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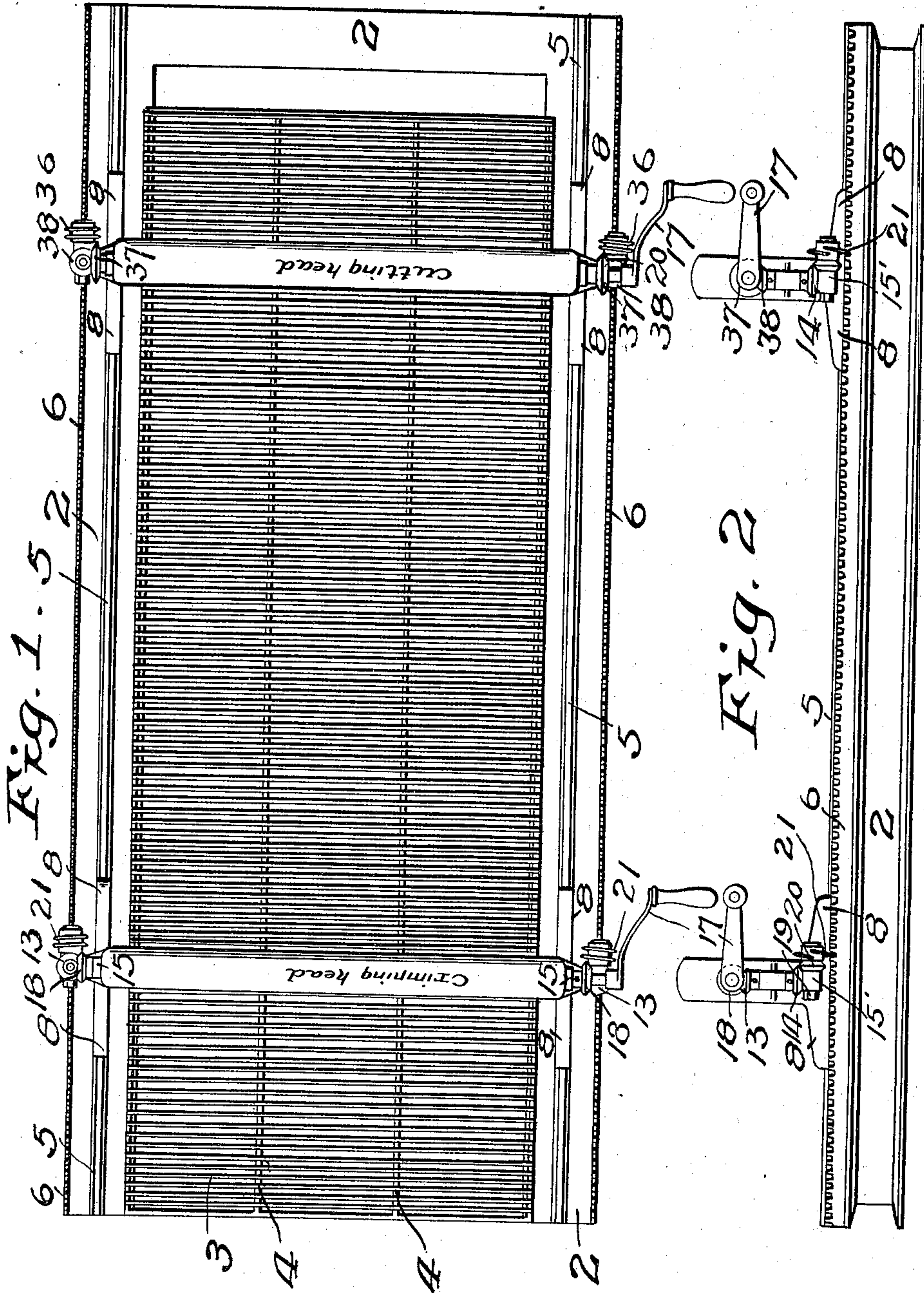
Patented May 30, 1899.

J. D. HATCHER.
PLAITING MACHINE.

(Application filed Apr. 13, 1898.)

(No Model.)

4 Sheets—Sheet 1.



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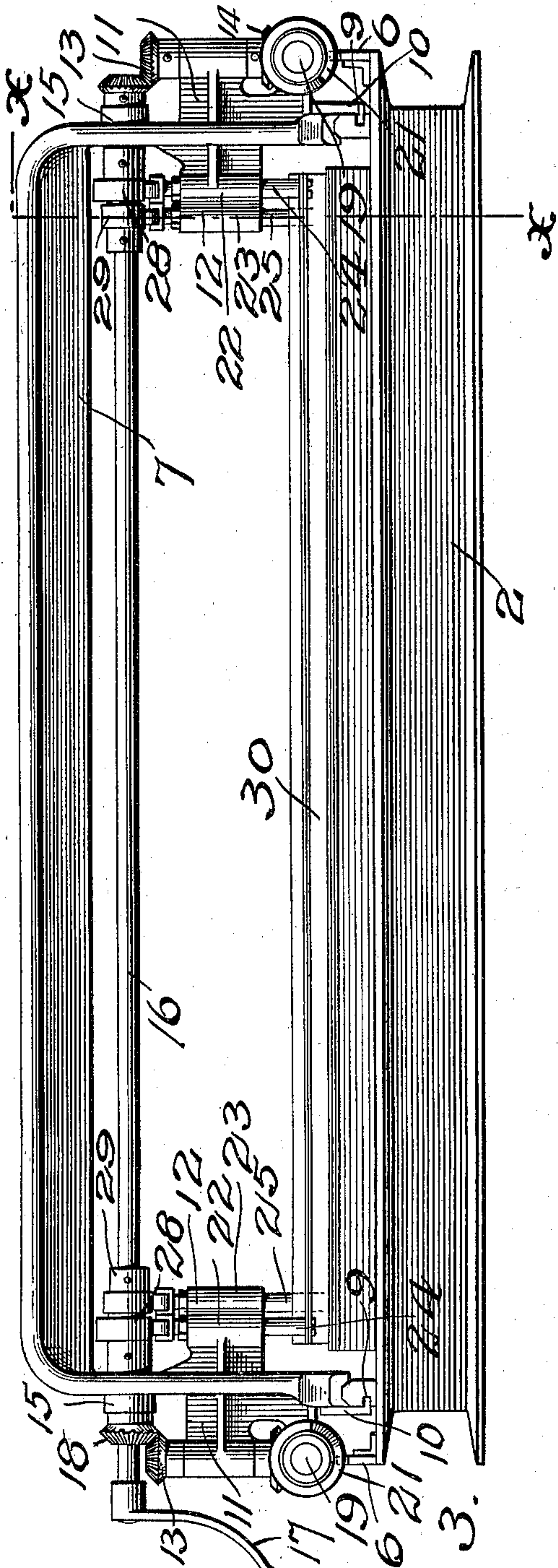
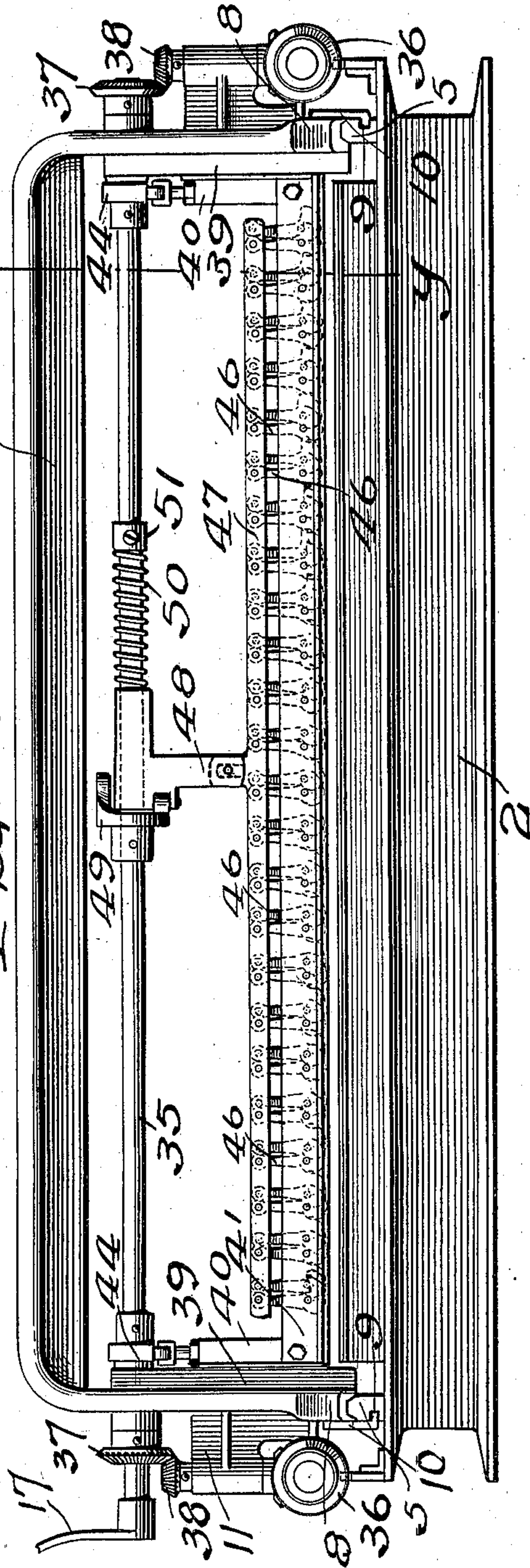


Fig. 3.

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Fig. 4.



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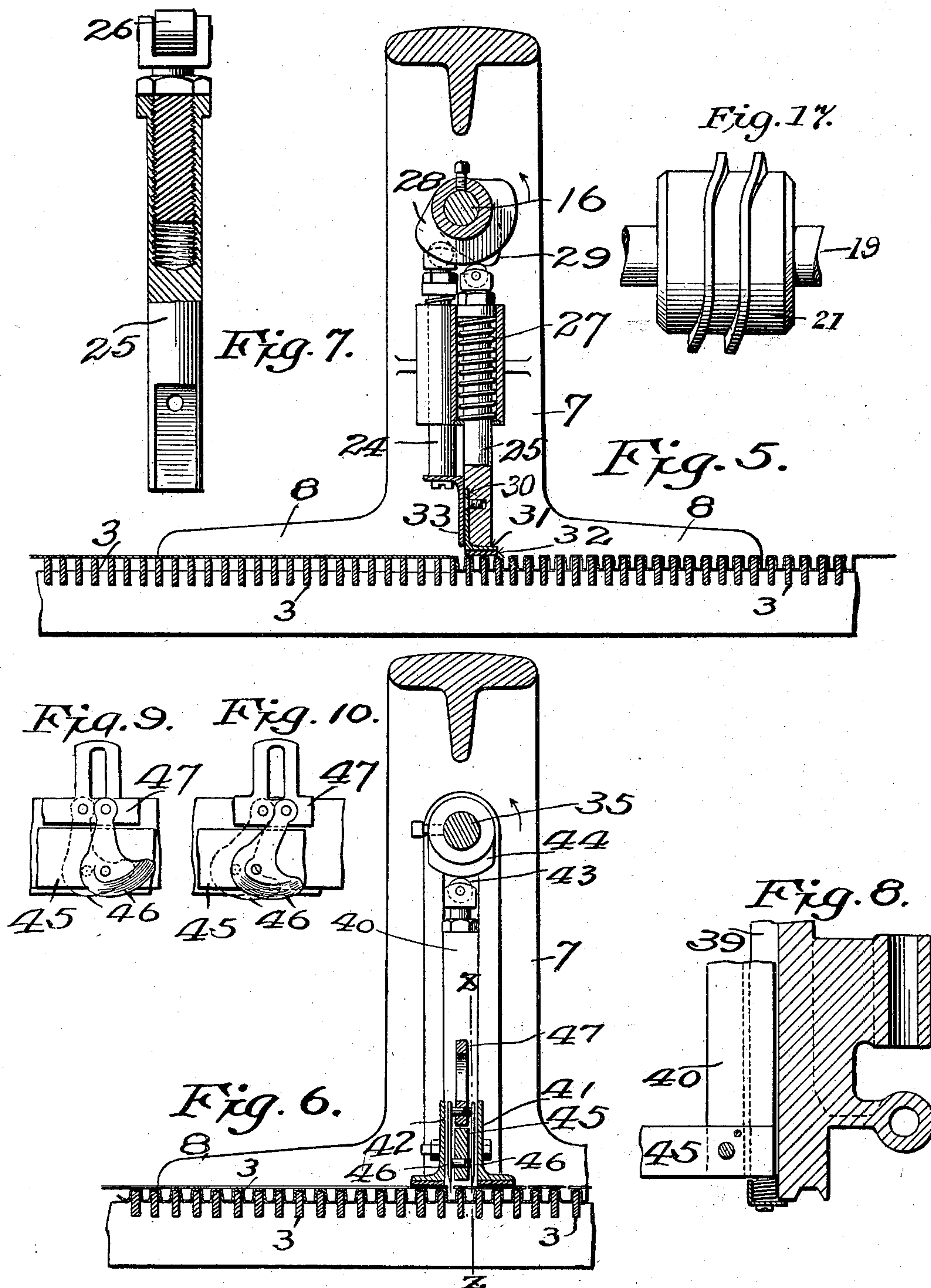
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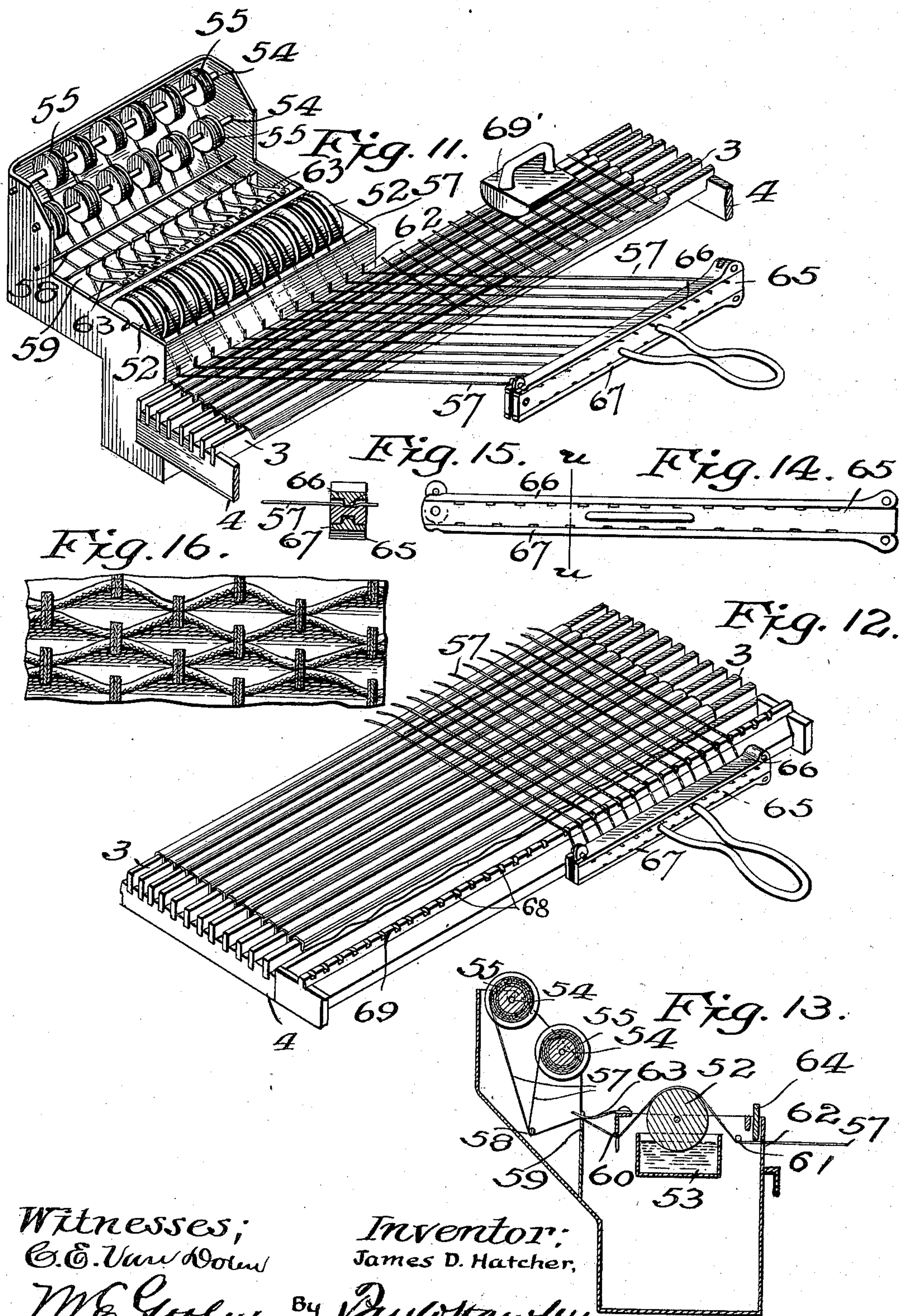
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

JAMES D. HATCHER, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO HATCHER
NOVELTY CO., OF SAME PLACE.

PLAITING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,761, dated May 30, 1899.

Application filed April 13, 1898. Serial No. 677,450. (No model.)

To all whom it may concern:

Be it known that I, JAMES D. HATCHER, of the city of Minneapolis, county of Hennepin, State of Minnesota, have invented certain
5 new and useful Improvements in Plaiting-Machines, of which the following is a specification.

My invention relates to means for manufacturing plaited fabrics; and the object of
10 the invention is to provide means whereby cloth may be plaited and the plaits secured neatly and cheaply.

The particular object of the invention is to provide a neat, cheap, and compact machine
15 for plaiting the cloth, applying the plait-fastenings, and for cutting said fastenings at alternate points.

The invention consists generally in a plaiting-machine of the construction and combination of parts all as hereinafter described,
20 and particularly pointed out in the claims.

The invention will be more readily understood by reference to the accompanying drawings, forming part of this specification, and
25 in which—

Figure 1 is a plan view of a plaiting-machine embodying my invention. Fig. 2 is a side view thereof. Fig. 3 is an enlarged end view of the machine with the plaiting-head
30 thereon. Fig. 4 is a similar view showing the cutter-head or frame. Fig. 5 is an enlarged vertical section on the line *xx* of Fig. 3. Fig. 6 is a similar section on the line *yy* of Fig. 4. Fig. 7 is an enlarged sectional detail of one of plungers or arms shown in Fig. 5. Fig. 8 is a detail section of a portion of the end of the frame or head substantially on the line *zz* of Fig. 6. Figs. 9
35 and 10 are detail views showing the cutting blades or knives. Fig. 11 is a perspective view illustrating the means for applying the tapes. Fig. 12 is a similar view showing the guide upon the end of the bed. Fig. 13 is a vertical section of the glue-applying device.
40 Fig. 14 is an enlarged side view of the tape-holder. Fig. 15 is a sectional view thereof on the line *uu* of Fig. 14. Fig. 16 illustrates a small section of the plaited fabric as it appears when it is drawn or stretched. Fig.
45 17 is an enlarged detail of the worm-wheel,

showing the straight portion of the thread thereon.

The machine comprises the heavy metal frame or bed 2, in or upon the top of which are the parallel bars 3, having parallel slots
55 between them. The upper edges of the bars are preferably flat, with the corners slightly rounded. The bars 3 may be stayed and fastened at the middle by one or more longitudinally-extending bars 4. On each side of
60 the transversely-slotted bed are the ribs 5, whereon the operating heads or frames are adapted to slide. Outside of the tracks are the gear-racks 6. Ordinarily only one head or frame is used on the bed at a time, one being adapted to crimp or plait the fabric and
65 the other to cut the tapes, which are glued upon the folds or crimp of the fabric. The crimping head or frame is best shown in Figs. 3, 5, and 7. The frame proper, 7, is provided
70 with the broad feet 8, having grooves fitting the rails or guides 5. In the sides of the rails 5 I provide the grooves 9 to receive the ribs or fingers 10, that extend downwardly from the feet 8, whereby the raising of the frame
75 is prevented when the pressure foot or bar is operated. On each end of the frame or head 7 is a bracket 11, and upon each inner side is a bracket 12. In each bracket 11 is a short shaft, having on its upper end a beveled gear
80 13 and on its lower end a beveled gear 14. In the upper part of the frame are bearings 15 for the cross-shaft 16, on one end of which is the crank 17. The shaft 16 is connected with the vertical shafts by beveled gears 18,
85 that mesh with the gears 13. The brackets 11 also have the horizontal bearings 15' for the short shafts 19, Fig. 2, which are driven by beveled gears 20 and meshing with 14, and the worm-screws 21 are provided thereon.
90 These worms engage the racks 6 upon the bed and operate to move the frame or head forward as the crank 17 is turned. A portion of the threads upon each worm is straight (see Fig. 17) to permit the head to pause an instant
95 in traveling over the slotted bed while the pressure and crimping bars are in engagement with said bed. Each inside bracket 12 has two vertical bearings 22 and 23 for the plungers 24 and 25. These plungers are each
100

of the construction shown in Fig. 7, preferably comprising two parts connected by a thread and the upper part having an anti-friction-roller 26. The plungers are forced upwardly by springs 27 within the bearings 22 and 23, and they engage the cams 28 and 29, respectively. The opposite plungers 25 carry the pressure bar or foot 30, that is attached to the lower ends of said plungers.

The lower flange 31 of the pressure-bar 30 is preferably provided with a rubber pad or other yielding surface 32, and the pressure-bar is adapted to be forced down strongly upon the tops of the cross-bars 3 of the machine-bed to hold the fabric while a fold is drawn. The crimping-bar 33, which works close to the vertical flange of the pressure-bar, is carried by the two plungers 24 in opposite ends of the frame or head. The cam 29 is set about midway of the cam 28, so that the pressure-foot is first forced down, after which the blade or bar 33 is quickly depressed to enter between the bars 3 of the bed and make a fold or crimp in the fabric thereon.

When the crimping-bar 33 is released from its cams, it is raised by the plunger-springs, and then the pressure-foot is released. As the pressure foot or bar rises the screw-thread of the worms 21 engages the next teeth of the racks 6 to move the head forward. In this manner a full length of fabric that is laid upon the bed is crimped or folded, after which crimping or plaiting the head is preferably removed from the bed. The fastenings or tapes are then secured to the fabric, after which the cutting-head is placed on the bed and is passed across the same to cut the tapes.

The cutting-head is similar to the crimping or plaiting head, the frames thereof being identical with the exception of the inside brackets 12. The shaft 35 of the cutting-head is connected with the worms 36 by two to one gears 37 38, so that at each revolution of the shaft 35 the frame will be moved forward the distance of two bars in the bed. In other respects the connection of the shaft 35 to the rack 6 is the same as upon the crimping frame or head.

39 39 represent vertical guides for plunger-bars 40, to the lower ends of which the oppositely-extending pressure-bars 41 42 are attached. The bars 40 are provided with the adjustable anti-friction-rolls 43 to engage the cams 44 upon the shaft 35. Between the vertical flanges of the two pressure-bars 41 42 is the bar 45, on which the cutting-knives 46 are pivoted. These knives are preferably made in the bell-crank form, and they are separated by a distance equal to the distance between the centers of the bars 3 of the bed. The upper arms of the bell-crank knives are attached to the horizontally-reciprocating rod 47, that is supported thereon. This bar is operated to turn the knives and cause the same to make a downward and drawing cut upon the tapes that lie across the bars 3. For operating the bar 47 I provide the slid-

ing head 48 on the shaft 35 and connected with the bar 47. On the shaft 35 is a side cam 49, and the head 48 is constantly pressed against this cam by a coil-spring 50, arranged about the shaft 35. The pressure of the spring is adjusted by means of the collar 51. As the shaft 35 is turned, the head 48 is thrust away from the cam to throw the bar 47 and depress the knives or cutters 46. Upon the passage of the high part of the cam 49 the head and the bar 47 are forced back by the spring 50. This operation takes place only after the pressure-bars 41 have been forced down upon opposite sides of the knives to hold the tapes for the cutting operation. The knives 46 are staggered or alternated upon opposite sides of the bar 45 to cut the alternate tapes between the creases of the fabric.

The tape-gluing machine is shown in Figs. 11 and 13. The same comprises the gang of glue-rolls 52, which dip into the glue-trough 53. 54 54 are arbors for the spools 55, upon which the tape 57 is wound. From the spools 55 the tape is carried beneath the cross-rod 58, thence over the bar or partition 59, and thence beneath the cross-bar 60 and upward over the tops of the rolls 52, from which the tape is passed beneath the cross-bar 61 and out through slots 62 in the front of the box or frame whereon the several parts are arranged. The necessary tension upon the tape is secured by light springs 63, fastened on the bars 60 and pressing upon the tapes in the slots or notches of the bar or partition 59. 64 is a bar which rests upon the tapes to be pushed down to force the tapes upon the fabric after the tapes are drawn. The gluing device is preferably detachable from the bed, being placed thereon only after the material has been crimped and the head removed. 65 represents the drawing-out bar or tape-clamp. A single bar is provided with two clamps 66 and 67, and notches in the upper and lower edges of the bar 65 are spaced differently. The bar 65 is provided with longitudinal grooves, and the clamping-bars 66 and 67 are provided with ribs to enter the same and firmly clamp upon the ends of the tapes. The ends of the tapes are drawn from the glue device and are secured in the clamp. The clamp is then lifted and drawn out over the plaited fabric upon the bed and the outer ends of the tapes are dropped into the notches 68 in the guide-bar 69, that is on or adapted to be placed on the end of the bed. The bar 64 is then pressed down to force the tapes upon the fabric at the opposite end of the bed, after which the tapes are, by means of the pad or stamp 69', pressed firmly upon the parts of the fabric that lie over the flat top of the bars 3, as shown in Fig. 11. The clamp is then removed and replaced upon the tapes near the gluing device ready for the next operation. The gluing device is preferably made of about half the width of the bed, so that two operations are necessary to apply the tape; but a larger

gang may be employed. Fig. 11 shows a part of the tapes as they appear when being drawn out and a part applied to the fabric, but before they are cut. When the tapes have thus been glued to the fabric, the cutter-head is placed upon the bed and is passed across the same to cut the tapes between the folds or plaits of the fabric, so that when the fabric is drawn out it will have the appearance presented in Fig. 16. The finished side of the fabric is faced down upon the bed, the tapes being applied to the unfinished side thereof. By means of this machine I am able to produce a plaited fabric, the plaits of which are perfectly even and true, and, further, a fabric which is of very low cost as compared with similar fabrics in which the plaits are secured by a thread or by metallic fastenings.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A plaiting-machine, comprising the bed having the parallel equidistant bars, the frames upon said bed, the head movable thereon, the pressure-bar and means actuated by the head-moving mechanism for moving said pressure and crimping bars into engagement with said bed, substantially as described.

2. The combination, in the plaiting-machine, of the bed having the parallel bars 3, the guides 5, and the racks 6, the head slidable upon said ways or guides 5 and provided with worm-wheels engaging said racks, means causing an intermittent movement to said head during the rotation of said worm, said head provided with a shaft wherefrom said worm-wheels are rotated, the pressure-bars actuated from said shaft, and the crimping-bar also actuated from said shaft to crimp the material upon the bed, substantially as described.

3. The combination, with the slotted bed, of the frame or head movable thereon, the operating-shaft 16 wherefrom said frame is moved, the cams upon said shaft, the plungers held in guides in said frame and operated by said cams, the pressure-bar carried by two of said plungers, and the crimping-bar carried by other plungers, said bars being relatively operable, substantially as described.

4. The combination, with the slotted bed, of the frame or head 7 provided with the brackets 11 and 12, the shaft 16 in said frame, the worm-wheels supported by said brackets 11 and driven from said shaft 16, the plungers arranged in said brackets 12, cams upon said shaft to actuate said plungers, and the crimping and pressure bars operated by said plungers, substantially as described.

5. The combination, with the slotted bed, of the frame, with the pressure-bars and the rocker-knives arranged between said pressure-bars, substantially as described.

6. The combination, with the bed, of the frame, means for moving said frame, the pressure-bars in said frame to operate upon said

bed, and knives operating between said pressure-bars, substantially as described.

7. The combination, with the slotted bed, of the frame movable thereon, the shaft 35 for said frame, the side cam upon said shaft, the sliding head also on said shaft, the knife-bar in said frame, the rocker-knives pivoted upon said bar, a common connecting-bar for said knives, and a connection between said bar and said head whereby the rotation of said shaft causes the operation of said knives, substantially as described.

8. The combination, with the frame, of the guides therein, the plungers 40 operating in said guides, the oppositely-extending pressure-bars attached to said plungers, the shaft in said frame, cams thereon to actuate said plungers, and the cutting devices, substantially as described.

9. The combination, with the slotted bed, of the movable frame, the shaft therein, guides in said frame, plungers in said guides, said plungers being adjustable as to length, cams upon said shaft to actuate said plungers, and the pivoted pressure-bar carried by said plungers, substantially as described.

10. The combination, with the crimping-frame, of the gluing-trough, the glue-rolls therein, the spool-rack, the tape tension devices, and the drawing-out clamp adapted to clamp the ends of the tapes and draw the same out over the fabric preparatory to gluing the tapes thereto, substantially as described.

11. The combination, with the slotted plaiting frame or bed, of the gluing device adapted to be attached thereto and provided with a glue-trough and rolls and with a spool-rack and tension devices, and the drawing-out clamp having guide-notches, substantially as described.

12. The combination, with the plaiting-bed and plaiting means, of the gluing attachment, the drawing-out clamp and the notched guide 68, substantially as described.

13. The combination, in a plaiting-machine, of a slotted bed, with a head, means for advancing said head with an intermittent movement over said bed, holding and crimping means carried by said head and means actuated by the head-moving mechanism for moving said holding and crimping means into engagement with said bed, substantially as described.

14. The combination, in a plaiting-machine, of the slotted bed, with the head movable thereon and having tape holding and cutting means, substantially as described.

15. The combination, in a plaiting-machine, of the slotted bed having racks, a head slidable over said bed and provided with worm-wheels engaging said racks, a shaft mounted in said head and wherefrom said worm-wheels are rotated, pressure-bars actuated from said shaft, crimping-bars also actuated from said shaft and said worm-wheels being provided with threads having straight sections where-

by said heads will pause at intervals during the engagement of said pressure and crimping bars with said bed, substantially as described.

5 16. In a plaiting-machine, the combination, with the slotted bed, having parallel guides 5 and racks 6, of a frame movable on said guides 5 over said bed, a shaft mounted in said frame, worm-wheels engaging said racks and actuated from said shaft means causing an intermittent movement of said head during the rotation of said worm, plungers carried by said frame and actuated by said shaft and pressure and crimping bars carried by said 15 plungers and adapted to engage the fabric passing over said slotted bed, substantially as described.

17. The combination, in a plaiting-machine, of a slotted bed, with a head movable thereon, holding and crimping means carried by 20 said head, plungers supporting said holding and crimping means, and a cam mechanism for operating said plungers as said head is moved over said slotted bed, substantially as 25 described.

18. The combination, in a plaiting-machine, of a slotted bed, with a head movable thereon, holding and crimping means carried by said head, an operating-shaft wherefrom said 30 head is moved, plungers movable with said

head, and whereby said holding and crimping means are supported, and means carried by said shaft for engaging and successively operating said plungers, substantially as described.

19. The combination, in a plaiting-machine, of a slotted bed, with a head movable thereon, holding and crimping means carried by said head, means for advancing said head with an intermittent movement over said bed, and means for moving said holding and crimping 40 means down upon said bed during the pauses of said head, substantially as described.

20. The combination, in a plaiting-machine, of a slotted bed, with a head movable thereon, holding and crimping means carried by said head, means for advancing said head with an intermittent movement over said bed, and means carried by said head for successively 50 moving said holding and crimping means down upon said bed during the pauses of said head, substantially as described.

In testimony whereof I have hereunto set my hand, this 6th day of April, at Minneapolis, Minnesota.

JAMES D. HATCHER.

In presence of—

C. G. HAWLEY,

M. E. GOOLEY.