Nov. 26, 1935. E. WIRTH 2,022,448

GUIDE NEEDLE LAPPING MACHINE

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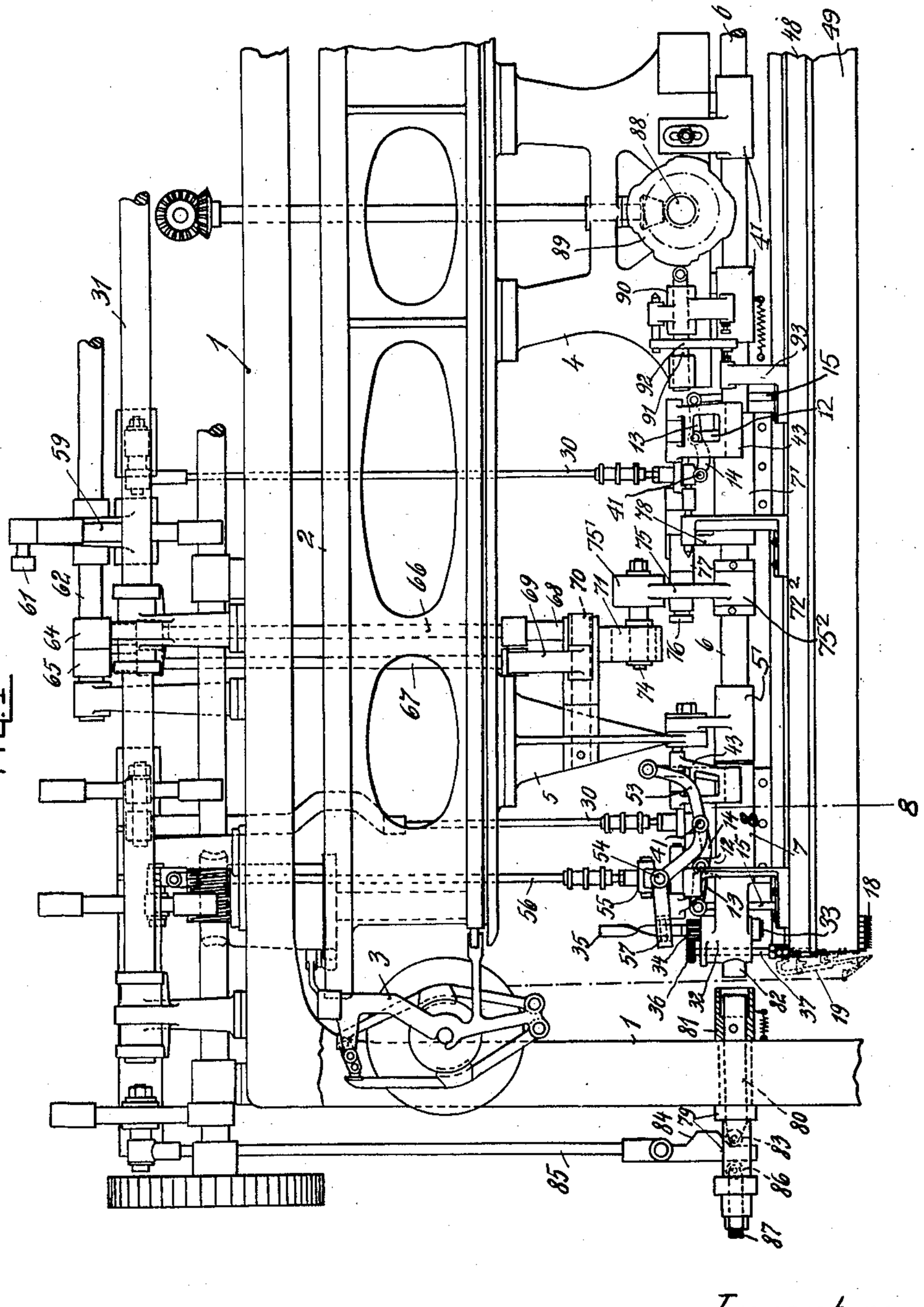

Fig. 1

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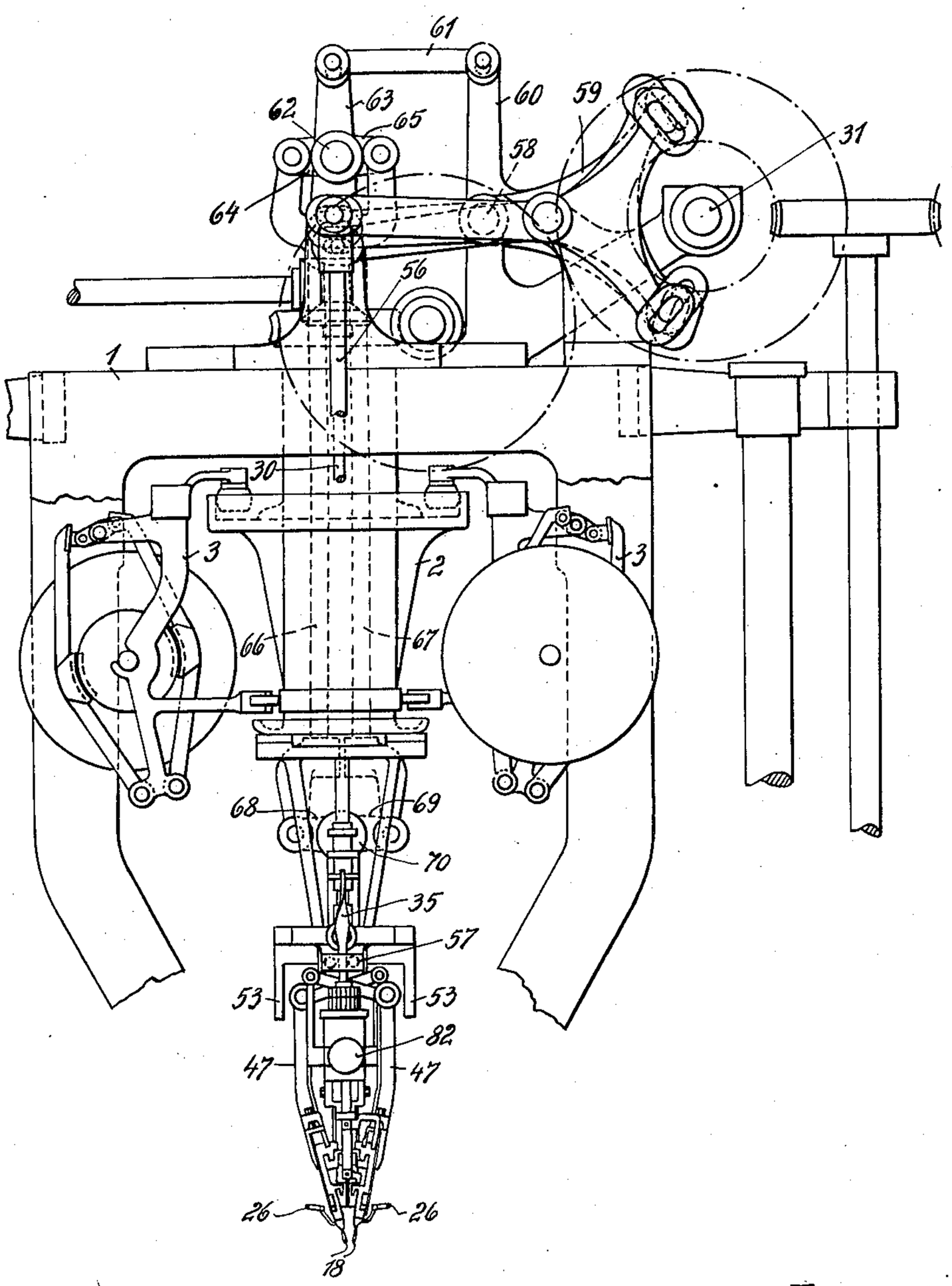
FIG. 2



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GUIDE NEEDLE LAPPING MACHINE

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FIG. 3

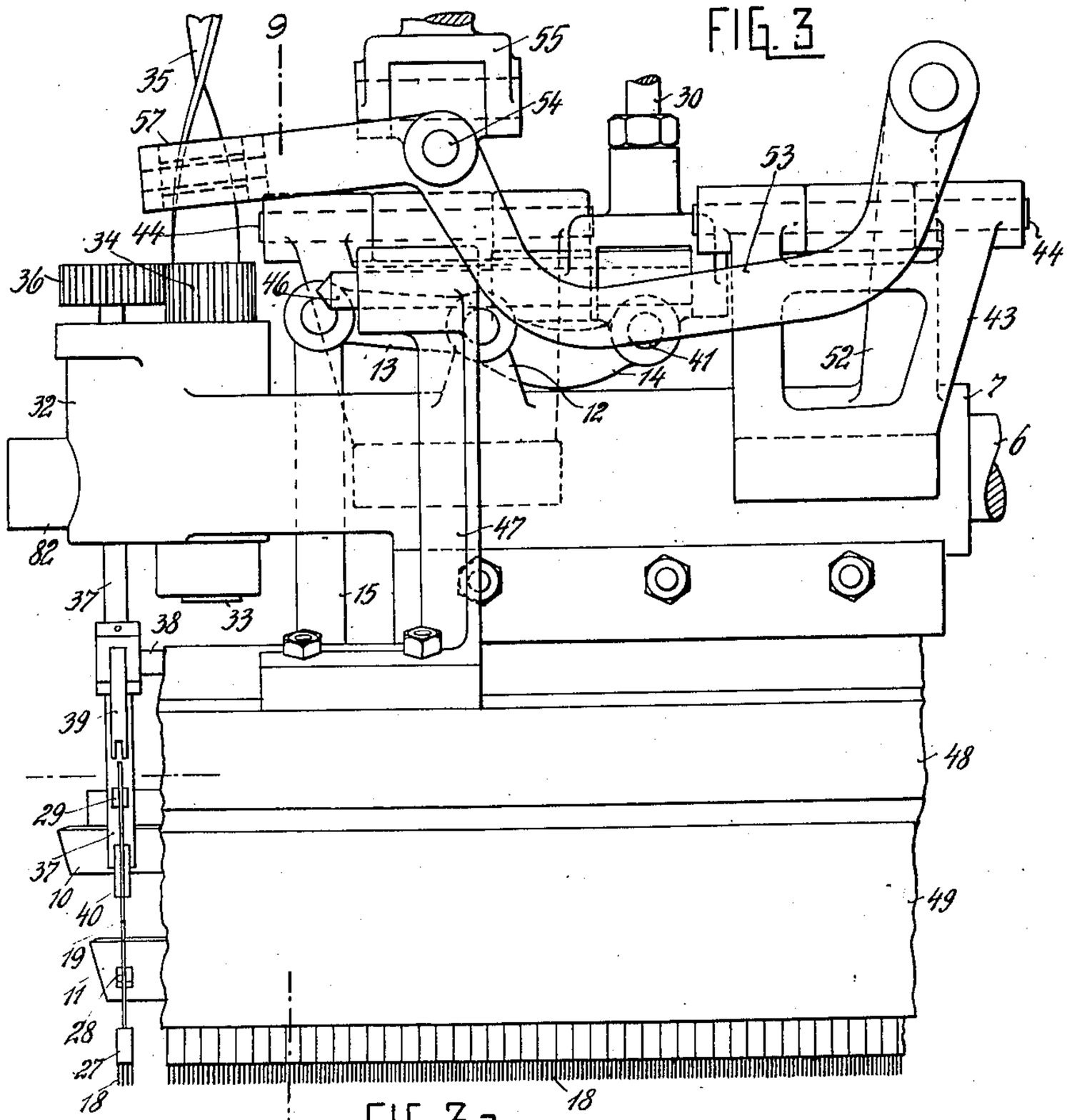

FIG. 3a

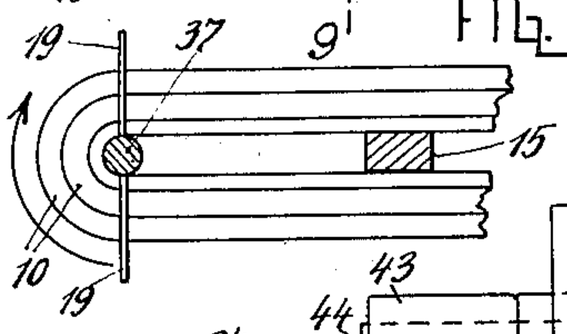

FIG. 4

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FIG. 5

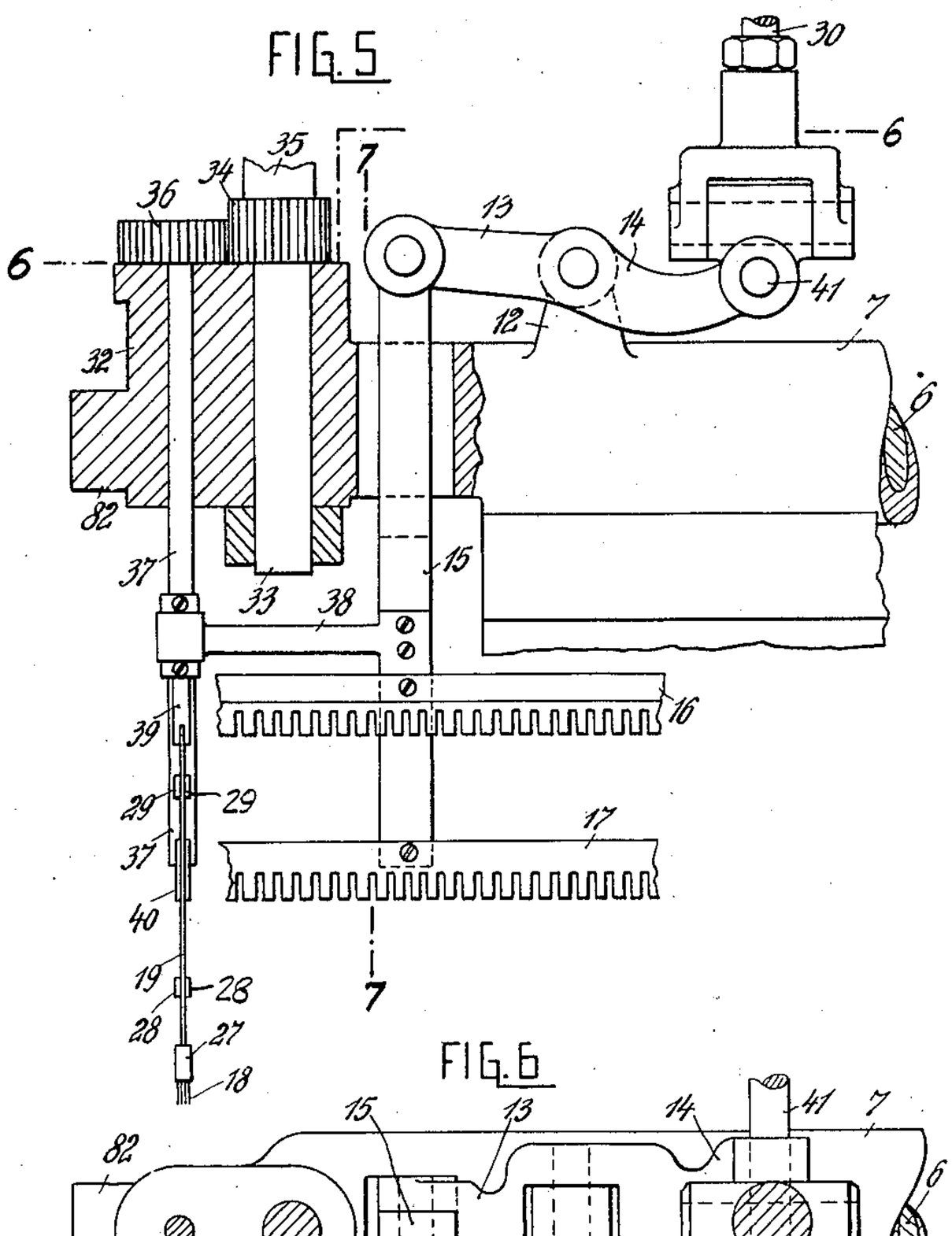

FIG. 7

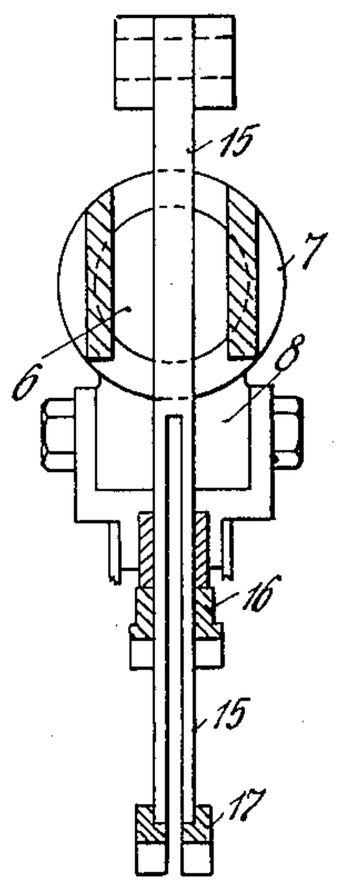

FIG. 6

FIG. 8

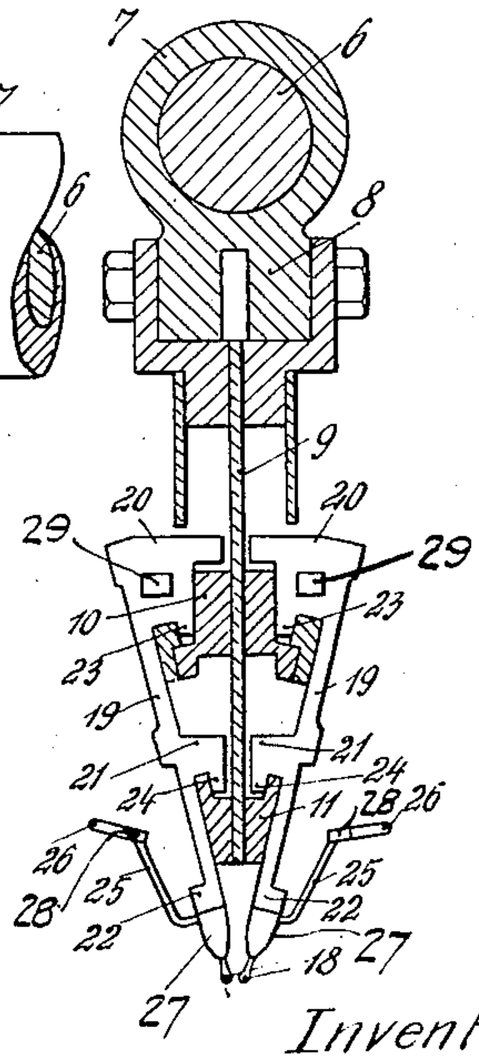

FIG. 16

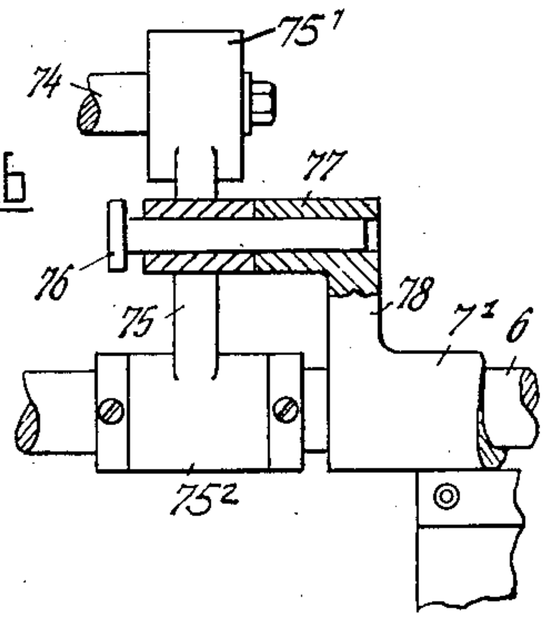

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FIG. 10

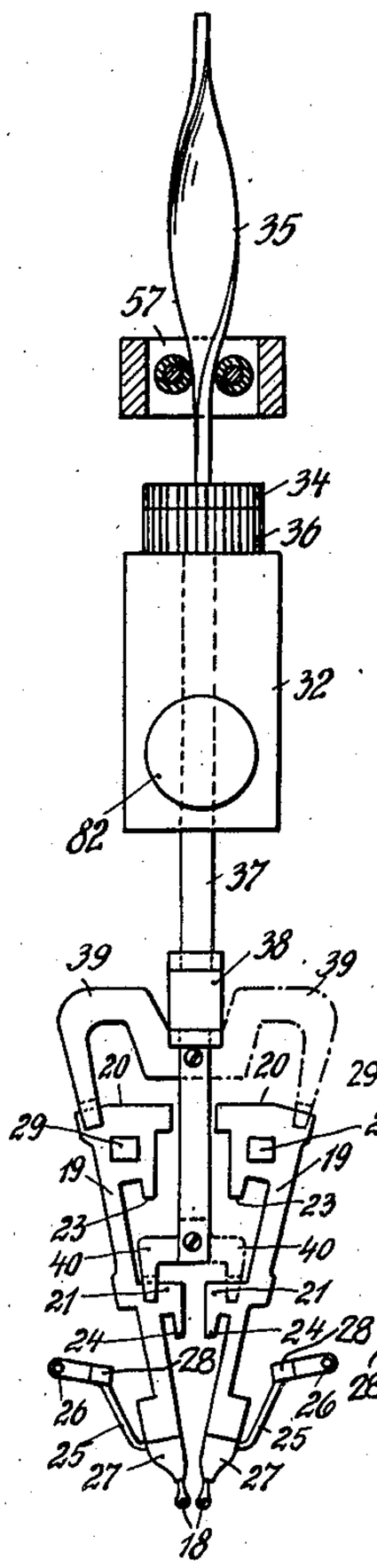

FIG. 11

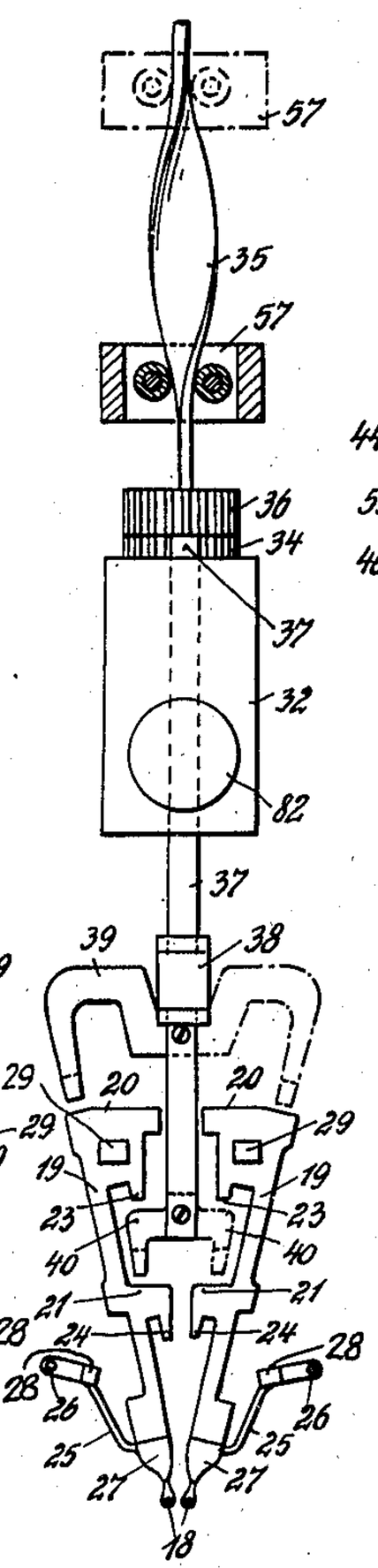

FIG. 9

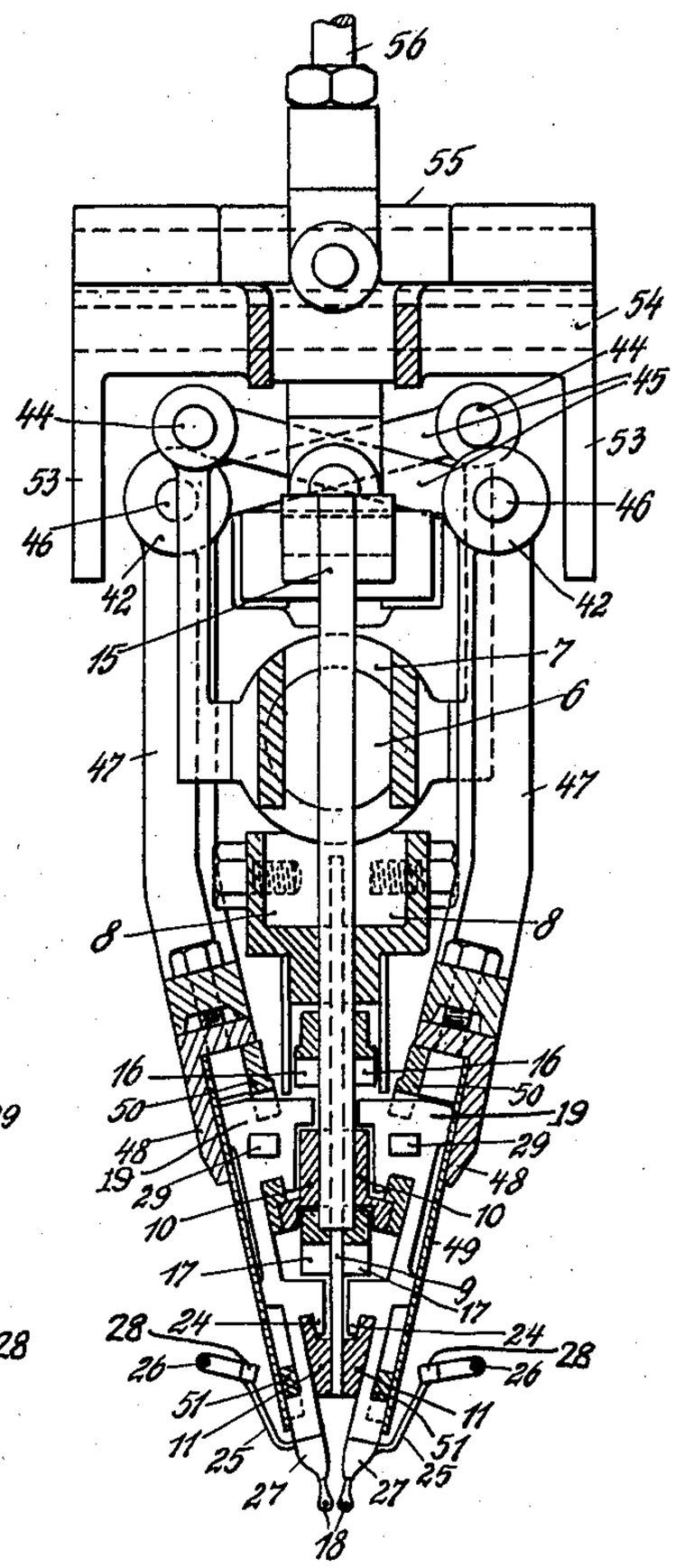

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FIG. 12

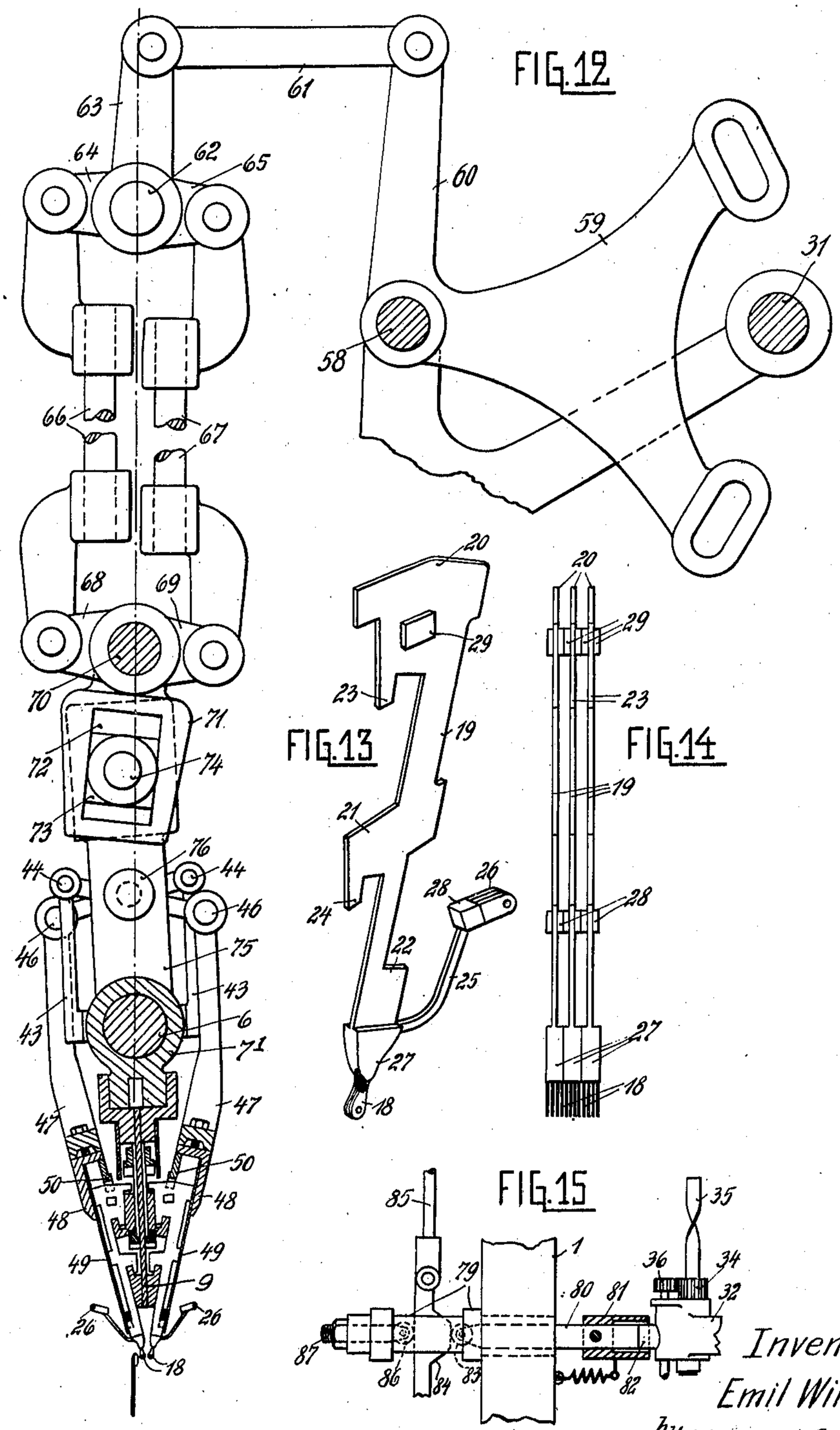

FIG. 13

FIG. 14

FIG. 15

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Patented Nov. 26, 1935 2,022,448

UNITED STATES PATENT OFFICE

2,022,448

GUIDE NEEDLE LAPPING MACHINE

Emil Wirth, Hartmannsdorf, near Chemnitz, Germany

Application June 23, 1934, Serial No. 732,122
In Germany September 27, 1932

16 Claims. (Cl. 66—86)

The invention relates to a warp frame or to an attachment for warp frames, high speed warp frames, double warp frames, double rib warp frames or Rachel machines and the like, for the production of diagonally worked knitted fabrics.

In the known warp machines for producing diagonally knitted fabric, the so-called Milanese knitting machines, the warp threads extend from the warp beams towards the lace needle through open needle frames. The laying and further movement of the warp threads is effected by these needle frames as well as by moving sinker combs.

It has already been proposed to pass the warp threads through eye pointed or guide needles. In these machines the guide needles are mounted in a frame which is pivotally arranged at the top of the frame of the machine. The frame in which the warp beams are slidingly mounted is also secured to the arms carrying the guide needle frame. The warp beam frame is rocked from the guide needle frame. The frame is oscillated by means of an eccentric shaft mounted beneath it in the frame of the machine.

The present invention relates to a device which can be applied as a self contained unit to warp knitting machines of the kind above referred to in order to produce diagonally knitted fabric. The device can also be applied to existing warp knitting machines in order to be able to utilize the latter for the production of diagonally knitted fabric.

The warp beams are arranged so as to be individually removable in warp members which are displaceably mounted in the frame of the machine. The guide needle lapping machine is suspended on a shaft which is journalled in bearings rigidly connected to the frame of the machine. By means of levers and ties this guide needle lapping machine is connected with levers which are carried on a shaft mounted in the upper part of the device and this shaft has motion imparted to it by the eccentric shaft. In this manner the lapping motion by the needles is derived from the eccentric shaft.

The guide needles or guide sinkers are not mounted individually but are secured in groups of two or more in the lead by fusing in or fitting in recesses. This group is carried on a correspondingly heavily constructed rocker so that the guide needles have a stronger support. In accordance with the nature of the desired lapping and the number of guide needles carried on a rocker two or more threads are rocked simultaneously instead of each needle with the associated thread being moved individually as hitherto. In the gap between the rockers a spacing device is provided at the upper part so that the rockers are held against lateral displacement and precisely in accordance with the groups of guide needles. The rockers are locked by inner double combs arranged to be displaced up and down whereas the movement of the rockers is effected by laterally arranged outer double combs which can be moved up and down and also laterally.

One embodiment of the invention is shown by way of example in the accompanying drawings in which:

Fig. 1 shows a part of the machine in front view.

Fig. 2 shows a side view.

Fig. 3 shows one end of the guide needle lapping machine on an enlarged scale.

Fig. 3*a* shows a part of Fig. 3 as seen from above.

Fig. 4 is a plan view of the mechanism shown in Fig. 3.

Fig. 5 shows a partial section through one end of the guide needle lapping machine.

Fig. 6 is a section along the line 6—6 of Fig. 5.

Fig. 7 is a section along the line 7—7 of Fig. 5.

Fig. 8 is an enlarged section along the line 8—8 of Fig. 1.

Fig. 9 is a section along the line 9—9 of Fig. 3.

Figs. 10 and 11 show two different working positions of the device for rocking the guide sinkers.

Fig. 12 shows the motion of the guide needle lapping machine.

Fig. 13 is a perspective view of a guide sinker carrier.

Fig. 14 shows a front view of a number of guide sinker carriers.

The arrangement comprises a framework 1 on the upper part of which is mounted a stationary frame 2 on which the warp beams 3 are displaceably arranged. Only the left hand half of the machine and broken away parts of the right hand half are shown in Fig. 1.

Fixed to the frame 2 is a central bearing 4 and two lateral bearings 5 carrying sleeves 4′, 4′ and 5′, respectively, for the stationary shaft 6 carrying the guide needle lapping machine.

Sleeves 7, one near each end of the shaft 6 and sleeves 7′, one near each side of the central bearing 4 are pivotally arranged on the shaft 6 provided with supporting surfaces 8 on which an intermediate member 9, Fig. 8, is secured. Provided on this intermediate member are two supporting bars 10 and 11 on which rockers carrying the guide needles are suspended.

On their upper side the sleeves 7 and 7′ are provided with bearing elements 12 in which double armed levers 13 and 14 are journalled. Rods 15 carrying locking combs 16, 17 are linked to the arms 13, Fig. 5.

The guide needles or guide sinkers 18, Figs. 3 and 9–14, are mounted on rockers 19 furnished with projections 20, 21 and 22. Provided on the projections 20, 21 are hook shaped portions 23, 24 by means of which the rockers 19 are suspended

on the supporting bars 10 and 11 provided on the intermediate member 9. Guide sinkers 26 are also arranged on the supporting rockers 19 on arms 25.

Two or more guide needles 18 are arranged in leads 27 or the like on the supporting rockers 19. In accordance with the number of guide needles, the arms 25 have guide sinkers 26 also secured in leads 28. In order that the supporting rockers 19 are held at the correct separation at the upper ends they are provided on either side with spacing members 29 (Figs. 8 and 13).

Connected to each arm 14 of the double armed levers 13, 14 is a pitman 30, Figs. 1 and 5 by means of which the double armed levers 13, 14 are actuated from the eccentric shaft 31.

At both ends of the device a shaft 33, Figs. 1, 5, is mounted in a lug 32 on the sleeve 7. The shaft 33, a pinion 34 and a twisted bar 35 in alignment with the shaft 33 are united to constitute a unit. The pinion 34 is in engagement with a pinion 36 carried on a displaceable shaft 37. Each shaft 37 is, by means of an arm 38, Fig. 5, connected with the corresponding rod 15 carried by the arm 13.

Secured to the lower end of each shaft 37 is a member which carries arms 39 and 40 at the upper and lower ends respectively. The ends of these arms are slotted and, when the shaft 37 is lowered, embrace the projections 20, 21 on the supporting rockers 19, Figs. 10 and 11. The bolt 41, Fig. 4, connecting the arm 14 with the pitman 30, is extended in both directions and carries cross bearing sleeves 42.

Provided on the right hand side of the front cross bearing sleeve 42 and on the left hand side of the hind cross bearing sleeve 42 is a bearing bracket 43. In each of these bearing brackets 43, a pin 44 is journalled on which a lever 45 is secured. The levers 45 carry at their other ends bolts 46 which are journalled in the cross bearing sleeves 42 and in turn carry arms 47 to which the outer comb carriers are secured.

As shown in Figs. 1, 3, 9 and 12, these outer comb carriers consist of bars 48 of angular cross section on which are secured plates 49 covering the rockers 19 on the outside.

At the upper side of the bars 48, shifting combs 50, Fig. 9, are provided which also can embrace the projections 20 on the supporting rockers 19. The lower end of the plates 49 carry shifting combs 51 adapted to cooperate with the projections 22.

Mounted on the sleeves 7 provided near the ends of the shaft 6 are further bearings 52, Fig. 3, in which forked levers 53 are journalled. The forked levers 53 carry pins 54 for cross heads 55 to which is connected the pitman 56 deriving motion from the eccentric shaft 31, Fig. 2.

As shown in Figs. 1–4, 10 and 11, the forward end of the forked lever 53 is shaped to constitute a slot guide 57 embracing the twisted bar 35.

Mounted on a shaft 58, Figs. 2 and 12, is a bell crank lever 59, 60, the forked arm 59 of which is actuated from an eccentric on the shaft 31. Connected to the upwardly directed arm 60 is a link 61, the other end of which is connected to an arm 63 carried on a shaft 62.

Rigidly secured on the shaft 62 are two lever arms 64, 65 connected to pitmans 66 and 67, as shown in Figs. 1, 2 and 12. These pitmen 66 and 67 are connected with the arms 68, 69 of a double lever carried on a shaft 70. The shaft 70 is journalled in the bearing 5, Fig. 1.

Connected with the double armed lever 68, 69 is a downwardly extending lever 71 having a slot guide 72. Moving in the guide 72 is a block 73 which is secured to a bolt 74 mounted in an upper sleeve 75′ of an arm 75, the lower sleeve 75^2 of which is pivoted to the shaft 6, Figs. 1 and 16.

A bolt 76 carried by the arm 75 is adapted to be engaged in a sleeve 77. The sleeve 77 is carried on an arm 78 which forms part of or is secured to the sleeve 7′ on the shaft 6.

Secured to each of the end walls of the framework 1 are bearings 79, Figs. 1 and 15, in which are journalled bolts 80 spring urged in one direction. At one end, each of the bolts 80 carries a sleeve 81 adapted to engage over a pin 82 mounted on the lug 32. The other end of the bolt carries a roller 83. The bearings 79 are provided with apertures through which a stepped portion 84, connected to each thrust rod 85, are adapted to pass. The stepped portion 84 bears against the roller 83 and a roller 86 on an adjustable pin 87. The thrust rods are actuated from the eccentric shaft 31.

As shown in Fig. 1 a cross shaft 88 is journalled in the central bearing 4. On both sides of the shaft 88 is a cam disc 89. These cam discs 89 are driven in common by a toothed gearing, Fig. 1. The cam discs 89 cooperate with thrust bolts 91 which are mounted in bearings 90 and carry arms 92. The arms 92 operate on spring actuated driver arms 93 carried on the bars 48 of angular cross section. The driver arms 93 displace laterally the two shifting combs 50 mounted on the bars 48 and thus effect the displacement of the warp threads.

The eccentric shaft 31 is driven from the main shaft.

Due to eccentrics operating on the lever 59 the other lever arm 60 is moved. If for example the lever 59 is lowered, Fig. 12, then the lever 60 moves to the right. Due to the link 61, the lever 63 follows this motion, whereby the lever arm 64 is raised and the lever arm 65 is lowered. By means of the pitmen 66, 67 this motion is transmitted to the lever arms 68, 69 so that the lever 71 connected therewith moves to the left. Due to the block 73 moving in the slot guide 72 and the bolt 74 carried on the block 73, the arm 75 pivoted by means of its sleeve 75″ to the shaft 6 is swung to the left. By means of the bolt 76 mounted on the arm 75, the arm 75 is connected with the arm 78 carried on the sleeve 7′ near the central bearing 4 so that the sleeve 7′ is turned on the shaft 6 and the member 9 carried on the supporting surfaces 8 of the sleeves 7 and 7′ is moved to the right. The guide needles 18 suspended thereon are thereby swung to the right through the lace needles, Fig. 12. By lifting the lever arm 59, the guide needles 18 are in a similar manner swung to the left.

By withdrawing the bolt 76, Fig. 16, from the sleeve 77, the connection between the arms 75 and 78 can be released so that the guide needle lapping machine may be swung to both sides, for instance, for drawing in the threads at the beginning of the operation.

The rockers 19 carrying the guide needles 18 are operated on the one hand by the locking combs 16, 17 and on the other hand by the shifting combs 50, 51. If the pitmen 30 are lifted by the eccentrics carried on the eccentric shaft 31 then the lever arms 14 linked to the pitmen 30 are raised. The other arms 13 of the double levers 13, 14 are lowered whereby the rods 15, Fig. 5, move downwardly and the locking combs

16, 17 embrace and hold the projections 20, 21 on the rockers 19.

By means of the cam discs 89, the thrust bolts 91 are actuated. The arms 92 carried thereon operate on the spring actuated driving arms 93 carried on the angular bars 48. In this way the plates 49 secured to the angular bars 48 are displaced after they have been lowered in a manner which will be described below. Due to the lowering motion, the shifting combs 50, 51 carried on the angular bars 48 or plates 49 are brought over the projections 20 and 22 on the rockers 19 so that the rockers 19 are displaced therewith after being released from the locking combs 16 and 17.

By means of the bolts 41, Figs. 3 and 4, which connect the arms 14 with the pitmen 30, the cross bearing sleeves 42 carried on the extension of the bolts 41, Figs. 3 and 4, are raised on raising the pitmen 30. In this way the levers 45 which are carried in the bearing blocks 43 on the bolts 44 and which are caused to move with the cross bearing sleeves 42 by means of the bolts 46 are also moved upwardly. By means of the levers 45, the arms 47 carried on the bolts 46 and to which are secured the bars 48 and the plates 49 carrying the shifting combs 50 and 51 respectively, are also raised.

In this way by means of the pitmen 30 the locking combs 16, 17, Fig. 7, on the one hand are moved downwardly by the rods 15 in order to hold the rockers and on the other hand, by means of the arms 47 the bars 48 and plates 49 are raised whereby the shifting combs 50, 51 carried thereon release the rockers 19. In this way, the rockers 19 are alternately positively placed under the influence of the pairs of locking combs 16, 17 and shifting combs 50, 51.

In order to move the rockers 19 from one side to the other, a twisted bar 35 forming a unit with a vertical shaft 33 is provided at each end of the guide needle lapping machine. This bar 35 is embraced by means of a slot guide 57 carried on the lever 53. By means of the cross head 55 the lever 53 is connected with the pitman 56 actuated from the eccentric shaft 31. The gear wheels 34 mounted on the shafts 33 carrying the twisted bars 35 engage with gear wheels 36 mounted on displaceable shafts 37, Fig. 5. By means of the arms 38, these shafts 37 are caused to participate in the motion of the rods 15. Mounted on the shafts 37 are the elements having the arms 39, 40 provided with slotted ends. In the lowered position of the shafts 37, these arms 39, 40 embrace the projections 20, 21 on the rockers 19, Fig. 10. If the lever 53 is moved downwardly then by means of the slot guide 57 embracing the twisted bar 35, the shaft 33 with the gear wheel 34 is rotated and thereby the gear wheel 36 and the shaft 37 with the element secured thereto. By means of the arms 39, 40 embracing the lugs 20, 21, the rockers 19 are moved from one path through 180° into the other path.

As an additional safeguard for holding the stationary shaft 6 against movements in any direction as well as against vibrations and in order to ensure the required definite position of the guide needle lapping machine during operation, a special locking device is provided at each end of the guide needle lapping machine.

Sleeves 81 carried on bolts 80 can pass over the pins 82, Figs. 1 and 15, provided at both ends of the machine. The motion of the bolts 80 is effected by means of the stepped portions 84 provided on the thrust bars 85. By means of the stepped portions 84, the bolts 80 are urged against the pins 82. In this way, the precise position of the guide needle lapping machine in the longitudinal direction is ensured. By means of the sleeves 81 passing over the pins 82, the guide needle lapping machine is simultaneously held against displacement in the transverse direction, Fig. 15. This locking is released for a short period of time only during which the rockers 19 are swung. In the upward motion of the thrust bars 85, the stepped portion 84 is withdrawn from the range of the bolt 80 which is restored by the action of a spring thereby offering a space for the passage of the thread, Fig. 1.

Conversely, the sleeve 81 could be arranged over the pin 82. Then the bolt 80 would be displaced in the sleeve 81 towards the pin 82.

The guide needles 18 are secured in groups of two or more in leads 27 or the like on the supporting rockers 19. In order to give the threads a reliable guidance they are also guided by separate guide sinkers 26. In order that the rockers 19 are held at the upper portion also so as to correspond with the thickness of the leads 27 or 28 carrying the guide needles 18 and the guide sinkers 26, spacing sections 29, Figs. 13 and 14 are provided. Instead of using guide sinkers 26, the guidance of the thread can be effected by means of combs carried on the arms 25.

What I claim is:

1. In a warp frame or attachment for warp frames, high speed warp frames, double warp frames, Rachel machines and the like, for producing Milanese fabric with travelling guide needles, in combination a stationary frame carrying the warp beams and connected to the frame of the machine bearing supports depending from said stationary frame, a stationary shaft fixed in said bearing supports, a guide needle lapping machine pivotally carried on said stationary shaft, said guide needle lapping machine comprising rockers carrying guide needles, locking combs and shifting combs, an eccentric shaft arranged above said stationary frame, and transmitting members mounted between said eccentric shaft and said guide needle lapping machine for transferring the movements of said eccentric shaft to said guide needle lapping machine.

2. In a mechanism as set forth in claim 1, a twisted bar carried by said vertical shaft driven by said eccentric shaft, a traction member actuated by said eccentric shaft, a lever connected to said traction member and a slotted guide on said lever embracing said twisted bar.

3. In a mechanism as set forth in claim 1, bolts at both ends of the machine, sleeves carried by the free ends of said bolts, a stepped wedge provided at each end of the machine and moved up and down by said eccentric shaft and pins carried on the ends of said guide needle lapping machine and adapted to be engaged by said sleeves on said bolts.

4. In a mechanism as set forth in claim 1, means adapted to interrupt said transmitting members requisite for actuating said guide needle lapping machine for the purpose of facilitating the drawing in of the warp threads.

5. In a mechanism as set forth in claim 1, a cross shaft mounted in the middle portion of said machine frame and driven by toothed wheels, a cam disc mounted at each end of said cross shaft, bolts displaceably mounted in bearings carried by said machine frame and actuated by said cam discs, driver plates fixed to said bolts, a guide pin

provided at one end of each driver plate and driver arms carried by said shifting combs, the arrangement serving the purpose of displacing said shifting combs.

6. In a mechanism as set forth in claim 1, in which said guide needles are mounted in groups on rockers.

7. In a mechanism as set forth in claim 1, in which combs corresponding to said guide needles are arranged on small arms provided on said rockers.

8. In a mechanism as set forth in claim 1, in which said combs and said guide needles are fused-in in leads.

9. In a mechanism as set forth in claim 1, in which said combs and said guide needles are secured in recesses provided in carriers.

10. In a mechanism as set forth in claim 1, spacing members provided at the upper portion of said rockers, the thickness of said spacing members corresponding to that of the lower needle carriers.

11. In a mechanism as set forth in claim 1, hook-shaped extensions on said rockers carrying said guide needles, said hook-shaped extensions being adapted for engagement in an intermediate member and in addition being provided with lugs with which said locking and said shifting combs can engage.

12. In a warp frame or attachment for warp frames, high speed warp frames, double warp frames, Rachel machines and the like for producing Milanese fabric with travelling guide needles, in combination, a stationary frame carrying the warp beams and connected to the frame of the machines, a stationary shaft fixed in said stationary frame, a guide needle lapping machine pivotally carried on said stationary shaft, means for moving said guide needle lapping machine, rockers carrying movable guide needles mounted in groups thereon, locking combs adapted to alternately lock and release said rockers, and means for laterally displacing said rockers after release.

13. In a warp frame or attachment for warp frames, high speed warp frames, double warp frames, Rachel machines and the like for producing Milanese fabric with travelling guide needles, in combination, a stationary frame carrying the warp beams and connected to the frame of the machine, a stationary shaft fixed in said stationary frame, a guide needle lapping machine pivotally carried on said stationary shaft, means for moving said guide needle lapping machine, rockers carrying movable guide needles mounted in groups thereon, locking combs adapted to alternately lock and release said rockers, means for laterally displacing said rockers after release, a projection at each end of said stationary shaft, vertical shafts carried by each of said projections, gearings connecting said vertical shafts at each end of said stationary shaft, an eccentric shaft, and means on said eccentric shaft for driving one of said vertical shafts at each end of said stationary shaft, the other of said vertical shafts at each end of said stationary shaft being furtner vertically movable and carrying grippers for sv.inging the end rockers released by said locking combs.

14. In a warp frame or attachment for warp frames, high speed warp frames, double warp frames, Rachel machines and the like for producing Milanese fabric with travelling guide needles, in combination, a stationary frame carrying the warp beams and connected to the frame of the machine, a stationary shaft fixed in said stationary frame, a guide needle lapping machine pivotally carried on said stationary shaft, means for moving said guide needle lapping machine, rockers carrying movable guide needles mounted in groups thereon, locking combs adapted to alternately lock and release said rockers, means for laterally displacing said rockers after release, sleeves carried by said stationary shaft provided with bearing surfaces and projections, and an intermediate member mounted on said projections of said sleeves and carrying two supporting bars for said rockers carrying said guide needles.

15. In a warp frame or attachment for warp frames, high speed warp frames, double warp frames, Rachel machines and the like for producing Milanese fabric with travelling guide needles, in combination, a stationary frame carrying the warp beams and connected to the frame of the machine, a stationary shaft fixed in said stationary frame, a guide needle lapping machine pivotally carried on said stationary shaft, means for moving said guide needle lapping machine, rockers carrying movable guide needles mounted in groups thereon, locking combs adapted to alternately lock and release said rockers, means for laterally displacing said rockers after release, sleeves carried by said stationary shaft provided with bearing surfaces and projections, an intermediate member mounted on said projections of said sleeves and carrying two supporting bars for said rockers carrying said guide needles, bearings provided on said sleeves, levers movably mounted in said bearings and extending obliquely towards one side, connecting bolts carried at one end of said levers, and arms on said bolts carrying laterally positioned shifting combs.

16. In a warp frame or attachment for warp frames, high speed warp frames, double warp frames, Rachel machines and the like for producing Milanese fabric with travelling guide needles, in combination, a stationary frame carrying the warp beams and connected to the frame of the machine, a stationary shaft fixed in said stationary frame, a guide needle lapping machine pivotally carried on said stationary shaft, means for moving said guide needle lapping machine, rockers carrying movable guide needles mounted in groups thereon, locking combs adapted to alternately lock and release said rockers, means for laterally displacing said rockers after release, sleeves carried by said stationary shaft provided with bearing surfaces and projections, an intermediate member mounted on said projections and carrying two bearing bars for said rockers carrying said guide needles, bearings provided on said sleeves, oblique levers movably mounted in said bearings and extending obliquely towards one side, connecting bolts carried at one end of said levers, arms on said connecting bolts carrying laterally arranged shifting combs, double-armed levers pivoted on said sleeves and carrying at one end said locking combs, said double-armed levers effecting the motion of said obliquely extending levers as well as the motion of said locking combs, a cross-head connection at opposite ends of said double-armed levers, a traction member connected to said cross-head connection and actuated from said eccentric shaft, and other cross bearings at the extended ends of said connecting bolts adapted to actuate said obliquely arranged levers for moving said shifting combs up and down.

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