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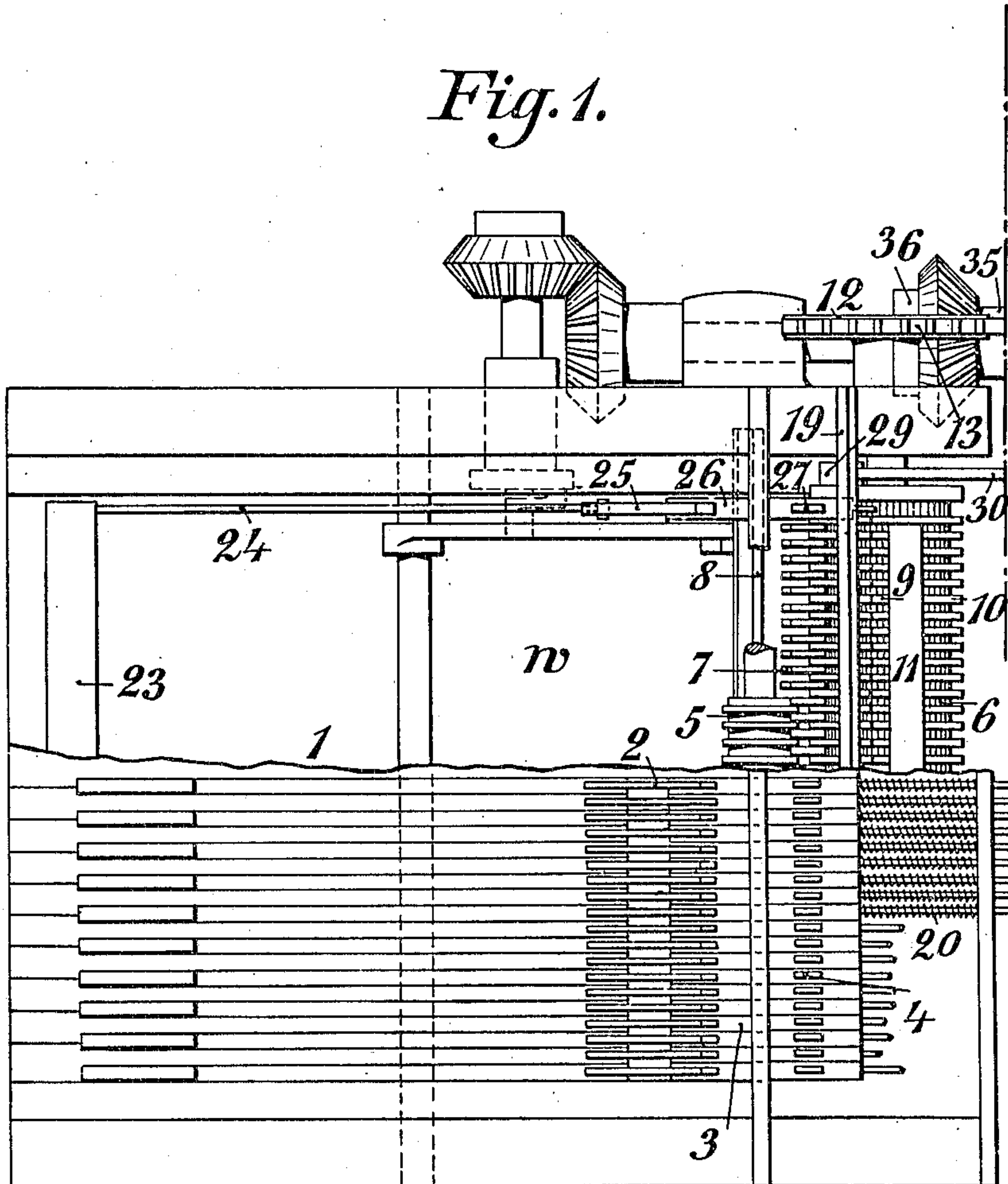
PATENTED FEB. 5, 1907.

E. PARUSZEWSKI.
LOOM FOR WEAVING TUFTED FABRICS.

APPLICATION FILED APR. 1, 1905.

6 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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6 SHEETS—SHEET 2.

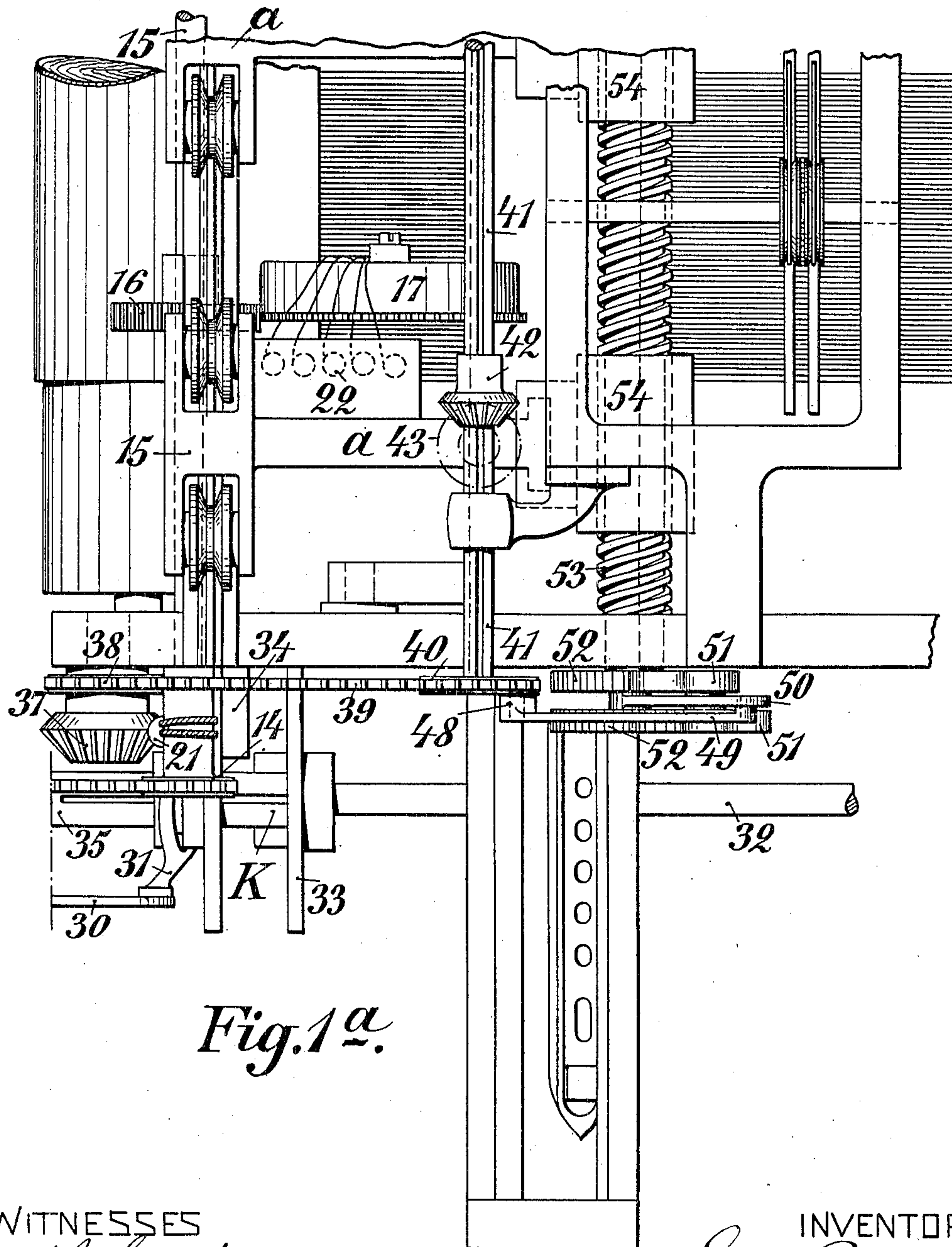


Fig. 1a.

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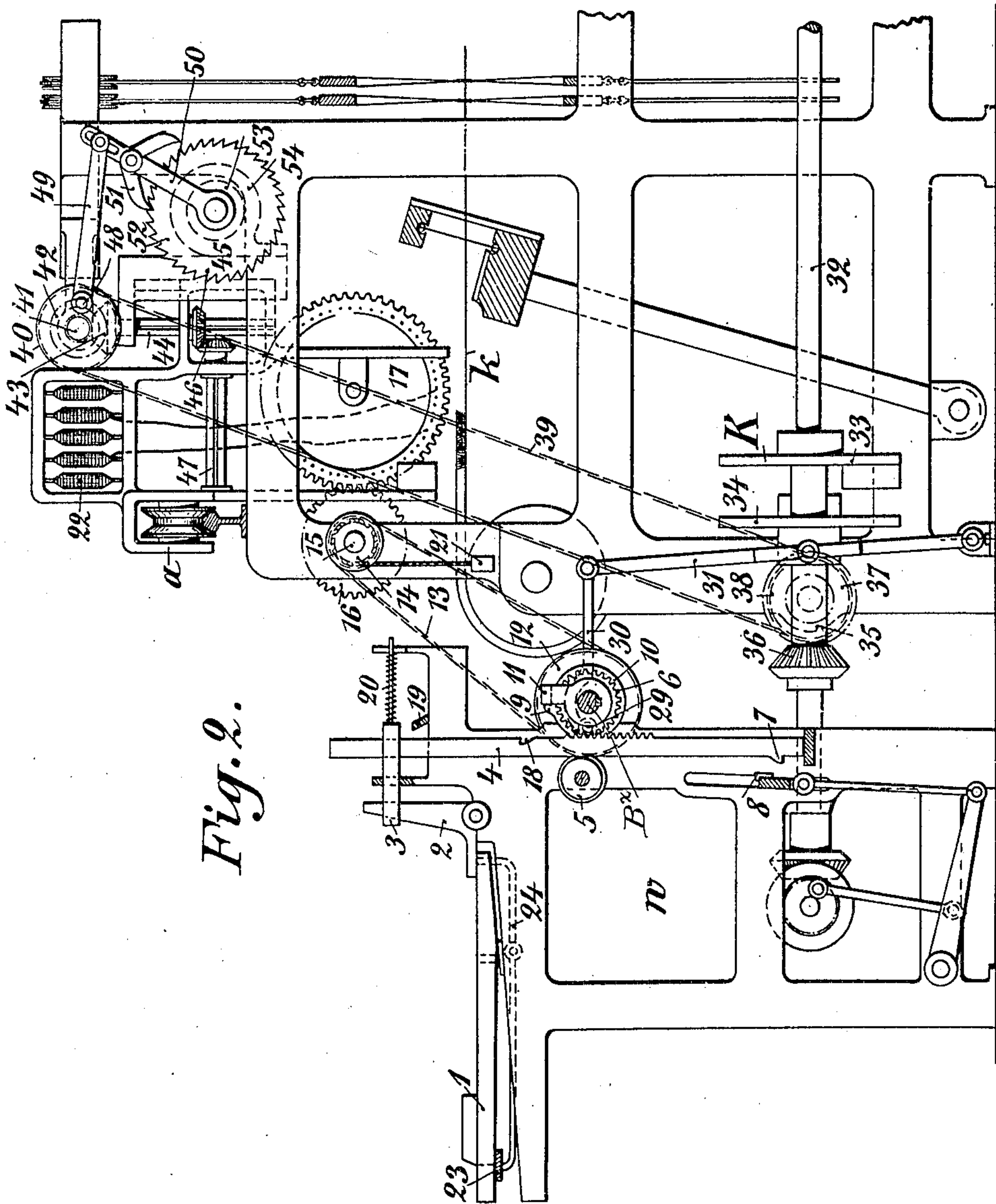


Fig. 2.

WITNESSES

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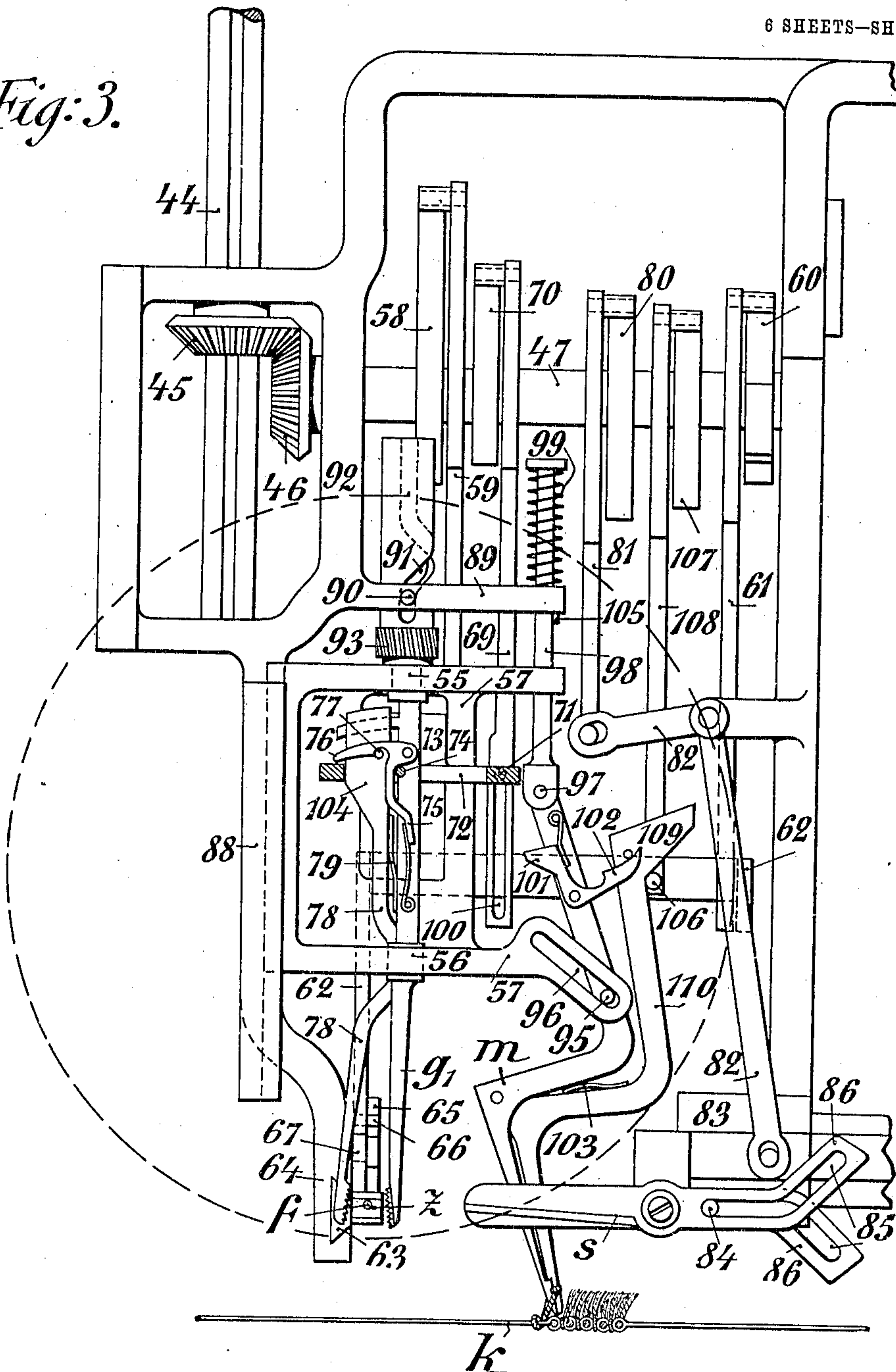
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6 SHEETS—SHEET 4.

Fig. 3.



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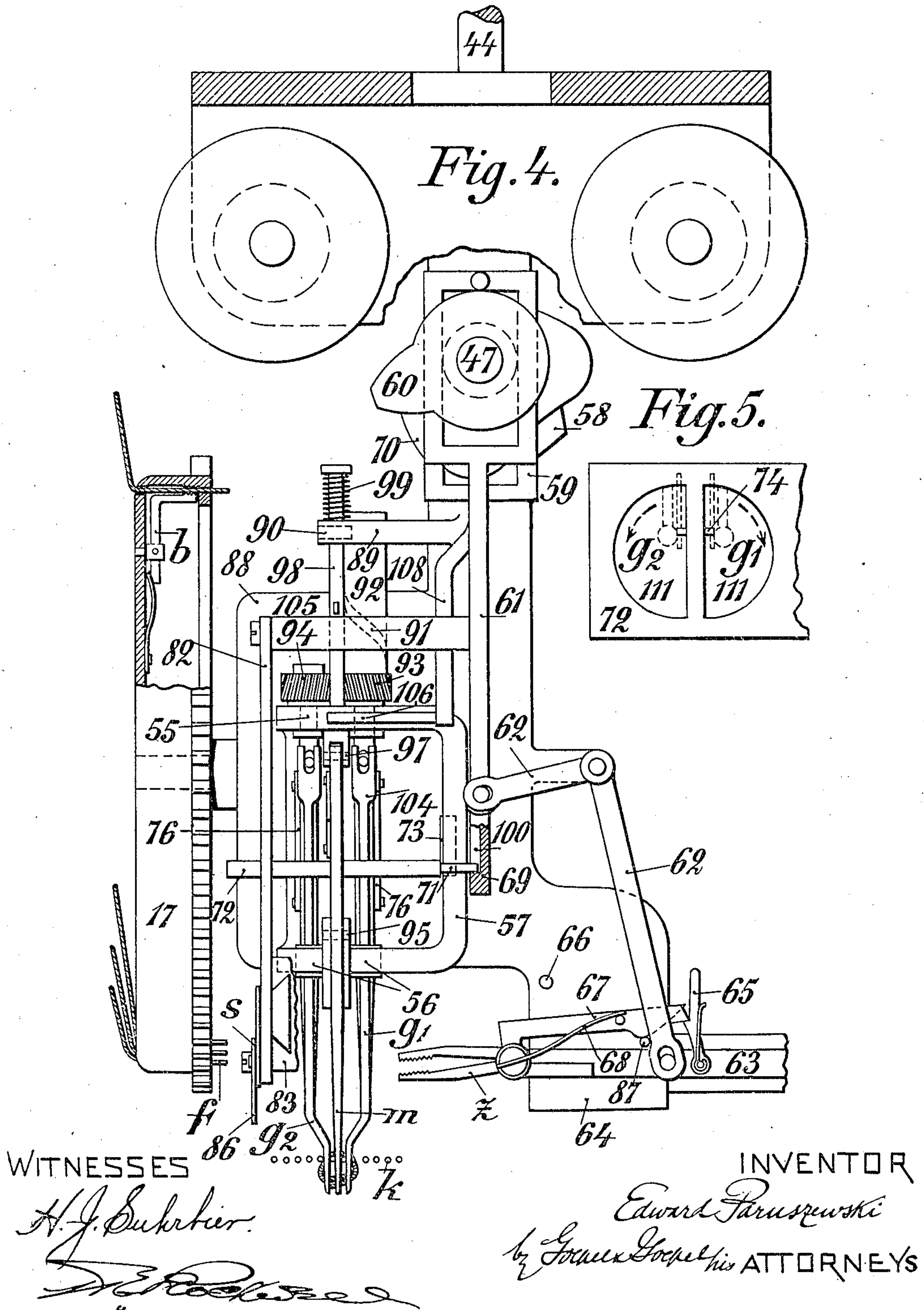
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6 SHEETS—SHEET 5.



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6 SHEETS—SHEET 6.

Fig. 6.

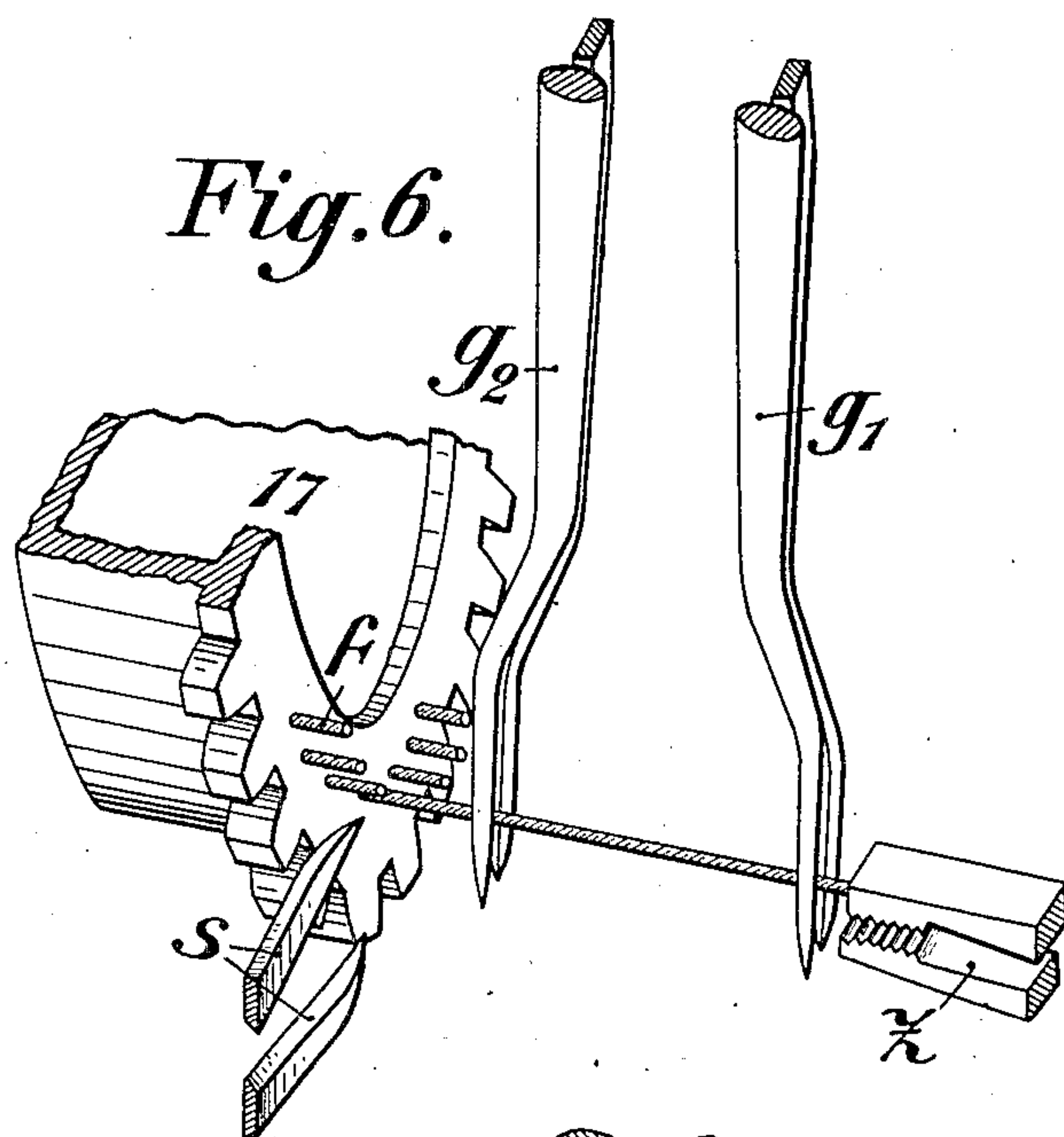
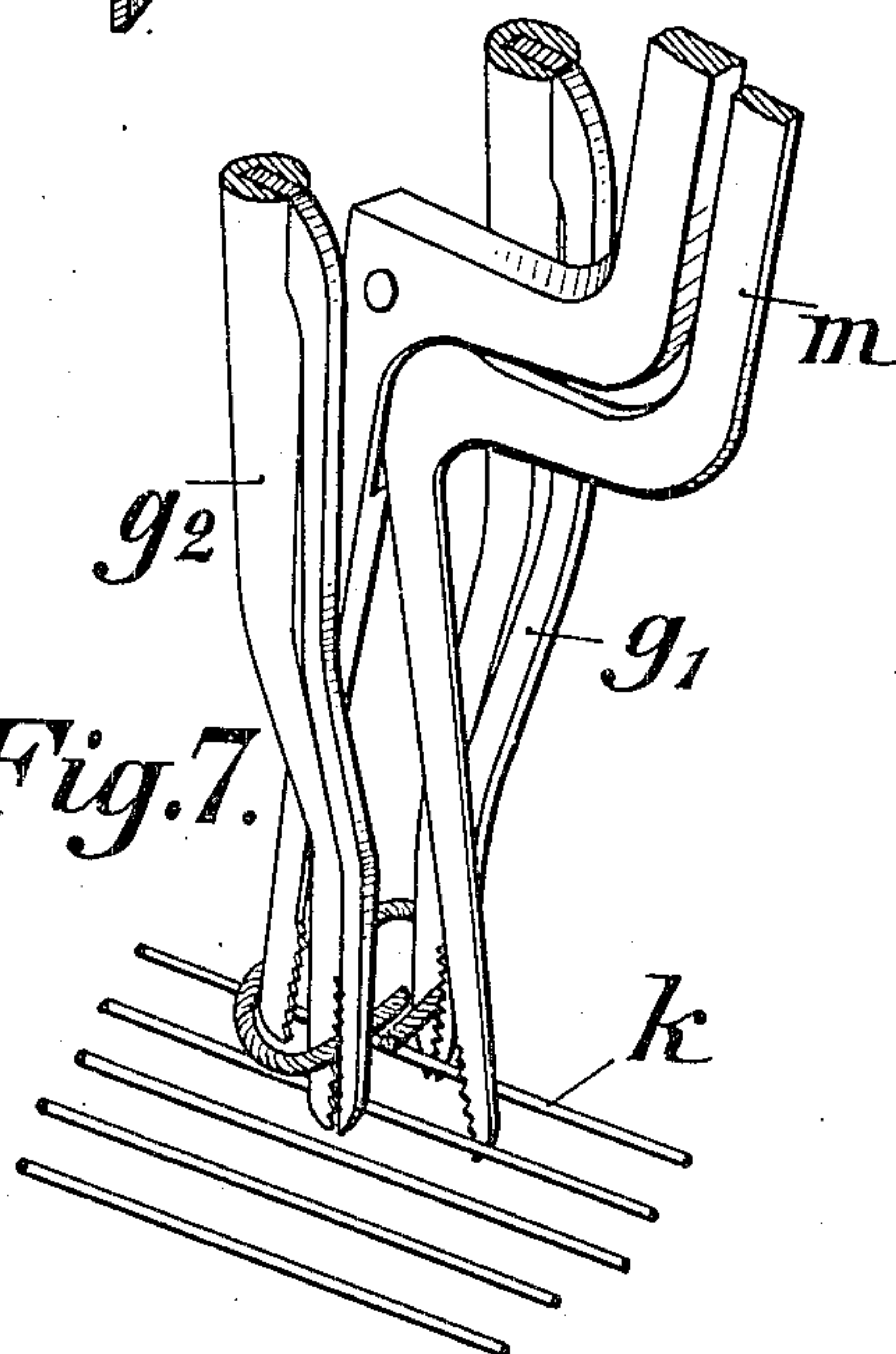


Fig. 7.



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UNITED STATES PATENT OFFICE.

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LOOM FOR WEAVING TUFTED FABRICS.

No. 843,358.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed April 1, 1905. Serial No. 253,353.

To all whom it may concern:

Be it known that I, EDWARD PARUSZEWSKI, a subject of the German Emperor, residing at Kottbus, in the German Empire, have invented certain new and useful Improvements in Looms for Weaving Tufted Fabrics, of which the following is a specification.

This invention relates to looms for weaving tufted fabrics.

One object of the invention is to provide a loom of this type in which a plurality of pattern-forming mechanisms, each comprising yarn selecting, feeding, cutting, and knotting devices, may be operated from a single keyboard.

The invention also contemplates the provision of improved means for operating each and all of said mechanisms from the keyboard.

It is also an object of the invention to provide a loom in which the several pattern-forming mechanisms embodying the instrumentalities indicated above are simultaneously shifted transversely of the warp by mechanism which is actuated by each key.

The invention further purposes to furnish an improved pattern-forming mechanism—viz., mechanism for selecting and knotting the yarn for use in looms of the type indicated.

With these objects in view the invention consists in the novel features and combinations of parts to be hereinafter described, and finally recited in the claims.

In the accompanying drawings, in which similar reference characters denote the same parts throughout the several views, Figures 1 and 1^a in conjunction show a plan view of the improved loom in which the knotting devices of the different pattern-forming mechanisms are omitted for the sake of clearness, a portion of the keyboard being broken away. Fig. 2 is a side elevation, partly in section. Figs. 3 and 4 are two different elevations of the knotting mechanism, showing the parts in different positions. Fig. 5 is a detail of the knotting mechanism; and Figs. 6 and 7 are detail perspective views of the knotting mechanism, showing the knot-forming grippers separated from their actuating devices.

A number of pattern-forming mechanisms *a* for knotting or tying the loops of yard are arranged side by side transversely of the warp-threads *k*, said mechanisms corresponding in number to the patterns in the repeat of the fabric. Each of such mechanisms com-

prises a set of yarn-holding reels and all the instrumentalities necessary to knot the desired pattern from the yarn thus held, as will be presently explained, and said reels and other instrumentalities of each mechanism are mounted on a suitable frame movable transversely of the warp-threads by means of rollers which move along a track supported on the loom-frame, as indicated, and by means of sleeves 54, threaded on a threaded shaft 53, as shown in Figs. 1^a and 2.

In the figures just mentioned an entire pattern-knotting mechanism is shown, together with part of a second one, it being understood, however, that the number of such mechanisms used in the loom is theoretically unlimited. All the mechanisms *a* are actuated simultaneously by one and the same keyboard *w* in order in each mechanism to select the color of yarn to be used for the time being and to feed it to the knotting devices. The yarns of different colors are wound upon reels or cops 22 in each mechanism and are led thence to yarn-presenting disks 17, having peripheral openings through which the strands of yarn protrude, being held lightly in position by means of spring-actuated pressers *b* in such a manner that they can be readily drawn out and unwound from the cops 22.

It is necessary that by the pressure upon one of the keys of the keyboard *w* all of the yarn-presenting disks 17 of the different pattern-forming mechanisms shall be simultaneously so adjusted as to present the yarn of the required color to the feeding means, by which the same is carried to the knotting devices of each mechanism *a*. In the arrangement shown in the drawings the feeding device is designed to act upon the yarn held at the lowermost part of the disk 17. Said feeding means is illustrated as a gripper *z*, by means of which a certain length of yarn is drawn out of the disk 17 in a manner to be presently described in order to be looped and knotted about two of the warp-threads. The adjustment of all the disks 17 for this purpose is effected from the keyboard *w*, as follows: On pressing down a key 1 (each of which is advantageously indicated by means of a piece of yarn of a color which is selected by the disk 17 upon the depression of the key) an elbow-lever 2, moved by the key, and a slide 3, actuated by said elbow-lever, cause the upper end of an upright rack 4 to be moved rearwardly against the action of a spring 20,

the rack, which is guided in vertical direction by a roller 5, being thus partly rotated about a gear-wheel 6, with which it engages. Each rack is provided at its lower portion with a nose or catch 7, said noses being arranged at different heights on the several racks. The parts 1, 2, 3, 4, 6, and 20, as shown in Fig. 1, are of a number corresponding to the number of yarn-colors. The gear-wheels 6 are all mounted loosely on a common shaft B^x , and each is fixed to a disk 10, provided with a peripheral lug 9, as shown in Fig. 2. A bar 11 is adapted to rock the shaft of the gear-wheels 6 by means of perforated ears which are keyed to said shaft at its ends, said bar 11 extending completely across the keyboard and normally abutting against the lugs 9 of the several disks 10, as shown in Fig. 2. In front of the racks 4 a knife-like bar 8 is continuously reciprocated to a uniform extent in a vertical direction by means of the driving-shaft of the machine, with which it is connected by suitable transmission devices, such as those indicated.

When one of the keys is depressed, the corresponding rack is by the above-described arrangement swung forward at its lower end, so that the bar 8, according to the position of the nose 7 with respect thereto, will sooner or later engage said nose during its upward movement and will as a consequence elevate the corresponding rack to a greater or less degree, thereby causing the corresponding gear-wheel 6, with which it engages, to be turned to a corresponding extent. The lug 9 of the disk 10, which is adjacent such gear-wheel, is thereby made to rock the bar 11 to the same extent as the gear-wheel, such extent being, as before stated, dependent upon the height of the nose or projection 7 on the corresponding rack. The bar 11 actuates, through the shaft B^x , a chain-wheel 12, which is fixed to said shaft and from which partial rotation is transmitted to the yarn-presenting device 17 by means of a chain 13, chain-wheel 14, shaft 15, and gear-wheel 16, which latter is engaged with a toothed ring on the disk 17, so that this disk is thereby set in such position that the yarn of the desired color arrives at the lowermost point opposite the tongs or gripper z . The parts are thus held in adjusted position so long as the corresponding key is held down, this being insured by a notch 18 in the rack 4, which catches upon a fixed bar 19, suitably mounted in the loom-frame. Therefore so long as the key is not released the disk 17 maintains its position and loops of the same-colored yarn will be continuously cut and knotted. When the key is released, spring 20 pushes the rack 4 away from the bar 19, and a weight 21, acting upon the shaft 15, carries the wheels and disk 17 back into initial position. All of the yarn-presenting devices 17 of the mechanisms a are operated in the same manner, being op-

eratively connected with the shaft 15 by instrumentalities similar to those just described, so that upon the actuation of said shaft by one of the keys the same color of yarn will be presented by each of the presenting devices.

After the knotting of each loop each mechanism a must be shifted transversely of the warp-threads k for a distance corresponding to two of said threads, as the knot is formed about two threads. This lateral shifting is also effected by the depression of the keys, and hence will be described before the knotting devices. A bar 23 extends transversely under all the keys, as shown in Figs. 1 and 2, so that upon the depression of a key 1 said bar is made to move a lever 24, so that by means of a lever 25 and slide 26, arranged at one end of the keyboard, the last rack 27 is moved in the same manner as was described with reference to the racks 4, serving for the selection of the color. By means of the rack 27 a gear-wheel 28 is rotated, to which wheel is fixed a crank-disk connected by a pin 29 to a connecting-rod 30, as shown in Figs. 1 and 2. The rod 30 is connected to a lever 31, by means of which one member 34 of a toothed clutch K is made to engage the other member 33, fixed on the driving-shaft 32, when the gear-wheel 28 is turned by the depression of a key in the manner described. By this means the shaft 35 is coupled to the shaft 32, and the resulting rotary motion of the former shaft is transmitted, by means of bevel-gears 36 and 37, chain-wheel 38, chain 39, and chain-wheel 40, to the shaft 41, which extends transversely of the warp-threads at the upper portion of the loom above the several pattern-forming mechanisms a . By means of the shaft 41 a reciprocating motion is imparted to a ratchet-pawl 51 by means of a crank-disk and connecting-rod 49, the pawl being thereby made to turn the ratchet-wheel 52 through a certain distance at each forward motion. The ratchet-wheel 52 is fixed upon the threaded guide-spindle 53, on which the threaded sleeves 54, fixed to the frames of the mechanisms a , are mounted, as hereinbefore described. The ratchet-gear, the pawl 51 of which is formed double in order to operate in either direction, serves to shift the mechanisms a to the extent of two warp-threads in the direction of the weft after the formation of each knot.

From the shaft 41 the shafts 47 of the pattern-forming mechanisms receive their rotary motion by means of the bevel-gears 42 and 43, shaft 44, and bevel-gears 45 and 46. On each shaft 47 are arranged the cams by which the knotting devices of each pattern-forming mechanism are operated, as shown in Figs. 3 and 4. Said knotting devices, as shown in Figs. 3, 4, 5, 6, and 7, consist, essentially, of the feed-grippers z , already mentioned, which draw the end of the yarn from

the presenting-disk 17, the shears *s*, which cut it off, the two cranked loop-forming grippers *g'* and *g*², which seize the ends of the yarn length and pass the same downwardly through the warp-threads, so as to include two of the latter, and a middle knotting-gripper *m*, which seizes the ends of the yarn length when passed through such warp-threads, draws them up between said threads, and draws the loop thus formed by a locking motion toward the finished part of the fabric.

The two loop-forming grippers *g'* *g*² are held in bearings 55 and 56 at the upper and lower portions of a rectangular frame 57, which slides vertically in a guide 88 of the loom-frame. The intermediate gripper *m* is also mounted on the frame 57 and partakes in its vertical reciprocating motion, which is imparted to the same by means of a cam 58, fixed on shaft 47, and a rod 59. The action of the frame 57 is such that the same remains stationary in its highest position during the first quarter-revolution of the shaft 47, then descends during the second quarter-revolution, then remains stationary in its lowermost position during the third quarter-revolution, and finally rises again during the last quarter-revolution of said shaft. When the frame is at a standstill in the highest position, the grippers *g'* *g*² are in the position shown in Fig. 3, in which the middle gripper *m* is, however, supposed to be open. The shears *s* are at their greatest distance from the yarn ends *f*. While the frame 57 is still stationary, the rotation of shaft 47 causes, by means of the cam 60, rod 61, and elbow-lever 62, the gripper *z*, which slides on a slide-bar 63 in a guide 64 of the loom-frame, to be pushed toward the yarn end *f*. Toward the end of this movement the catch 65, which holds the feeding-gripper open, bears against the fixed pin 66, whereby the movable part or finger 67 of said gripper is released, and the gripper then closed by the action of the spring 68. The gripper *z* thus grips the yarn end and draws it during the subsequent backward motion between the grippers *g'* *g*². At the end of the return stroke after the knot-forming grippers *g'* *g*² have seized the yarn the inclined end of the part 67 of the feeding-gripper strikes against a fixed pin 87, whereby said gripper is again opened and is then held open by engagement with the spring-actuated catch 65.

During the movement of the gripper *z* a slotted slide 69, which is actuated by the shaft 47 by means of a cam 70, has seized the pin 71 of a plate 72, Figs. 3, 4, and 5, which slides in a guide 73 of the frame 57 and carries said plate downwardly. In this movement a pin 74 of said plate 72 bears against the incline 75 of catches 76, which are thus disengaged from pin 77 of the movable part

of the grippers *g'* *g*², so as to release said grippers. As a consequence said grippers close under the action of spring 79 and seize the yarn laterally in the manner indicated in Fig. 6. At this moment the gripper *z* is opened in the manner above described.

As soon as the grippers *g'* and *g*² have seized the yarn near its ends and the feeding-gripper *z* is opened the shears *s* are moved in their guide 83 toward the yarn and back again therefrom by means of a cam 80, rod 81, and elbow-lever 82, as shown in Fig. 3. During this movement a fixed pin 84 slides in the angular slot 85 of the shears' arms 86, and thereby the shears are opened during the forward motion and closed during the backward motion, so that the yarn is thereby cut off in front of the disk 17.

During the second quarter-revolution of the shaft 47 the frame 57, together with the grippers *g'*, *g*², and *m*, moves downwardly. During this motion a pin 90, fixed to a bracket 89 of the framing, slides in the helical groove 91 of a cylinder 92, connected to the upper portion of the gripper *g'*. The gripper *g'* thus describes a semirevolution, which is transmitted, through gears 93 and 94, to the gripper *g*², which movement is indicated in Fig. 5 by dotted arrows. In consequence of the crank form of the grippers at their lower ends said ends do not rotate upon their axes, but describe an arc about the longitudinal axes of the upper ends of the grippers, so that the gripping ends turn in opposite directions and bring together the ends of the yarn length, so as to form a loop, as shown in Fig. 7. This rotation of the loop-forming grippers is already completed at the first half of the downward movement, so that the gripper ends and the yarn length are already disposed at a height of about ten millimeters above the warp-threads in the position shown in Fig. 7. During this rotation of the loop-forming grippers a pin 95 of the intermediate gripper *m* slides in an oblique slot 96 of the frame 57. By this means the intermediate gripper *m* receives a rocking motion at right angles to the face of the disk 17, with the pin 97 of the guide-rod 98 as a pivot, until the ends of the middle gripper pass between the two loop-forming grippers *g'* *g*², as shown in Fig. 7. During the following second half of the downward motion of the frame 57 the grippers *g'* and *g*², together with the bent yarn length, pass through the warp-threads in the manner shown in Fig. 4, thereby laying the middle part of the length over two warp-threads and taking the two ends of these warp-threads downwardly. As the spring 99 yields during the downward motion of the frame 57 the intermediate gripper *m* also descends through the warp-threads, passing between the two warp-threads over which the lateral grippers lay the yarn length, as shown in Fig. 4. During the third quarter-revolution the frame 57,

with three grippers, remains in this lowest position. The pin 71 of the plate 72, which during the downward motion of the frame 57 can slide in the slot 100 of the slide-piece 69 without altering the relative position between said plate 72 and said frame 57, is now seized by the slide 69, which draws the plate 72 upwardly. During this movement the plate 72 strikes against the nose or lug 101 of the catch 102, which holds open the middle gripper, and in thus disengaging said catch causes said middle gripper to be closed by a spring 103, so as to grip the two yarn ends. During the further upward motion the plate 72 strikes against the incline 104, Fig. 3, of the grippers g' and g'' , thereby opening these somewhat, so that they release the yarn.

During the fourth quarter-revolution of the shaft 47 the frame 57 with the three grippers arrives upwardly, the grippers retaining during the first half of the upward motion the same relative positions, the gripper m drawing the ends of the yarn lengths upwardly, so as to form a knot. Said gripper is drawn upwardly by the spring 99 until the pin 105 strikes against the fixed framing-piece 89. As the frame 57 moves still farther upward, the pin 95 of the intermediate or middle gripper slides in the slot 96 of the frame 57, which causes said gripper to swing back into its original position, thereby bringing the completed yarn loop or tuft close up to the part of the fabric which has already been formed, as shown in Fig. 3. In the meantime the loop-forming grippers turn back into their original position in moving in openings 111 of the plate 72, which openings have curved surfaces formed eccentrically to the axis of rotation of said grippers, so that said grippers are thereby completely opened again. In this position they are held by the catches 76. Before the above-described operation recommences the middle gripper m is opened again by means of a pin 106, which is moved upwardly by means of a cam 107 and a rod 108 and which slides against an incline 109 of the movable part 110 of said middle gripper, and this is then locked in open position by means of the spring-actuated catch 102.

The knotting devices of all the pattern-forming mechanisms a are simultaneously operated in the manner set forth by their connection with the operating-shaft 41 through the shafts 44 and 47, said operating-shaft 41 being actuated from the keyboard, in the manner previously described.

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

1. In a loom for weaving tufted fabrics, mechanisms for forming a plurality of patterns, and a single keyboard apparatus for operating all said mechanisms.

2. In a loom for weaving tufted fabrics,

mechanisms for forming a plurality of identical patterns, and a single keyboard apparatus for actuating all of said mechanisms.

3. In a loom for weaving tufted fabrics, the combination, with a plurality of pattern-forming mechanisms a , of a single keyboard apparatus w , whereby all of said mechanisms are simultaneously actuated.

4. In a loom such as described, in combination, a plurality of pattern-forming mechanisms a , a keyboard apparatus for actuating the same, and means actuated by each key for shifting said mechanisms transversely of the warp.

5. A loom for weaving tufted fabrics, including in its construction a plurality of pattern-forming mechanisms, each comprising a yarn-selecting device and knotting devices, and a single keyboard for simultaneously operating said pattern-forming mechanisms.

6. A loom for weaving tufted fabrics, including a plurality of pattern-forming mechanisms a , and a single keyboard apparatus for simultaneously operating said mechanisms and embodying means for shifting all of the same transversely of the warp.

7. A loom for weaving tufted fabrics, including a plurality of pattern-forming mechanisms, each embodying a yarn-presenting device, and a single keyboard apparatus for shifting all of said yarn-presenting devices.

8. A loom for weaving tufted fabrics, including a plurality of pattern-forming mechanisms, each embodying knotting devices, and a single keyboard apparatus for operating the knotting devices of all said mechanisms.

9. In a loom for weaving tufted fabrics, a plurality of pattern-forming mechanisms, each embodying a yarn-presenting device, a single keyboard, and mechanism operatively connecting said keyboard and said presenting devices whereby the latter are shifted to different distances by different keys.

10. In a loom for the purpose set forth, a plurality of pattern-forming mechanisms, each embodying a yarn-presenting device and knotting devices, and a keyboard embodying a key for each color of yarn, each key being operable to actuate all of said presenting devices to present yarn of the same color to the knotting devices of said different mechanisms.

11. A loom for weaving tufted fabrics, including a plurality of mechanisms for forming a plurality of patterns, each mechanism embodying a yarn-presenting device and knotting devices, and a keyboard apparatus for shifting the yarn-presenting devices of all said mechanisms, starting said knotting devices, and shifting said mechanisms transversely of the warp after the completion of the knotting operation.

12. A loom for weaving tufted fabrics, including a plurality of mechanisms for form-

ing a plurality of patterns, each mechanism embodying a yarn-presenting device and knotting devices, a keyboard apparatus including a key for actuating each of said yarn-presenting devices to present yarn of any color to the knotting devices, a driving-shaft, mechanism operated by all the keys for operatively connecting said driving-shaft with said knotting devices, and mechanism also operated by all the keys for shifting each pattern-forming mechanism relatively to the warp.

13. In a loom for weaving tufted fabrics, mechanisms for weaving a plurality of patterns, each comprising a yarn-presenting device, a shaft for operating all of said yarn-presenting devices, and means for actuating said shaft.

14. In a loom for weaving tufted fabrics, mechanisms for weaving a plurality of patterns, each comprising a yarn-presenting device, a rockable shaft, operative connections between said shaft and all of said yarn-presenting devices, and means for rocking said shaft.

15. In a loom for weaving tufted fabrics, mechanisms for forming a plurality of patterns, each comprising a yarn-presenting device, an operating-shaft connected to all of said presenting devices and operable to shift the same, and a keyboard apparatus including keys to actuate said shaft through different distances.

16. In a loom for weaving tufted fabrics, in combination, mechanisms for weaving a plurality of patterns, each of said mechanisms comprising knotting devices, and a shaft for operating the knotting devices of all said mechanisms.

17. In a loom for weaving tufted fabrics, in combination, mechanisms for weaving a plurality of patterns, each of such mechanisms comprising knotting devices, a shaft for operating the knotting devices of all of said mechanisms, a driving-shaft, and keyboard-actuated mechanism for interclutching said shafts.

18. The combination, with a rotatably-mounted yarn-presenting disk, of a shaft having gears thereon, a connection between said shaft and said disk, a plurality of racks engaging said gears, means for actuating said racks through different distances, and a keyboard for placing any of said racks in co-operative relation with said actuating means.

19. The combination of a rotatably-mounted yarn-presenting disk, a plurality of racks, a reciprocating knife-bar, a keyboard for pushing any of said racks into such position as to be actuated by said knife-bar, and an operative connection between all of said racks and said yarn-presenting disk.

20. In a loom, a shiftable yarn-presenting device, a shaft operatively connected to said device and having gears thereon, upright

racks engaging said gears and each having a nose thereon, said noses being arranged at different heights, a vertically-reciprocating knife-bar, and a key for shifting each rack into such position as to have its nose engaged by said knife-bar.

21. In a loom, a shiftable yarn-presenting device, a shaft operatively connected therewith and having a plurality of gears mounted thereon, racks engaging said gears, a reciprocating knife-bar, and a key for pushing one end of each rack in one direction about the gear with which it engages, whereby the other end portion of such rack swings in the opposite direction into the path of said knife-bar.

22. In a loom, knotting devices, a yarn-presenting device, a shaft for shifting the latter and having mounted thereon a plurality of gears, upright racks engaging said gears and each having, at a height different from the others, a nose thereon, a vertically-reciprocating knife-bar, and means for rocking any of said racks about the gear which it engages into the path of said knife-bar, whereby the latter engages the nose of such rack and raises the same.

23. In a loom for weaving tufted fabrics, a yarn-presenting device, a shaft for shifting the same and having mounted thereon a plurality of gears, upright racks engaging said gears, means for raising said racks to different heights, and means for maintaining each rack in raised position.

24. In a loom for weaving tufted fabrics, a yarn-presenting device, a plurality of upright racks having notches therein, means for raising said racks through different distances, a bar to engage the notches of said racks and thus hold said racks in raised position, and an operative connection between each rack and said yarn-presenting device.

25. In a loom such as described, a yarn-presenting device, a shaft for shifting the same, gears on said shaft, racks engaging said gears, a roller for holding each rack against its gear, a continuously-moving rack-actuating device, and means for slightly rocking each rack about its gear as a pivot, whereby the same moves into the path of said actuating device.

26. In a loom, a yarn-presenting device, a shaft for shifting the same and having gears thereon, racks engaging said gears, a continuously-acting rack-actuating device, and a key for rocking each rack about its gear into the path of said actuating device.

27. In a loom for weaving tufted fabrics, in combination, a plurality of pattern-weaving mechanisms, each embodying a yarn-presenting device and knotting devices, an operating-shaft connected to the knotting devices of all of said mechanisms, a driving-shaft, keys for simultaneously shifting all the yarn-presenting devices to present yarn of

any color to said knotting devices, and mechanism operated by each key in being depressed for connecting said driving-shaft with said knotting-device-operating shaft.

28. In a loom for weaving tufted fabrics, a pattern-weaving mechanism embodying a yarn-presenting device and knotting devices, an operating-shaft connected to the knotting devices of said mechanism, a feed-shaft operated by said operating-shaft and adapted to shift said pattern-forming mechanism relatively to the warp, a keyboard for actuating said presenting device, a driving-shaft, a clutch mechanism between said driving-shaft and said operating-shaft, and means actuated by each key for clutching said clutch mechanism.

29. In a loom for the purpose set forth, a pattern-forming mechanism embodying a yarn-selecting device and knotting devices, an operating-shaft for said knotting devices, a feed-shaft for shifting said mechanism transversely of the warp, and an operative connection between said feed-shaft and said operating-shaft.

30. In a loom such as described, a plurality of pattern-forming mechanisms, and an operating-shaft connected with the knotting devices of all of said mechanisms.

31. In a loom such as described, a plurality of pattern-forming mechanisms, each embodying a yarn-selecting device and knotting devices, an operating-shaft connected with all of said selecting devices, and an operating-shaft connected with all of said knotting devices.

32. In a loom such as described, a plurality of pattern-forming mechanisms *a*, each embodying a yarn-presenting device 17 and knotting devices, a shaft 15 for operating all of said presenting devices, a shaft 46 for operating the knotting devices of all said mechanisms, and a keyboard apparatus *w* for controlling both of said shafts.

33. In a loom for weaving tufted fabrics, a plurality of pattern-forming mechanisms *a*, each embodying a yarn-presenting device 17 and knotting devices coacting therewith, a shaft 15 for shifting all said presenting devices, a shaft 46 for operating the knotting devices of all said mechanisms, and a shaft 53 for feeding all said mechanisms transversely of the warp.

34. In a loom for weaving tufted fabrics, a plurality of pattern-forming mechanisms, each including a frame having a cam-shaft mounted therein, knotting devices operated by said cam-shaft, and a single shaft for operating all of said cam-shafts.

35. The combination, with the mechanisms *a*, of the operating-shaft, the feed-shaft, and the pawl-and-ratchet device connecting said shafts.

36. In a loom such as described, a pattern-weaving mechanism movable in the loom and

comprising a frame, reels mounted on said frame, a yarn-presenting device also mounted on said frame, and knotting devices likewise carried by said frame.

37. In a loom such as described, a pattern-weaving mechanism shiftable on the loom-frame and comprising a frame having reels mounted in the upper part thereof, a cam-shaft intermediate of the height of the same, knotting devices operated by said cam-shaft and disposed below the same, and a yarn-presenting disk carried at the lower portion of said frame in cooperative relation with said knotting devices.

38. In a loom for weaving tufted fabrics, a yarn-presenting device, a feed-gripper for pulling out the yarn length, loop-forming grippers for grasping the ends of said length and bringing the same together, and an intermediate gripper for grasping said ends and pulling the same up through the warp.

39. In a loom for weaving tufted fabrics, grippers having cranked gripping ends to grip the ends of the yarn length, and means for partially rotating said grippers whereby their gripping ends are moved arcuately.

40. In a loom for weaving tufted fabrics, grippers to grip the ends of the yarn length, and means for arcuately moving the ends of said grippers in opposite directions.

41. In a loom for weaving tufted fabrics, grippers to grip the ends of the yarn length and form a loop of the same, and an intermediate knotting-gripper movable between and out from between said loop-forming grippers.

42. In a loom for weaving tufted fabrics, grippers having cranked gripping ends, means for rotating the shank of one of said grippers, and intermeshing gears mounted on the shanks of said grippers.

43. In a loom for weaving tufted fabrics, a frame, loop-forming grippers having their shanks journaled in said frame, means for rotating said grippers, and means for reciprocating said frame.

44. In a loom for weaving tufted fabrics, a rectangular frame, grippers having their shanks journaled in the top and bottom of said frame and having cranked gripping ends extending below the same, means for rotating the shanks of said grippers, and means for moving said frame toward and away from the warp.

45. In a loom for weaving tufted fabrics, a rectangular vertically-reciprocating frame, grippers disposed side by side and having their shanks journaled in the upper and lower ends of said frame, said grippers having cranked gripping ends extending below said frame, a cylinder on the shank of one of said grippers having a curved slot therein, a fixed pin engaging said slot, and intermeshing gears on the shanks of said grippers.

46. In a loom for weaving tufted fabrics,

loop-forming grippers, means for moving their gripping ends in oppositely-directed arcs, means for raising and lowering said grippers, and a knot-forming gripper movable between said loop-forming grippers.

47. In a loom for weaving tufted fabrics, a yarn-presenting device, a feed-gripper for pulling the yarn out of the same, shears for cutting off the yarn length, grippers for grasping the ends of the same, means for moving each of said grippers in an arc so as to form a yarn-loop, means for moving said grippers toward the warp, a knot-forming gripper movable between said grippers, and means for actuating said knot-forming gripper

per to grip the ends of the yarn length and pull the same upwardly through the warp.

48. In a loom for weaving tufted fabrics, the combination, with the loop-forming grippers, of a pivoted knot-forming gripper, and means for pivotally swinging said last-named gripper so as to carry the completed knot away from the loop-forming grippers.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EDWARD PARUSZEWSKI.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.