No. 886,126. PATENTED APR. 28, 1908.

A. C. HOUGH.

MECHANISM FOR REPLACING WEFT UNITS.

APPLICATION FILED DEC. 31, 1906.

4 SHEETS—SHEET 1.

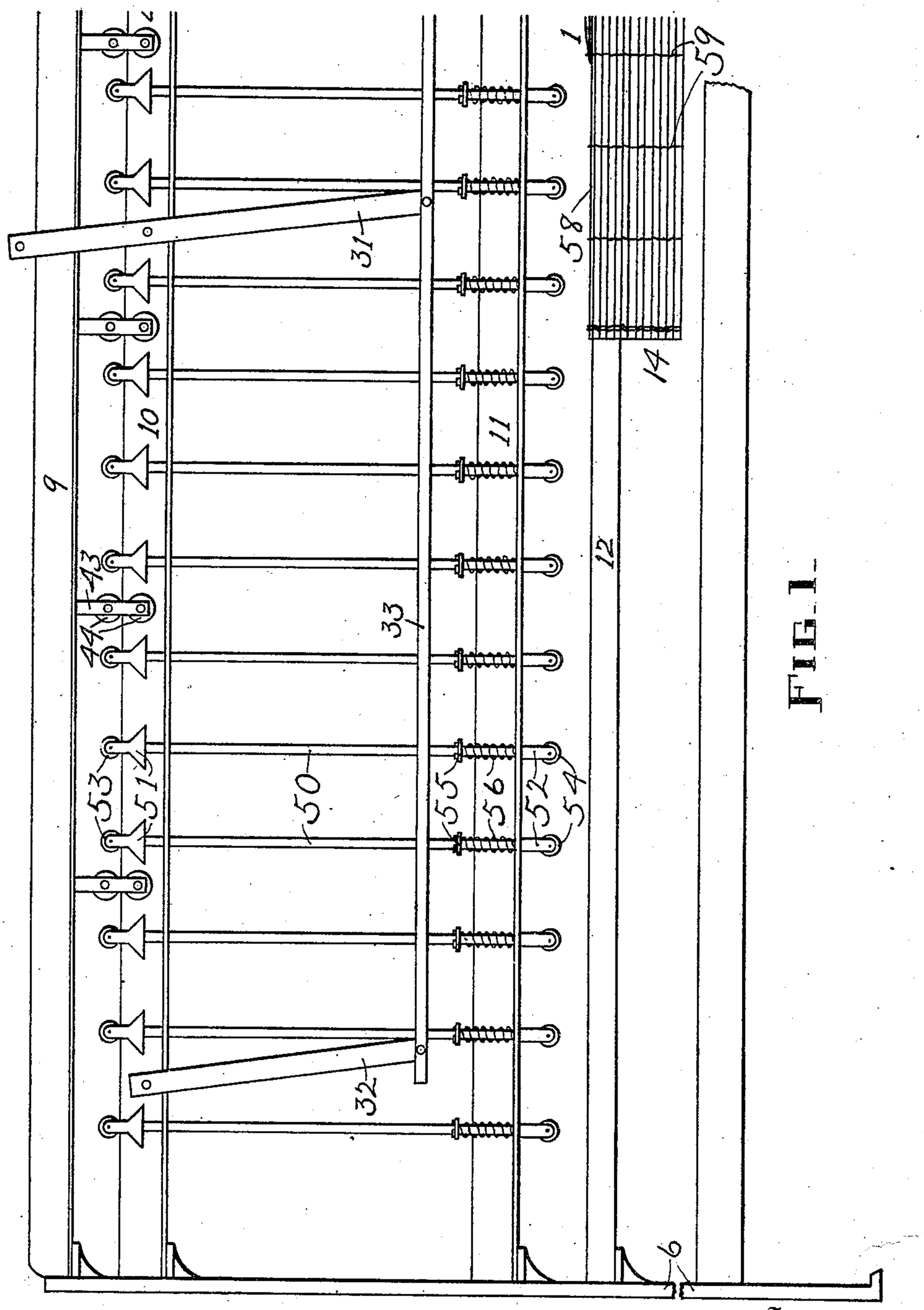

FIG. 1.

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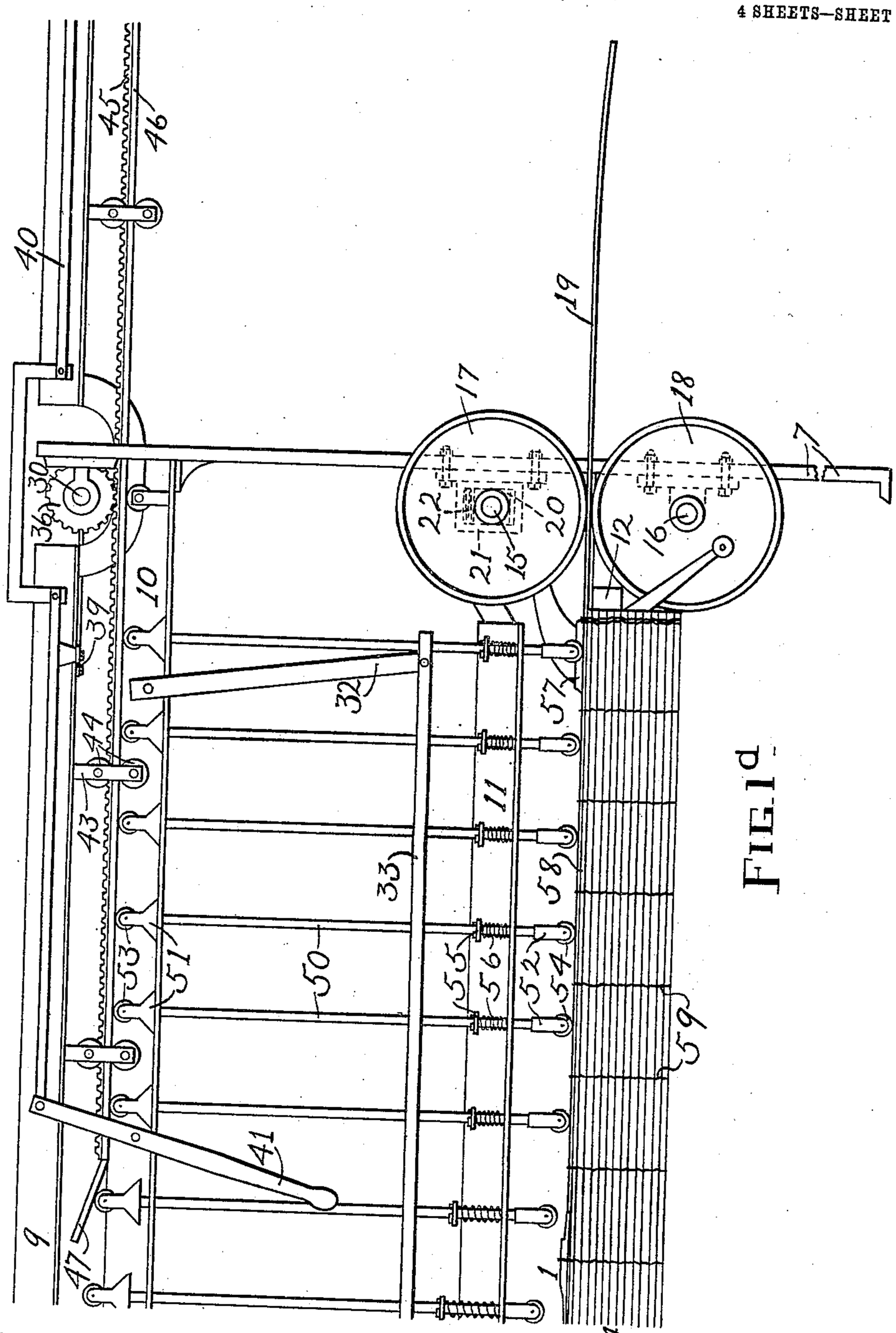

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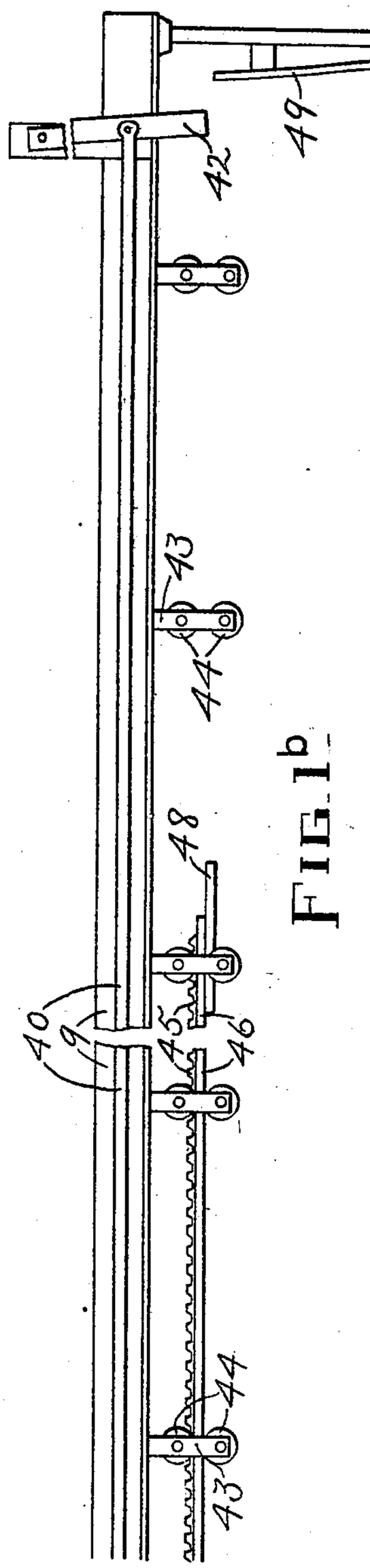

FIG. 1b

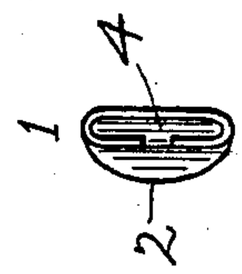

FIG. 3

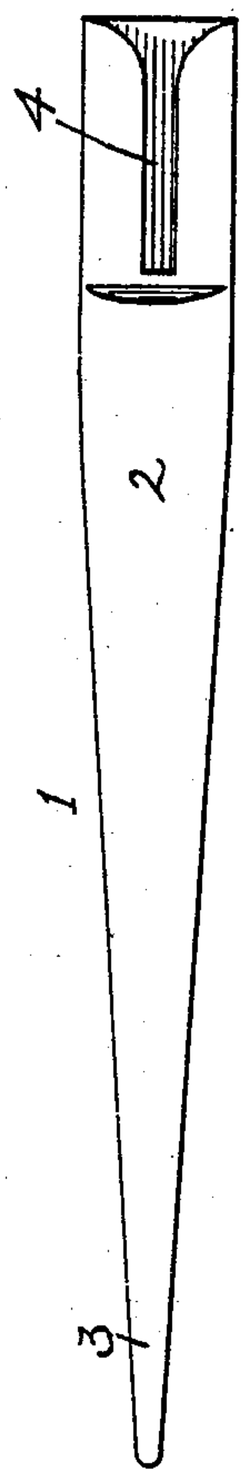

FIG. 2

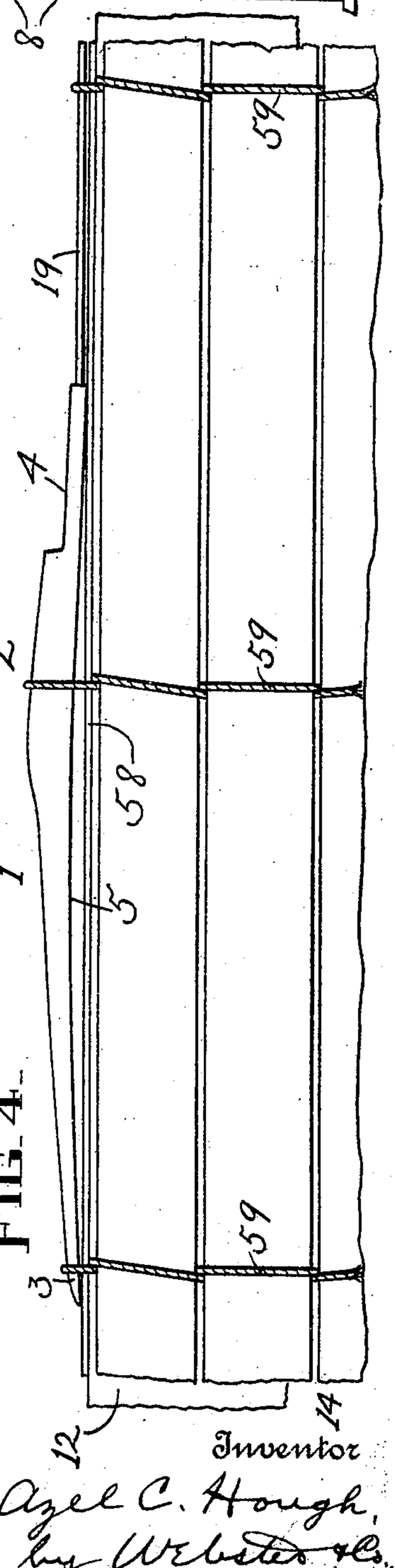

FIG. 4

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4 SHEETS—SHEET 4.

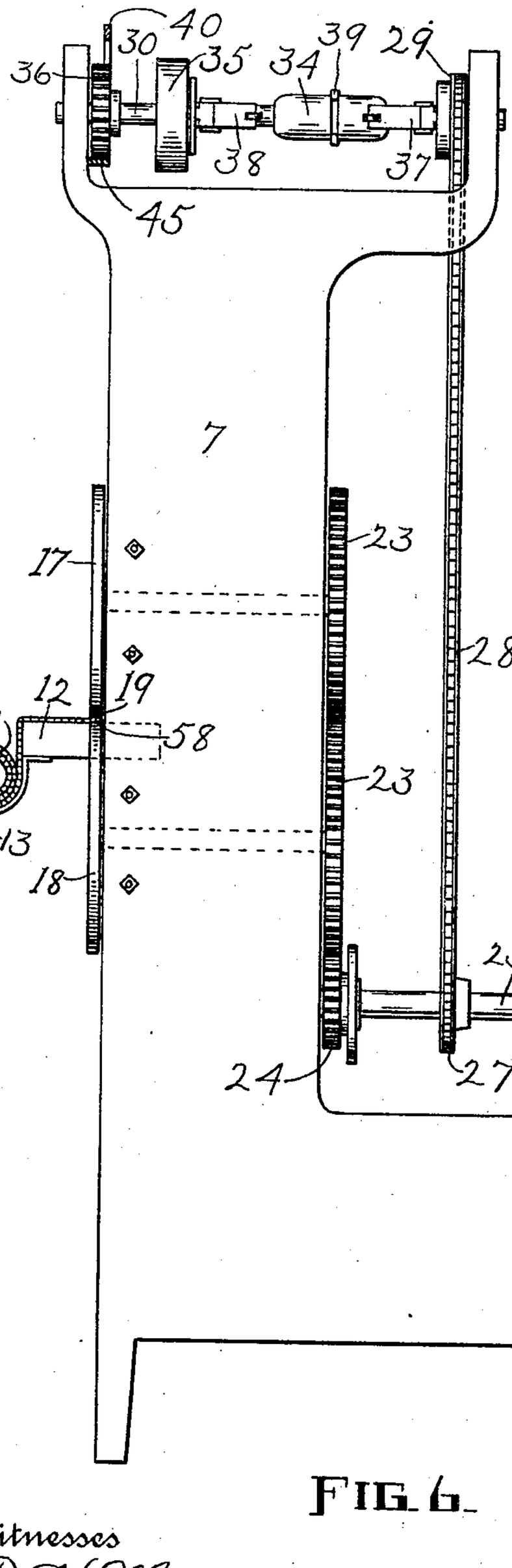

FIG. 6.

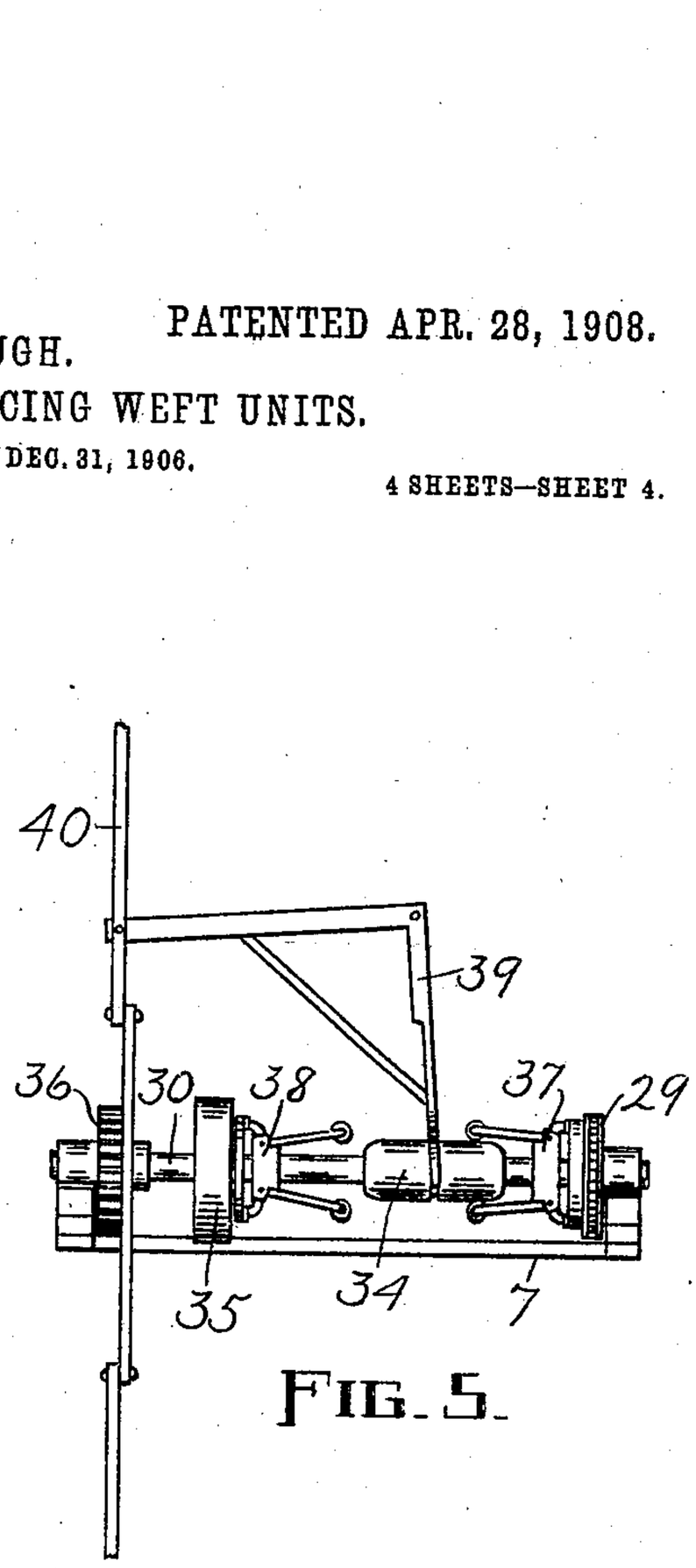

FIG. 5.

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR REPLACING WEFT UNITS.

No. 886,126. Specification of Letters Patent. Patented April 28, 1908.

Application filed December 31, 1906. Serial No. 350,115.

To all whom it may concern:

Be it known that I, AZEL C. HOUGH, a citizen of the United States of America, residing at Janesville, in the county of Rock and State of Wisconsin, have invented new and useful Mechanism for Replacing Weft Units, of which the following is a specification.

My invention relates to improvements in mechanism employed in the manufacture of woven shades and the like having a weft of more or less substantial material as wood, and the essential features of such mechanism are the means employed for opening the warp, the means employed for feeding the new weft unit, and the means employed for preventing buckling on the part of such unit. These and other features of minor importance will be understood from the description hereinafter given in detail.

The objects of my invention are, first, to provide means for replacing broken, imperfect or defective slats already woven in slat shades with perfect ones, (such slats whether perfect or imperfect being herein termed weft units or simply units,) work which has heretofore been done by hand, or for other similar purposes, whereby a large saving in time, labor, material and expense is effected; second, to produce a warp-opening needle capable of preceding the replacing unit to make a passage therefor through the warp; third, to furnish suitable feed-mechanism for the unit behind the needle; fourth, to furnish simple but effective mechanism to prevent the unit from buckling between the lines of warp, and fifth, to provide a machine which is a practicable and efficient embodiment of my invention. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figures 1, 1^a and 1^b together show a front elevation of a machine embodying one form of my invention, portions of the same being broken out; Fig. 2 is an enlarged plan view of the needle used in such machine; Fig. 3, a rear end elevation of said needle; Fig. 4, a side elevation of said needle showing its application to a section of a shade; Fig. 5, a plan view of the clutch mechanism which controls the abutment rolls, and, Fig. 6, an end elevation of the main part of the machine.

Similar figures refer to similar parts throughout the several views.

It is to be understood that, with the exception of the needle, feed device and abutment mechanism, the operating and other coacting mechanisms shown and described are unimportant since numerous substitutes for them may be found.

For the purpose of mechanically and expeditiously opening the warp for the passage of the perfect weft unit, I provide a peculiarly constructed needle 1 which consists of a transversely rounded part or body 2 extending forwardly in the form of a curved, tapering, more or less pointed and sharpened beak or bill 3 and having at the back end some means of connection with or attachment for the aforesaid unit, as a socket 4. The bottom surface 5 of the needle 1 longitudinally is concave. This curvature of the underside of the needle and that of the upper portion thereof are very essential to the proper operation of the device. The needle is so constructed and proportioned that before passing from beneath one warp loop said needle inserts its bill beneath the warp loop ahead, the pressure of the loop on the body 2 holding the sharper end or point of the needle so tightly to the top of the slat along which it is traveling that such point cannot normally fail to pass under the next loop which it approaches. The result thus attained is due in no small measure to the concavity of the needle, for without such concavity the point of the needle would as often perhaps pass over the loop which it approached as under it. The socket 4 is designed to receive the front end of the new weft unit which pushes the needle ahead of it to open a passage in the warp for the same.

I will now describe the mechanism with which the needle 1 is associated and explain in what manner said needle is used in connection therewith.

The supporting frame for the mechanism comprises three uprights or standards 6, 7 and 8, a bracket 9 extending the entire length of the frame at the top, upper and lower guides 10 and 11 between the standards 6 and 7, and a table 12 below said guide 11. The table 12 may be provided at the front with a holder 13, as shown in Fig. 6, for a shade, as 14, while being operated on, and a holder or other suitable receptacle can be furnished behind the table to receive the shade when pushed back after being repaired. Mounted on the front ends of two arbors 15 and 16 are two feed rolls or friction wheels 17 and 18 for feeding a perfect slat, as 19,

into said shade 14. The bite of the wheels 17 and 18 is in line approximately with the top of the table 12. The arbors 15 and 16 are suitably journaled in bearings attached to the standard 7, and one of said arbors at least should be so journaled as to permit the friction wheel mounted thereon to be forced away from the other friction wheel by the slat 19, whatever the thickness of such slat may be; in other words, the friction wheels should be separable, although only one need be vertically movable, to accommodate slats of different thicknesses and yet be under sufficient tension to insure the necessary grip on the slats, and to this end the front terminal of the arbor 15 is journaled in a bearing-block 20 slidingly mounted in a bearing box 21 with a spring 22 interposed between the top of such block and the adjacent part of such box, all in the usual and well-known manner and as shown in dotted lines in Fig. 1ª. The required vertical movement of the arbor 15 is slight, hence no special journal need be provided for the rear end of the same other than to make a loose fit at that point. On the rear ends of the arbors are intermeshing gears 23—23 which are driven by a gear 24 meshing with the lower gear 23. A shaft 25, Fig. 6, suitably journaled in the standard 7, has a driving pulley 26, a sprocket-wheel 27 and the gear 24 mounted thereon. The sprocket-wheel 27 is connected by a sprocket-chain 28 with a sprocket-wheel 29 mounted on a shaft 30 suitably journaled in the standard 7 at the top. The driving pulley 26 may be belted to a counter-shaft driven from the main shaft and controlled by a clutch operated by a shift-bar 31, such driving and controlling means not being illustrated since they are old and well-known and form no part of the present invention and because other means for driving the pulley can be employed. The shift-bar 31 and two supporting arms 32 are pivoted at their upper ends to the guide 10 and are connected at their lower ends by a shift-rail 33 within convenient reach of the operator at the table 12, who is thus able to easily and quickly start and stop the machine by moving said shift-rail in opposite directions.

On the shaft 30, with the sprocket-wheel 29 which is at the rear end, are a sliding clutch collar 34, a pulley 35, and a gear 36 in the order named from back to front, said gear being on the front end of the shaft. The sprocket-wheel 29 and the pulley 35 are loose on the shaft 30, the collar 34 is revolubly connected therewith, and the gear 36 is tight thereon. The pulley 35 is so connected by a belt (not shown) with the main shaft as to revolve in an opposite direction to that of the sprocket-wheel 29 when driven from the shaft 25 by the sprocket-wheel 27 and sprocket-chain 28. The sprocket-wheel 29 is provided with a clutch 37 and the pulley 35 with a clutch 38, such clutches being thrown in and out by the collar 34 when actuated longitudinally on the shaft 30 through the medium of a bell-crank lever 39, a horizontal shift-rod 40, a shift-bar 41 and a shift-dog 42. The bell-crank lever 39 has its elbow pivotally connected to the frame and its front end pivotally connected to the shift-rod 40. The end of the lever 39 opposite that which is pivoted to the shift-rod is forked to engage a grooved part of the collar 34. The shift-bar 41 and the shift-dog 42 are both pivoted on the frame and pivotally engage opposite ends of the shift-rod. The shift-rod 40 is made in two pieces connected by an angle-iron which extends over the top of the standard 7 and the mechanism carried by the upper part of said standard, as clearly appears in Figs. 1ª and 5. The operating and clutch mechanism above described for the gear 36 is only one of many common forms of driving and reversing mechanisms which are applicable to a machine of this kind and I do not desire or intend to be restricted in this particular.

Hangers 43 suspended from the bracket 9 have guide rolls 44 for a horizontal rack 45, such rolls being arranged in pairs one above the other to receive a flange 46, which is merely a forward extension of the base of said rack, between the two rolls in each pair. At the left-hand or forward end of the rack 45 is an upwardly and forwardly inclined projection or depressor 47, and at the right-hand or rear end of said rack is a buffer block 48. A spring buffer 49 is attached to the standard 8 with its upper terminal in the path of travel of the block 48. The free end or base of the oscillating dog 42 lies in the path of the rear end of the rack. Said rack is in mesh with the gear 36.

Mounted for a limited amount of reciprocation in the guides 10 and 11 is a series of vertical rods 50, each rod having a head 51 above the horizontal part of the guide 10 and a foot 52 below the corresponding part of the guide 11. Mounted in each head 51 is a depressor roll 53 and in each foot 52 an abutment roll 54. Encircling each rod 50 between the top of the horizontal part of the guide 11 and a flange or collar 55 fast on said rod is a spiral spring 56 which elevates the rod, after being depressed, with the top of its foot 52 against the underside of the aforesaid part of said guide and normally retains the rod in such position. The upward movement of each rod is thus limited by its foot. When in its raised position each rod supports its roll 53 in the path of travel of the depressor 47. The manner in which the rods 50 are operated by the rack 45 will hereinafter be made clear, it should be observed at this time, however, that the abutment rolls are in line with the friction wheel 17 and positioned directly above the unit weft being

fed by the wheels 17 and 18. The rods 50 are so spaced apart as to bring the rolls 54 between the lines of warp of a shade. The minimum amount of space between the top of the table 12 and the bottom of any roll 34 should be a little greater than the combined thickness of two of the thickest weft units employed in the manufacture of shades.

A suitable clamp 57 is provided to securely fasten a shade, at a point near the place where the new weft unit is to be first introduced, to the table 12.

In practice, after the shade 14 has been clamped in place on the table 12 with an imperfect slat 58 which it is designed to replace under the rolls 54 and in front of the bite of the wheels 17 and 18, the operator first inserts the point or bill 3 of the needle 1 by hand beneath the loop, in the first line of warp 59, which is above said imperfect slat, next a perfect slat 19 is fed by hand between said wheels until the forward terminal of such slat enters the needle socket 4, and then the machine is started. The friction wheels are now revolved in the proper directions to force the slat 19 through the lines of warp 59 with the needle ahead of it to open the way. As the needle is thus driven forward on the slat 58 its point enters beneath the second warp loop before the body 2 passes from beneath the first loop and while such body is subjected to the tension of said first loop which is under considerable strain owing to the size of said body, and in this manner is the needle forced through loop after loop and the slat 19 superimposed on the slat 58 and within the warp. Unless the needle were so constructed that the pressure of a warp loop on the body 2 must normally force the bill 3 beneath the warp loop next in order, said bill would be as liable to pass over as under the warp, as hereinbefore noted, thus rendering the needle practically useless. After introducing as many new slats as are required, in the manner herein set forth, the shade is taken from the machine and the broken or otherwise imperfect slats are removed therefrom, the new slats being left in their places to perfect the shade. The new slats project beyond both edges of the shade, one end of each new slat having been in the needle socket 4 and extended beyond the shade to drive the needle out of the last warp loop, and the other end of such slat having extended between the frictional wheels or feed rolls and the adjacent edge of the shade, and these projecting ends are cut off after removing the imperfect slats.

Owing to the great amount of friction developed after the new weft unit has been advanced through several lines of warp, said unit would be very liable to break at some point between the feed rolls 17 and 18 and the needle 1 in the absence of some means to prevent buckling. To overcome this difficulty an abutment for the weft unit should be provided above to coact with the table 2 below in keeping the unit from bending, and since the latter has motion imparted to it it is better that such abutment be in the form of an anti-friction device such as the rolls 54 constitute. These rolls are situated over the spaces between the lines of warp 59 and do not act until the needle passes, but are brought down one by one immediately behind said needle to a position almost touching the slat 19 when lying flat on the slat 58. The rack 45, which is caused to move to the left or to advance at this time, that is, at the time the slat 19 is being inserted in the shade 14, through the medium of the gear 36, shafts 30 and 25 and sprocket connections, and the clutch 37 which the collar 34 now engages, rides down with the depressor 47 one roll 53 after another and so thrusts down the rods 50 in succession against the resiliency of their springs 56 and holds them down with the rolls 54 in the position just described. All possibility of buckling on the part of the slat 19 is prevented therefore by the abutment rolls and the warp. Said slat is thus permitted to advance and does advance steadily and rapidly in a straight line beneath the warp until forced completely into position above the imperfect or damaged slat.

When the slat 19 has been forced completely across the shade 14 the machine is stopped, then the operator swings the shift-bar 41 to the right to bring about the release of the sprocket-wheel 29 from the shaft 30 and to engage the pulley 35 with said shaft, through the medium of the shift-rod 40, bell-crank lever 39, collar 34 and clutch 38, such collar being actuated by said lever out of engagement with the clutch 37 and into engagement with the clutch 38. The pulley 35 now revolves the shaft 30 in the opposite direction to that given it by the sprocket-wheel 29 when in motion, the gear 36 is reversed, and the rack 45 is driven to the right with some rapidity by said gear. The right-hand end of the rack 45 quickly encounters the shift-dog 42 and thereby throws out the actuating mechanism which retracts said rack, through the medium of the shift-rod and bell-crank lever which latter actuates the clutch collar away from the cluch 38 into operative relation with the clutch 37, with the result that the pulley 35 is left free to revolve without the shaft 30 and the sprocket-wheel 29 is locked to said shaft in readiness to cause it to rotate when next the machine is started. The shock which might otherwise be occasioned without the buffer 49 is prevented thereby since the block 48 strikes against said buffer at the time the rack swings the shift-dog, and the momentum acquired by the rack while being returned to its initial position is absorbed by the buffer. As the rack slides to the right it releases one rod 50