No. 609,223. Patented Aug. 16, 1898.

P. M. BEERS.

NEEDLE GROOVING MACHINE.

(Application filed June 1, 1896.)

(No Model.) 4 Sheets—Sheet 1.

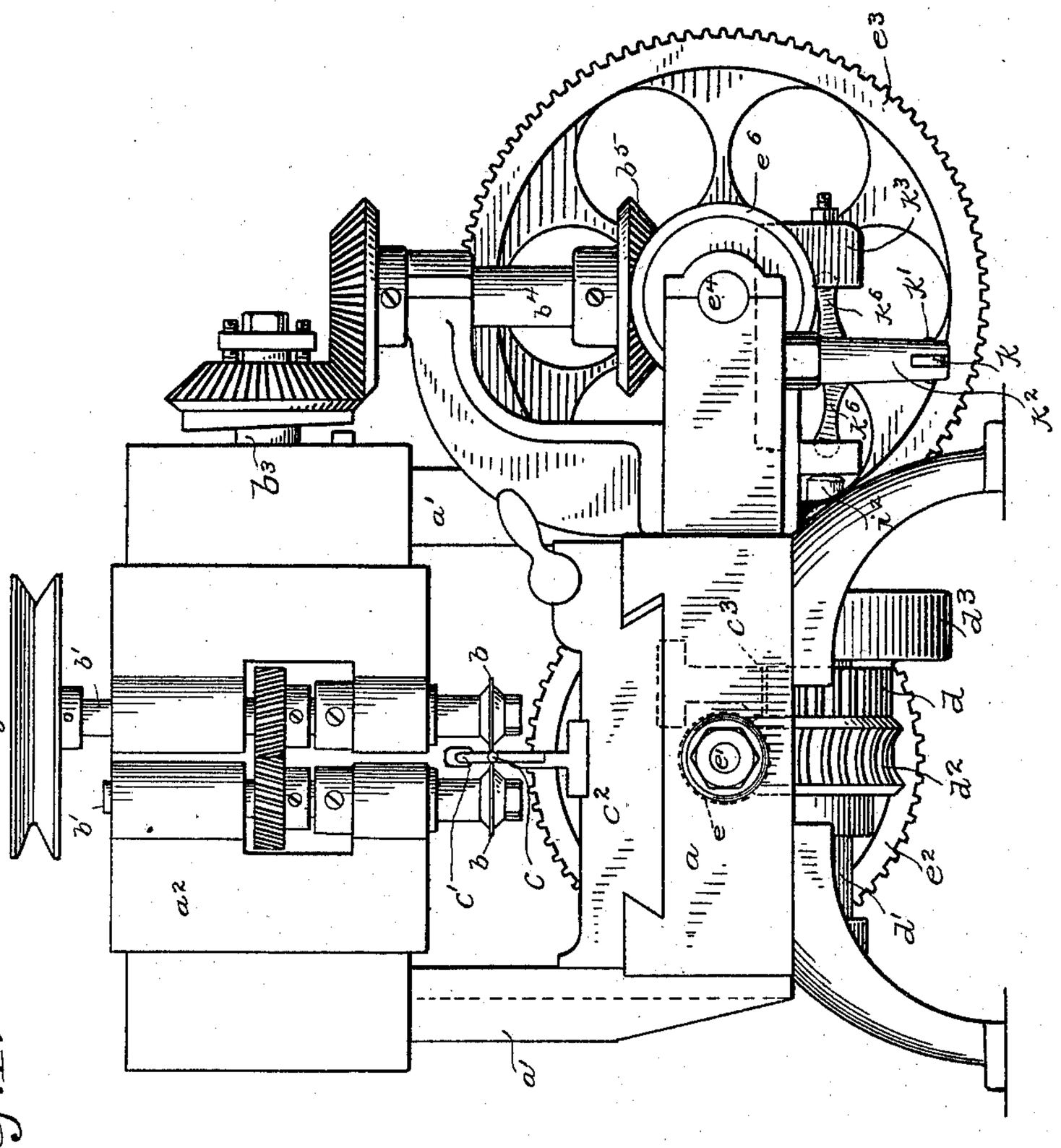

Fig. 1.

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Fig. 2.

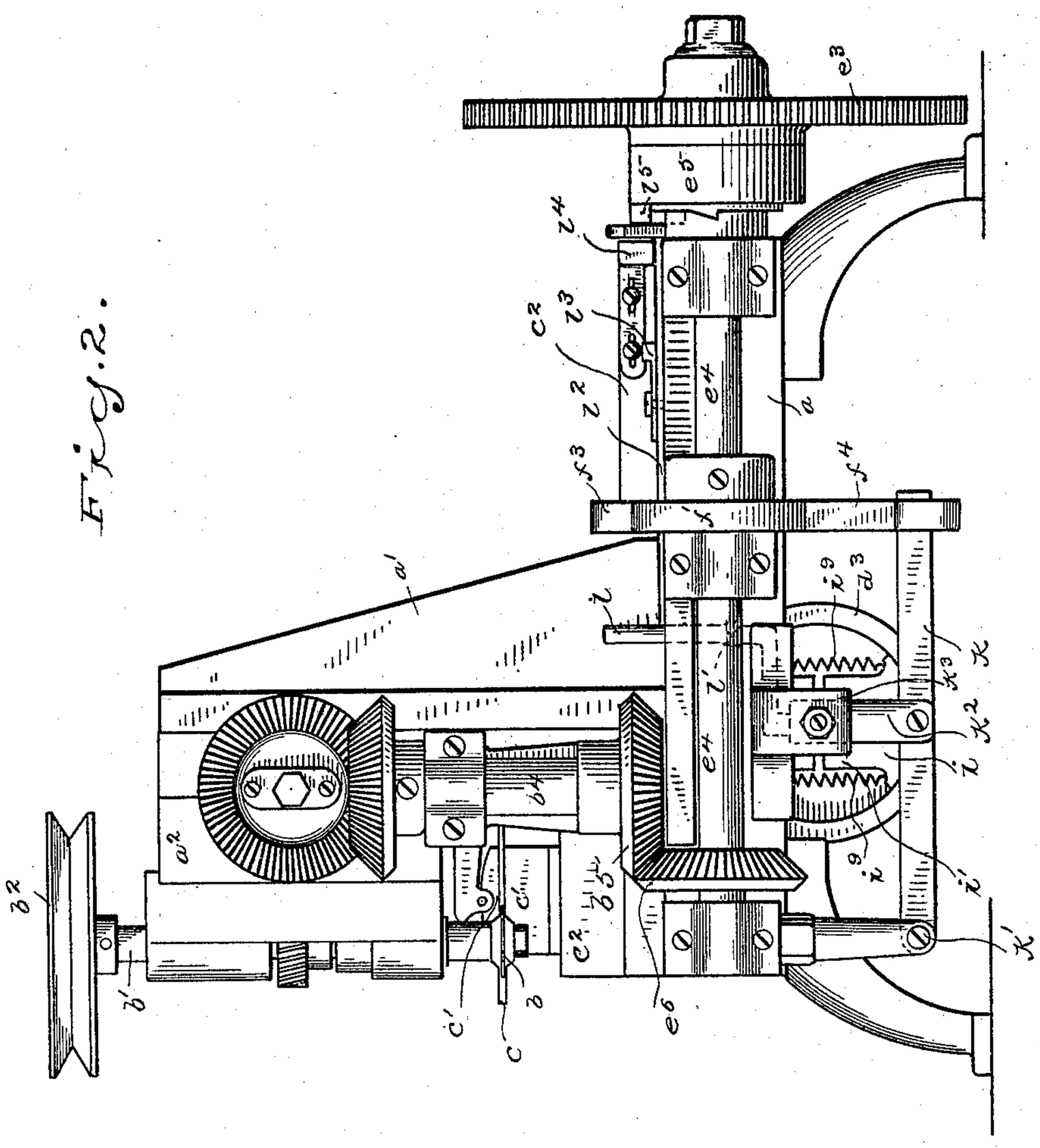

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Fig. 3.

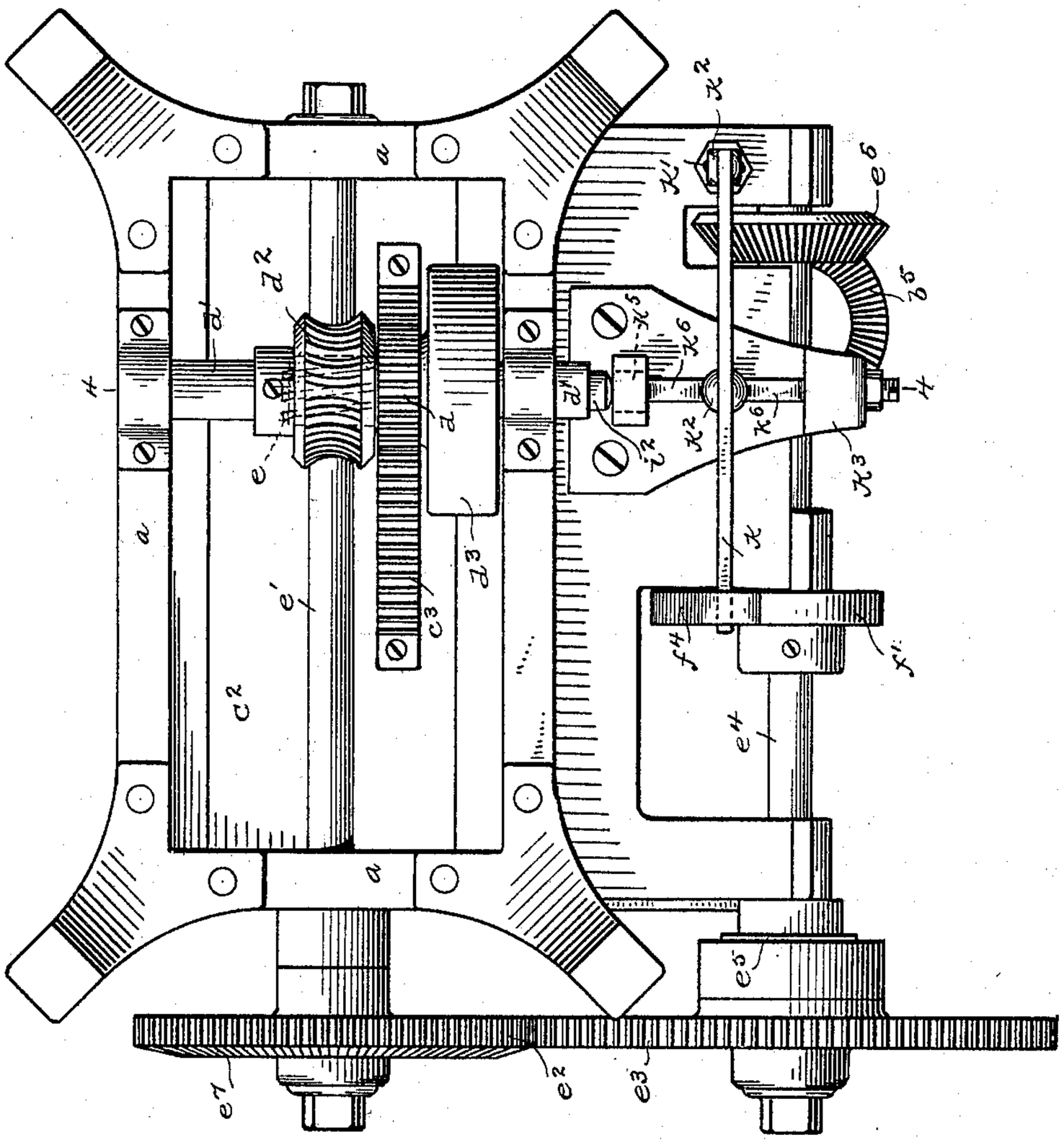

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Fig. 4.

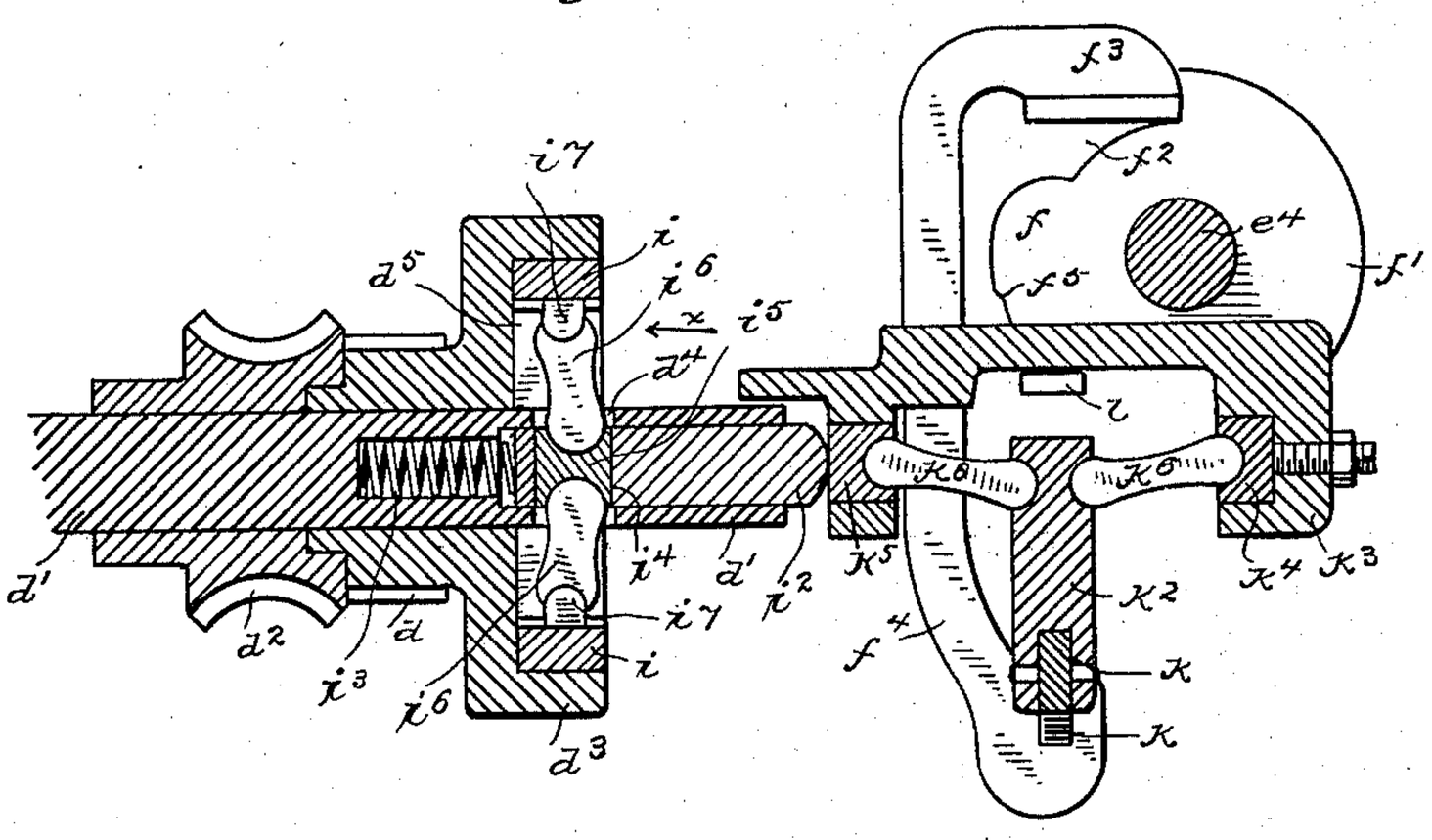


Fig. 5.

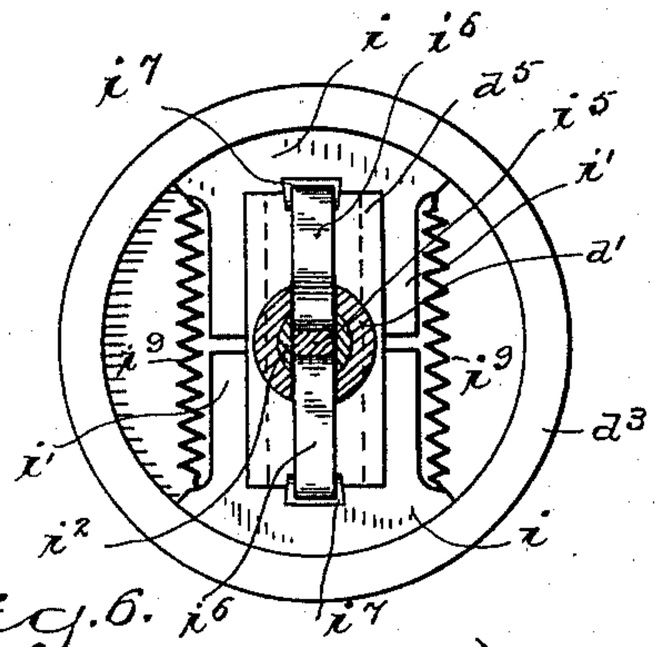


Fig. 6.

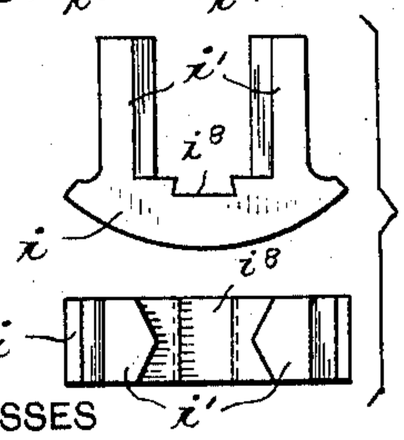


Fig. 7.

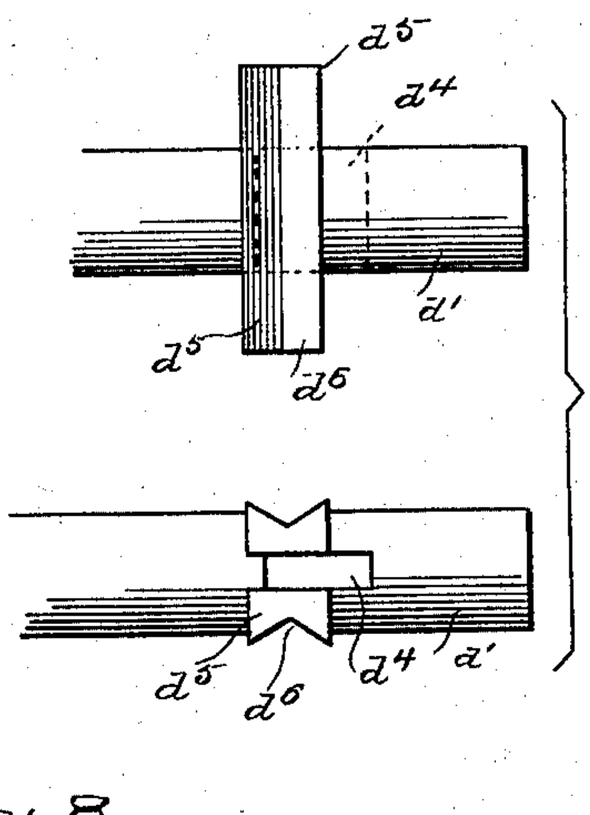
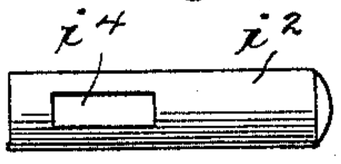


Fig. 8.



WITNESSES

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UNITED STATES PATENT OFFICE.

PHILO M. BEERS, OF BRIDGEPORT, CONNECTICUT.

NEEDLE-GROOVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 609,223, dated August 16, 1898.

Application filed June 1, 1896. Serial No. 593,693. (No model.)

To all whom it may concern:

Be it known that I, PHILO M. BEERS, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Needle-Grooving Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for grooving sewing-machine needles, and has particular reference to that type of such machines in which two constantly-rotating cutters form grooves in opposite sides of the needle, which is held in a vise or clamp and reciprocated between the said cutters, means being provided for automatically separating the cutters at the end of the grooving operation and then stopping the movement of the slide which carries the jaws of the clamp.

This invention has for its object to provide improved means for reciprocating the clamp-slide, whereby the feed-screw and half-nut heretofore employed are dispensed with, and to provide means whereby a cam-operated arm or tappet, which couples the clutch, will, after being actuated by the cam, be retained in a position out of contact with said cam during the greater part of its rotation in order to avoid unnecessary friction and wear.

Further objects of the invention are to simplify the construction and operation of the machine, as will more fully appear hereinafter.

To these ends the invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

The type of machine to which this invention relates being well known and in extensive use, the drawings which accompany and form part of this specification illustrate in detail only those parts which include the said invention.

In said drawings, Figure 1 represents a front elevation of a machine embodying my improvements. Fig. 2 represents a side elevation from the right of Fig. 1. Fig. 3 represents a bottom plan view of the machine. Fig. 4 represents a sectional detail on line 4 4 of Fig. 3. Fig. 5 represents a detail elevation of the clutch, looking in the direction of the arrow x in Fig. 4, the block between the toggle-arms being in section. Fig. 6 represents a detail side elevation and plan of one of the clutch-blocks. Fig. 7 represents a detail side elevation and plan of the clutch-shaft and its ways for the clutch-blocks. Fig. 8 represents a detail side elevation of the clutch-operating pin.

Similar reference characters indicate the same parts throughout the several figures of the drawings.

The main frame or bed a of the machine is provided with standards a' and head a^2, which support the vertical shafts b' of the cutters b, said shafts being geared together and one of them having a pulley b^2, which is continuously operated by a suitable belt. In the head a^2 is located the mechanism which causes the cutters to approach and recede from each other, said mechanism being operated at the proper times by the shaft b^3, driven by the vertical shaft b^4, mounted in bearings at the side of the head.

Fitted to ways on the bed a is the slide c^2, having clamping-jaws c' for the needle c and adapted to advance the needle between the cutters while the latter are in operative contact with said needle and adapted to be returned by the operator pressing against it after the grooves have been formed and the cutters separated, all of the mechanism so far referred to being substantially the same in construction and operation as the machines in common use.

My present improvements concern mainly the mechanism whereby the slide c^2 is advanced and then released from said mechanism, so that the operator may push the slide back after having removed the grooved needle and inserted another blank between the jaws of the clamp, which mechanism I will now describe. On the under side of the slide is a rack c^3, (see Fig. 3,) which meshes with a pinion d, loose on a shaft d' mounted in bearings on the side of the bed and provided with a worm-wheel d^2, secured thereon. The worm-wheel d^2 meshes with a worm e on a shaft e', mounted in bearings in the bed a and having a gear e^2, which is in mesh with a gear e^3, mounted loosely on the counter-shaft e^4 and adapted to be connected thereto or discon-

nected therefrom by a clutch e^5, as heretofore employed, the gears e^2 and e^3 being constantly rotated by a suitable power-driven pinion engaging the crown-teeth e^7 on the side of the gear e^2.

The shaft e^4 is provided with a bevel-pinion e^6 at its other end, which meshes with a similar pinion b^5 on the lower end of the shaft b^4, so as to drive the latter, and is also provided with a cam f. (See Figs. 2, 3, and 4, particularly the latter.)

Referring now to Figs. 4 to 8, inclusive, I will describe the clutch mechanism for controlling the operation of the pinion d on the rack c^3. Said pinion is formed on the hub of a collar d^3, which is loose on the shaft and is recessed to form an annular friction-surface, against which the curved portions of the clutch-blocks i, presently described, are adapted to act, the collar forming one clutch member and the blocks i the other clutch member. The shaft d' is provided with an opening d^4 (see Fig. 7) and with two radial arms d^5, which are grooved to form ways d^6 for the arms i' of the clutch-blocks i, and the shaft is also provided with a central longitudinal recess for the clutch-operating pin or plunger i^2 (see Fig. 8) and with a smaller recess back of it for the spring i^3, which tends to press said plunger outward, as shown in Fig. 4, with its rounded end projecting well beyond the end of the shaft d'. The plunger is provided with an opening or slot i^4, which registers with the slot d^4 in the shaft, and in this slot i^4 is loosely fitted a block i^5, having curved seats for the inner ends of toggle-levers i^6, the said toggle-levers extending out through the shaft and their outer ends being seated on bearing-blocks i^7, which are fitted in recesses i^8 of the clutch-blocks between the arms i'. With this it will be understood that when the plunger i^2 is forced in the direction of the arrow x in Fig. 4 the result will be to bind the clutch-blocks against the inner periphery of the clutch member d^3 and cause the latter and the pinion d to rotate with the shaft d' and move the needle-clamp slide c^2. When the plunger i^2 moves in the opposite direction, the withdrawal of the clutch-blocks i from the clutch member d^3 is facilitated by springs i^9, connecting the two blocks i.

The action of the clutch i and d^3 is controlled by means of the cam f on shaft e^4, as will now be described.

The cam f is formed on a disk f', which is provided with a recess f^2 and is adapted to act on the shoulder or horizontal part f^3 of a lifting-bar f^4, the lower end of which engages the outer end of a lever k, pivoted at k' to a stud below the bed and pivotally connected midway of its length with the lower end of an upright k^2. (See Figs. 2 and 4.) An arm or bracket k^3 projects out from the side of the bed, as shown in Fig. 3, and in the end of this bracket is a seat-block k^4. In a lug under the inner end of the bracket is a short plunger k^5, against which the plunger i^2 is pressed by the spring i^3. Toggle-levers k^6 are interposed between opposite sides of the upright k^2 and the block k^4 on one side and the plunger k^5 on the other side. Thus as the cam f elevates the bar f^4 the latter elevates the lever k and upright k^2 and through the toggles k^6 forces the plunger i^2 to the left of the position shown in Fig. 4, and this causes the toggles i^6 to press the clutch-blocks i outward and so that the pinion d will rotate with the shaft d' and act on the rack c^3 to move the needle-clamp slide. After the cam f passes the shoulder f^3 a slightly-reduced portion of the disk arrives under the shoulder; but the shoulder will not descend for the reason that the action of the cam is such that the toggles k^6 pass slightly above a straight line and are held there by the tension of spring i^3. This slightly-reduced portion begins at the point f^5 and continues around to the beginning of the recess f^2. By having this greater portion of the periphery of the disk but slightly reduced the toggles are prevented from releasing the clutch, since they cannot accidentally return to the position shown in Fig. 4 until the recess f^2 arrives under the shoulder f^3. In practical use, however, the shoulder f^3 remains elevated during the greater part of the rotation of the disk and is therefore out of wearing contact therewith.

To insure the descent of the bar f^4 when the recess f^2 of the disk arrives under the shoulder f^3 and to thus insure the disengagement of the clutch, I provide the following device: An elbow-lever l is pivoted at l' on the frame (see Fig. 2) and has its lower end extended over the top of the plunger k^5, (see Fig. 4,) while its upper end is adapted to be moved by one end of a bar or slide l^2, fitted to suitable ways on the frame of the machine. (See Fig. 2.) The other end of the bar l^2 is provided with a lug l^3, which is in the path of movement of a lug l^4, carried by the needle-clamp slide c^2. The lug l^4 is adapted to operate on a projection indicated at l^5 in Fig. 2 and act on the clutch e^5 to connect the gear e^3 with the shaft e^4.

In the operation of the machine when the attendant has placed a needle in the clamp and pushed the slide c^2 back the lug l^4 causes the clutch e^5 to start the shaft e^4 and rotate the cam f. The latter operates the clutch d^3 i, as above explained, and the needle-clamp slide begins to advance the needle between the cutters. As soon as the cam has revolved once the lug l^4 leaves the projection l^5 and the clutch e^5 is disconnected and the cam stops, but with the clutch d^3 i still in operative connection.

At the end of the cutting or grooving operation the lug l^4 strikes the lug l^3 of the sliding bar l^2 and the latter causes the lever l to depress the plunger k^5 and cause the toggles to release the clutch d^3 i, it being understood that at this time the recess f^2 of the cam-disk is under the shoulder f^3 of the bar f^4. This

brings the mechanism back to the starting-point, when the same operation may be repeated on another needle.

I claim—

1. A grooving-machine comprising in its construction a clamp-slide having a rack, a shaft provided with a loose pinion engaging said rack, power-driven mechanism for operating said shaft, a clutch for controlling the connection between said pinion and shaft, a counter-shaft having a cam for controlling the clutch, and means independent of the cam for retaining the clutch in operative connection, after the action of the cam ceases.

2. A grooving-machine comprising in its construction a clamp-slide having a rack, a shaft provided with a loose pinion engaging said rack, power-driven mechanism for operating said shaft, a clutch for controlling the connection between said pinion and shaft and a counter-shaft having a cam for controlling the clutch the connection between the cam and the clutch including toggle-levers and means arranged to retain the clutch in operation after the action of the cam ceases.

3. A grooving-machine comprising in its construction a clamp-slide having a rack, a shaft provided with a loose pinion engaging said rack, power-driven mechanism for operating said shaft, a clutch for controlling the connection between said pinion and shaft, a counter-shaft having a cam for controlling the clutch said cam having a recess f^2 and the greater portion of the periphery of its disk having a shorter radius than the cam, the bar f^4 having shoulder f^3, the lever k, the upright k^2 and clutch mechanism operated by said upright for locking the clutch.

4. In a grooving-machine the combination with the operating mechanism including a clutch, of the disk f' having the greater portion of its periphery of uniform radius and having the cam f slightly raised and provided with a recess f^2, and mechanism operated by said cam for locking the clutch.

5. In a grooving-machine the combination with the operating mechanism including a clutch, of the disk f' having the greater portion of its periphery of uniform radius and having the cam f slightly raised and provided with a recess f^2, mechanism operated by said cam for locking the clutch and means for automatically unlocking the clutch when permitted by the recess of the disk.

6. In a grooving-machine the combination with the operating mechanism including a clutch, of the disk f' having the greater portion of its periphery of uniform radius and having the cam f slightly raised and provided with a recess f^2, the bar f^4 having shoulder f^3, and toggle-lever mechanism operated by said bar f^4 for locking the clutch.

7. In a grooving-machine the combination with the operating mechanism including a clutch, of the disk f' having the greater portion of its periphery of uniform radius and having the cam f slightly raised and provided with a recess f^2, the bar f^4 having shoulder f^3, toggle-lever mechanism operated by said bar f^4 for locking the clutch, the elbow-lever l for insuring the unlocking of said toggle mechanism, and means connected with the main slide of the machine for operating the elbow-lever.

8. A grooving-machine comprising in its construction a clamp-slide having a rack, a shaft provided with a loose pinion engaging said rack, power-driven mechanism for operating said shaft, a clutch for controlling the connection between said pinion and shaft, a counter-shaft having a cam for controlling the clutch, the connection between the cam and the clutch including toggle-levers adapted in operation to pass beyond a straight line, means for retaining them in such position, and means controlled by the operation of the machine to return the toggle-levers to disengage the clutch.

9. A grooving-machine comprising in its construction a clamp-slide having a rack, a shaft provided with a loose pinion engaging said rack, power-driven mechanism for operating said shaft, a clutch for controlling the connection between said pinion and shaft, a counter-shaft having a cam for controlling the clutch, said cam having a recess f^2 and the greater portion of the periphery of its disk having a shorter radius than the cam, the bar f^4 having shoulder f^3, the lever k, the upright k^2, toggle-levers k^6 adapted to be lifted above a straight line by the upright k^2, clutch mechanism operated by said toggle-levers for locking the clutch, and means controlled by the operation of the machine for depressing the upright and toggle-levers.

In testimony whereof I affix my signature in presence of two witnesses.

PHILO M. BEERS.

Witnesses:
JOHN W. H. BEERS,
GEO. B. WOOTTON.