April 10, 1951 N. FLETCHER ET AL 2,548,663

WEFT NEEDLE MECHANISM FOR AXMINSTER LOOMS

Original Filed March 1, 1946 3 Sheets-Sheet 1

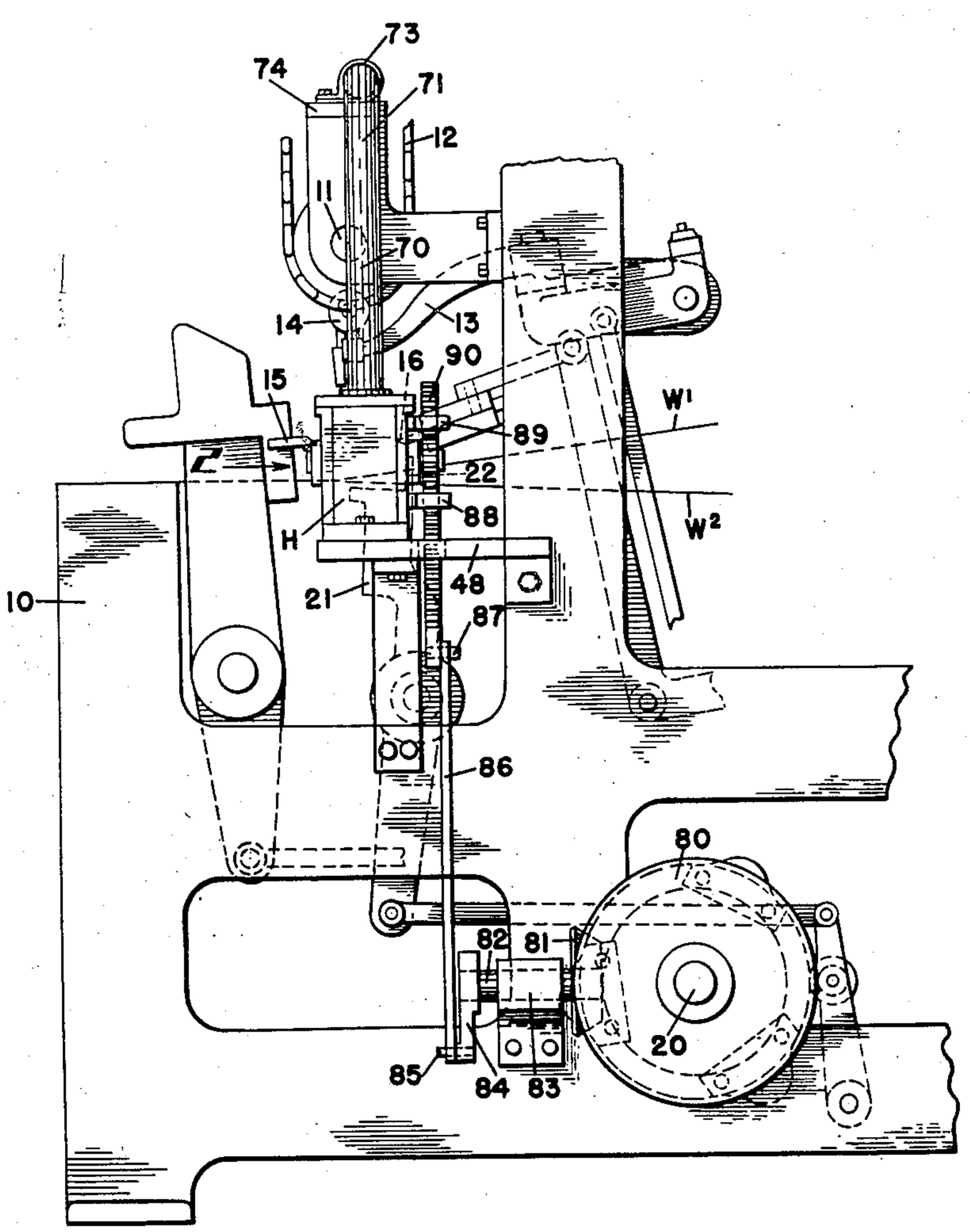

FIG. 1

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FIG. 2

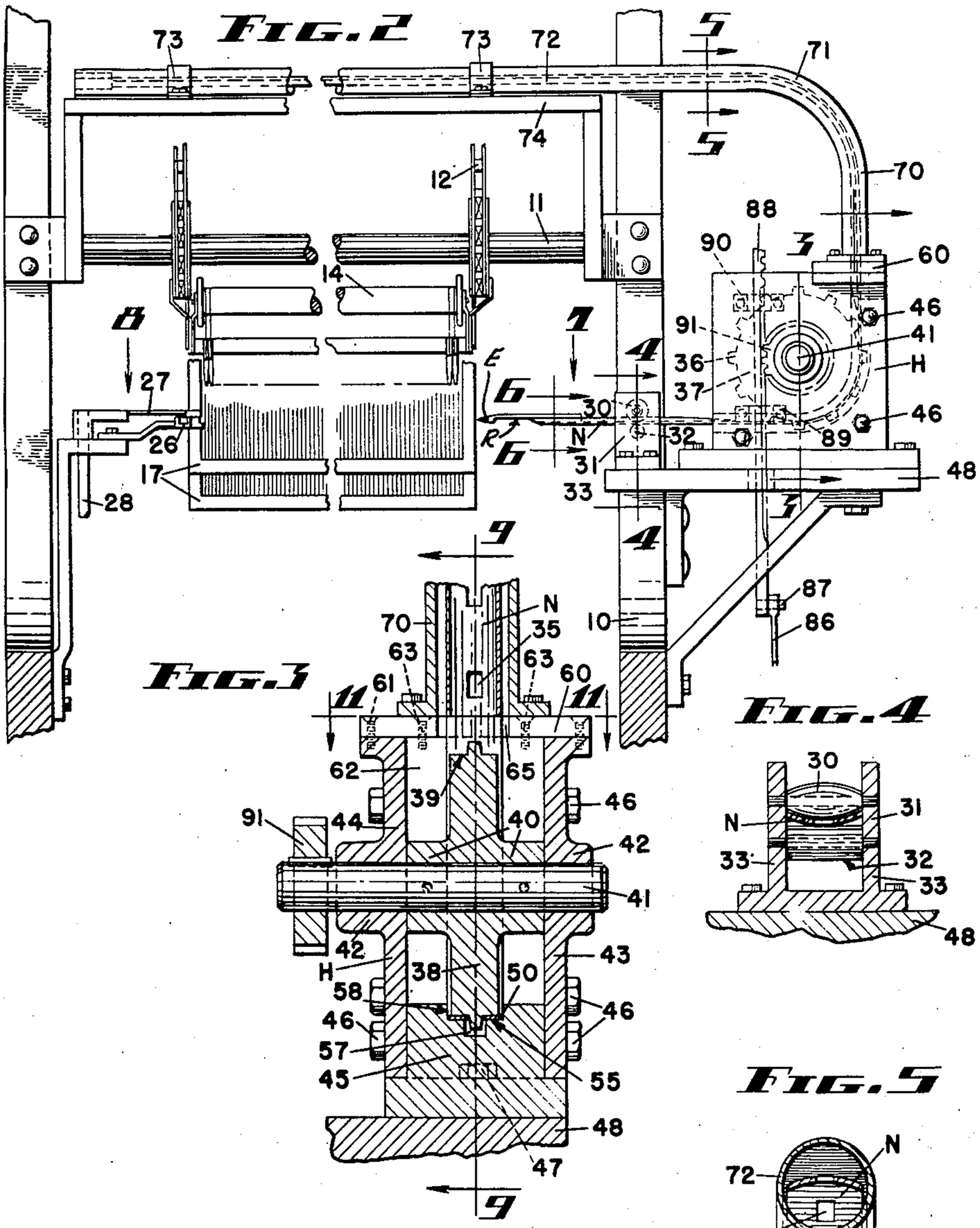

FIG. 3

FIG. 4

FIG. 5

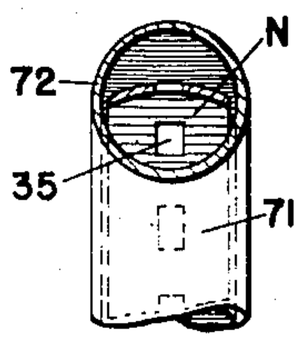

FIG. 6

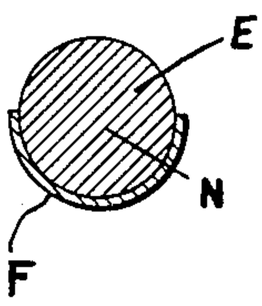

FIG. 7

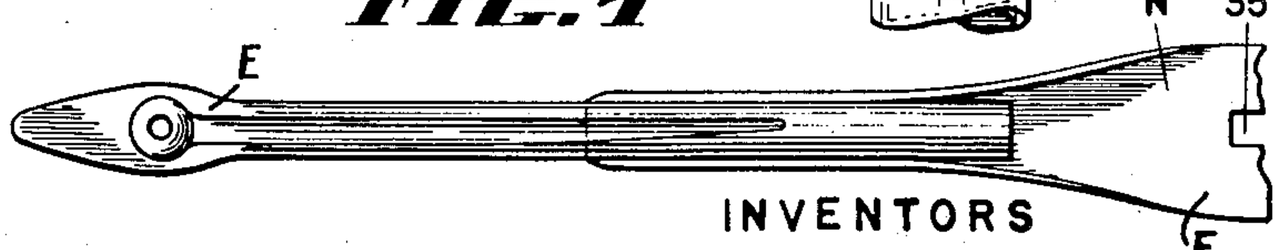

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FIG. 8

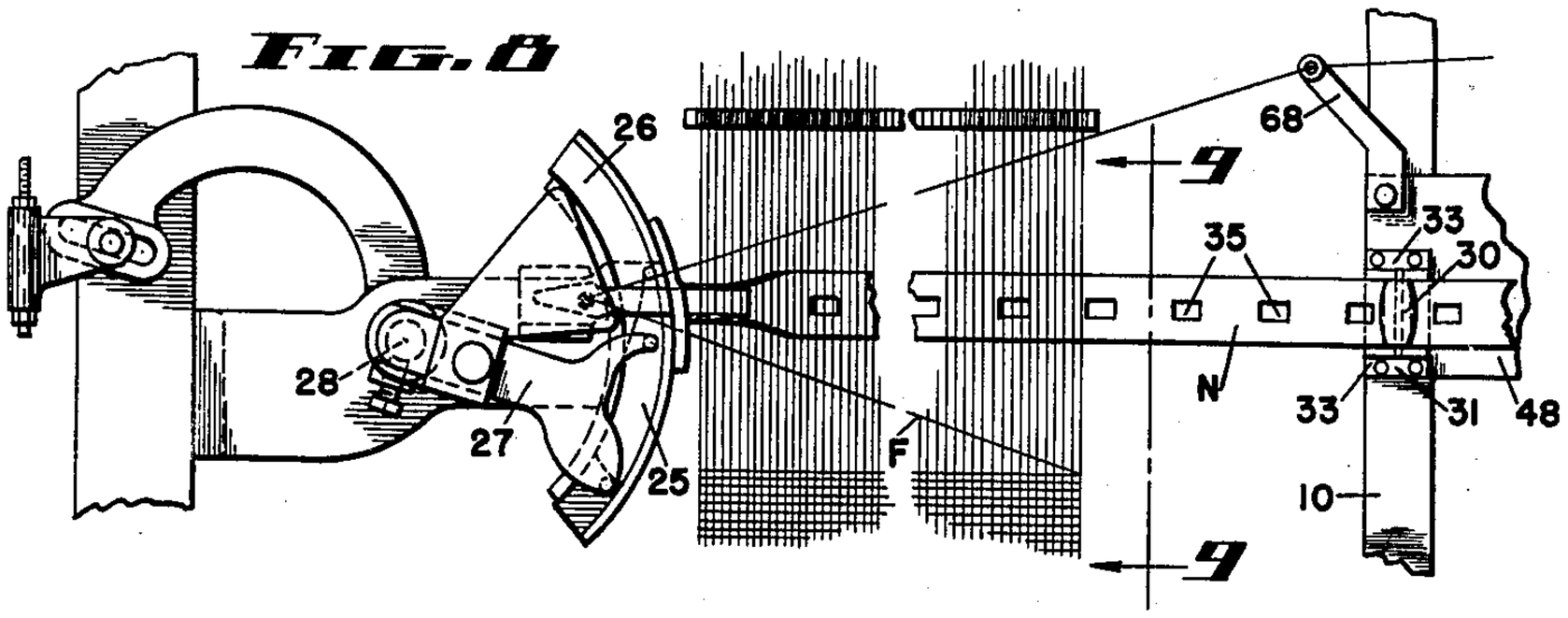


FIG. 10

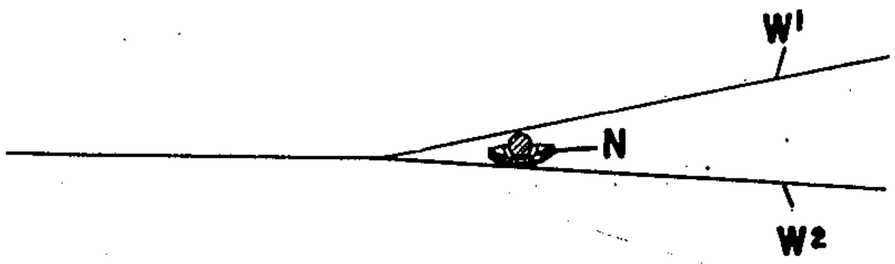
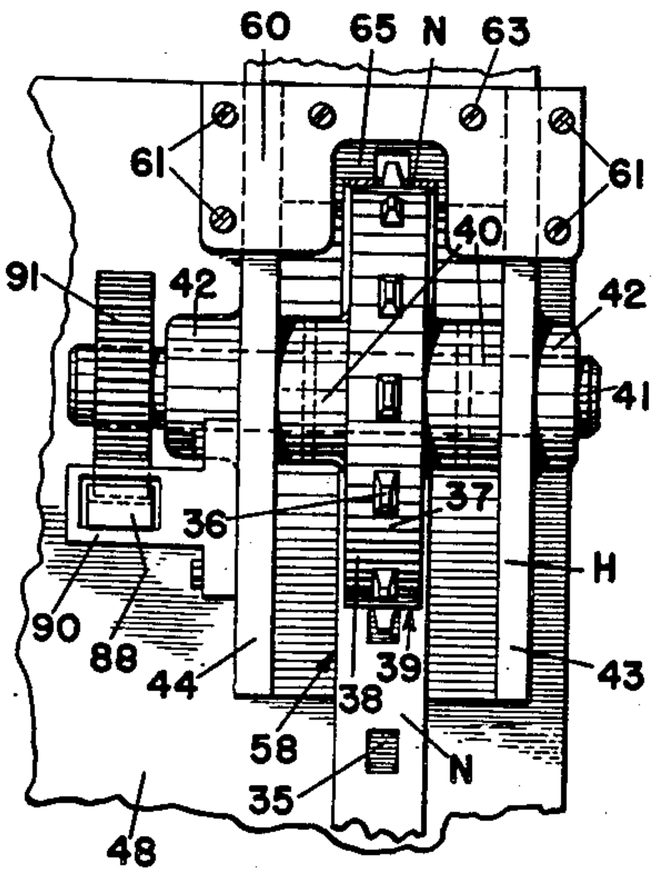


FIG. 9

FIG. 11



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WEFT NEEDLE MECHANISM FOR AXMINSTER LOOMS

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2 Claims. (Cl. 139—123)

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This is a division of my copending application Serial No. 651,178, filed March 1, 1946.

This invention relates to improvements in weft needles for looms more particularly of the Axminster type and it is the general object of our invention to provide a flexible needle formed of sheet metal curved transversely to provide rigidity.

In Axminster looms the weft is drawn from a stationary package and is introduced into the warp shed by an elongated needle. In the past this needle has been rigid and has required a long needle rail extending to one side of the loom. The needle rail adds considerably to the floor space occupied by the loom and in wide looms this additional space required for the rail is objectionably large. It is an important object of our present invention to provide a flexible needle which can be bent or curved on itself so that the part thereof out of the shed can move along a path transverse of that part of the needle which is in the shed, which usually extends to one side of the loom.

It is another object of our invention to make the needle of concave sheet metal provided with spaced slots or openings to receive the teeth of a driving sprocket wheel by which the needle is moved into and out of the shed.

With these and other objects in view which will appear as the description proceeds, our invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of our invention is set forth,

Fig. 1 is a side elevation of a portion of an Axminster loom having our invention applied thereto,

Fig. 2 is a front elevation looking in the direction of arrow 2, Fig. 1,

Fig. 3 is an enlarged vertical section on line 3—3 of Fig. 2 showing the needle driving mechanism,

Figs. 4, 5 and 6 are enlarged vertical sections on lines 4—4, 5—5 and 6—6, respectively, of Fig. 2.

Fig. 7 is an enlarged plan view of the eye end of the needle looking in the direction of arrow 7, Fig. 2,

Fig. 8 is an enlarged plan looking in the direction of arrow 8, Fig. 2, showing the selvage shuttle, the needle and the thread guide at the right side of the loom,

Fig. 9 is a vertical section on line 9—9, Fig. 3,

Fig. 10 is a vertical section through the warp shed showing the needle between the top and bottom sheds, and

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Fig. 11 is a horizontal section on line 11—11, Fig. 3.

Referring to Figs. 1 and 2, the loom frame 10 supports a pullover shaft 11 around which extends a tube frame transporting chain 12. The tube frame transfer arms, one of which is shown at 13 in Fig. 1, disconnect the tube frames one at a time from the chains 12 and move them down in the usual manner to tuft forming position after which the tube frame is returned to the chain. In Fig. 1 one of these tube frames is indicated at 14 in the position which it occupies just prior to movement downwardly to tuft forming position.

The loom is provided with front and back tuft cutting knives 15 and 16, respectively, which operate at the proper time in the loom cycle to cut the row of tufts from the tube frame which has been moved to tuft forming position. Harness frames 17 manipulate the warp threads in such manner as to form top and bottom sheds W' and W2.

The loom is provided with a shaft 20 which rotates once for each three picks of the loom. This shaft actuates the usual means for operating the tube frame transferrer arms 13, the knives 15 and 16, the harness frames 17, and the lay 21 which moves backwardly and forwardly once for each pick of the loom. The reed 22 of the lay extends through the warp shed and is the means by which the weft thread F is beaten forwardly into the fabric.

As shown in Figs. 2 and 8 the left side of the loom is provided with a selvage shuttle 25 which is reciprocated along an arcuate shuttle race 26 by means of an actuator arm 27 on the upper end of a shaft 28 journaled for rotation in the loom about a vertical axis. The shuttle 25 has a reciprocation for each pick of the loom and passes through a loop in the filling thread F after the latter has been moved into the shed by the improved needle forming part of our invention and set forth more particularly hereinafter.

The matter thus far described operates in the usual manner, the lay beating forwardly three times for each complete tuft forming cycle of the loom.

In carrying our invention into effect we provide a flexible needle N which is made of sheet metal and is permanently curved throughout its length so that it is of arcuate transverse cross section and concave relatively to an axis longitudinal of the needle, as set forth particularly in Figs. 4 and 5. The needle N has a generally cylindrical weft eye member E formed with a recess R on the under side thereof for a selvage shuttle such as is

customarily used on Axminster looms. The sheet or strip F forming the greater part of the length of the needle is flexible and in Fig. 4 is seen to be concave upwardly. As shown in Figs. 2, 6 and 7 the strip F is curved or wrapped around the bottom and sides of part of the eye E, the edges of the strip F converging toward each other for the purpose as shown in Fig. 7. The flexible strip F engages a guide roll 30 formed to fit the upper surface of the needle and rotatable in a stand 31 fixed to a stationary support 48 fixed with respect to the loom. A second roll 32 under the needle is also rotatable on the stand 31 and together with the upper roll 30 limits vertical motion of that part of the needle near the loom frame and shown at the right of Fig. 8. The stand 31 has vertical guide walls 33 between which the needle N moves. The flexible needle is therefore guided by the rolls 30 and 32 and also by the walls 33.

The needle is formed with a series of slots or openings 35 in strip F which are aligned longitudinally and centrally of the needle and are equally spaced along the length of the needle to receive the sprocket teeth 36 of a sprocket wheel 37 mounted in a housing designated generally at H. The sprocket wheel has a wide web 38 having cylindrical peripheral surfaces 39 located on opposite sides of the teeth 36. The wheel 37 also has hubs 40 which are pinned or otherwise secured to a shaft 41 which rotate in bearing hubs 42 of right and left side plates 43 and 44, respectively, as viewed in Fig. 3.

The side plates are secured to a guide block 45 as at 46 and the block is secured as at 47 to support 48. The block has provision for guiding the needle N including a slot designated generally at 50 and having a horizontal part 51, an arcuate part 52 concentric with shaft 41, and a vertical part 53. These three parts of the slot are continuous and form a guide for the needle as the latter moves along the guide block 45.

The bottom of the slot has a surface 55 which is engaged by the under side of the needle and the arcuate part 56 of surface 55 is spaced from the surfaces 39 of the sprocket by a distance slightly greater than the thickness of the needle N.

A narrower slot 57 is cut in block 45 below the level of surface 55 to provide clearance for the teeth 36 of the sprocket wheel, and the side walls 58 of the slot 50 serve as guides for the needle to prevent substantial lateral movement thereof with respect to the block. The slots 35 in the needle may be slightly wider than the sprocket teeth 36 and the latter serve merely to move the needle along the block without necessarily performing a guiding relation with respect to it.

The upper parts of the plates 43 and 44 are braced by a bridging plate 60 secured to the side plates as at 61 and to the vertical part 62 of block 45 as at 63. This plate 60 may be recessed as at 65 to permit upward movement of the needle N. A hollow guide 70 secured to the plate 60 extends upwardly therefrom and is then bent to the left as at 71, Fig. 2, and then horizontally as at 72. Clips 73 hold the horizontal part 72 of the guide to a supporting frame 74 fixed with respect to the loom.

The mechanism for oscillating the sprocket 37 is shown more particularly in Figs. 1, 2 and 3. Secured to the shaft 20 is a large bevel gear 80 meshing with a pinion 81 of one-third the size secured to a shaft 82 rotatable in a stationary bearing 83. The forward end of shaft 82 carries a crank arm 84 the pin 85 of which is pivoted

to the lower end of a connector 86. The latter extends upwardly and is pivotally connected as at 87 to the bottom end of a rack member 88 slidable in top and bottom bearings 89 and 90 supported by the housing H. The rack meshes with a gear 91 secured to the shaft 41. The side plates 43 and 44 cooperate with hubs 40 of the sprocket wheel to hold the latter in correct position for registry with the needle N.

During loom operation a rotation of the shaft 20 will cause three rotations of the crank arm 84 and therefore three complete oscillations of the sprocket wheel 37. The needle will be inserted and removed from the shed for each oscillation of the sprocket and a complete rotation of shaft 20 will result in laying three shots of filling customary in the complete cycle of the three-shot Axminster loom.

It will be apparent that the needle is not dependent for its weft laying motions upon the particular kind of drive set forth herein, and so far as certain features of our invention are concerned it is sufficient if the sprocket 37 is given rotations first in one direction and then in the other by any suitable mechanism other than that shown herein.

From the foregoing it will be seen that we have provided a simple form of flexible needle for an Axminster loom constructed of flat resilient sheet metal dished or curved so as to be concave with respect to an axis extending along the length of the needle. The housing H is constructed with guide walls for the needle which require the latter to bend uniformly along that part thereof in driving relation with respect to the sprocket. These guides prevent buckling of the needle and prevent a greater amount of bending at the slots than between the latter. It will also be seen that we have provided a guide for the upper part of the needle which directs the latter inwardly toward the center of the loom. By this construction we are able to avoid the long needle rails heretofore used in wide Axminster looms. Furthermore, the guide walls 58 and 33 serve to direct the needle eye toward the selvage shuttle. The needle N is flexible longitudinally so that it can bend around the sprocket wheel, and is also flexible transversely so that it can be flattened as it were when passing between the sprocket and guide block. Normally, however, the needle is curved in transverse cross section and tends to lie straight. The operating mechanism for the needle is not claimed herein but is the subject matter of the parent application of which this is a division.

Having thus described our invention, it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and we do not wish to be limited to the details herein disclosed, but what we claim is:

1. In a weft needle to cooperate with a toothed actuator of an Axminster loom, an elongated resilient sheet metal strip having substantially parallel edges and being curved in transverse cross section to be concave upwardly so that when in a horizontal warp shed said edges are at a level above the part of the strip intermediate said edges, said strip having a series of spaced apertures between said edges for cooperation with said toothed actuator, and a weft eye member secured to one end of said strip and having a recess on the under side thereof for a selvage shuttle said edges converging toward each other adjacent to said weft eye member and the strip be-

ing wrapped around the bottom and sides of part of said eye member.

2. In a weft needle to cooperate with a rotary toothed actuator of an Axminster loom, an elongated member made of resilient thin sheet material flexible when bent both longitudinally and transversely thereof and when in a horizontal warp shed having the upper surface thereof concave longitudinally of the needle and having the bottom surface thereof convex longitudinally of the needle, the member having longitudinally arranged apertures extending therethrough to cooperate with the toothed actuator, and a weft eye on one end of the needle around part of the bottom and sides of which said sheet material is curved, said needle due to flexibility thereof when bent longitudinally being capable of wrapping around said toothed actuator, and simultaneously assuming a straight form transversely thereof due

to the transverse flexibility thereof to lie against the periphery of said toothed actuator.

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