone directly between them, a needle-board provided with punching needles and movable relative to the grids to needle-punch the fibres of the stock itself together while held alone between the grids, means terminating at the entrance end of the grids for feeding the felt bat thereto, and a continuously moving conveyor exterior of said grids for withdrawing the punched stock therefrom.

In testimony whereof, I affix my signature.

PERCY R. BETTISON.