

F. A. SCHMIDT.  
LACE MAKING MACHINE.  
APPLICATION FILED MAY 19, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

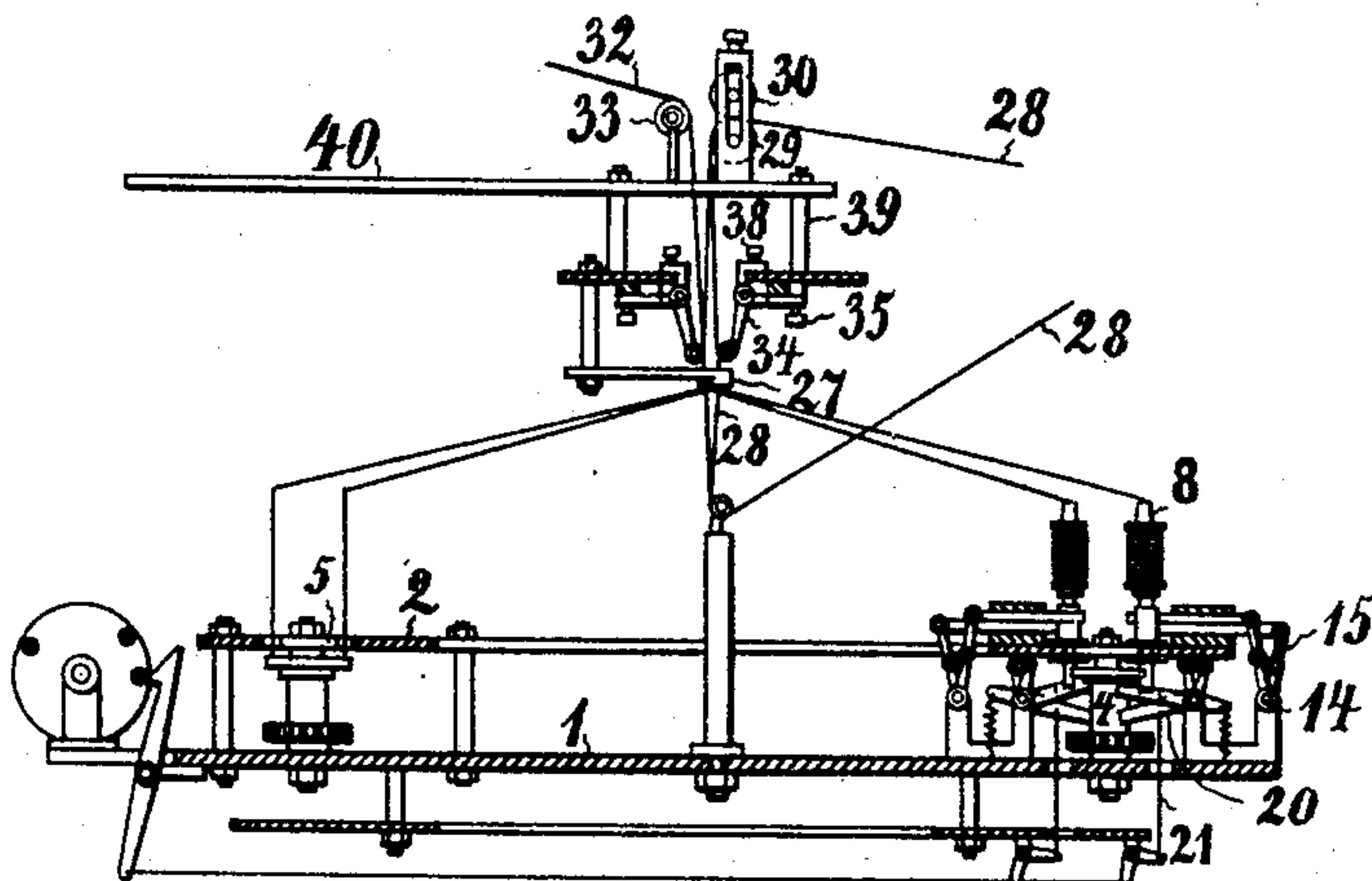
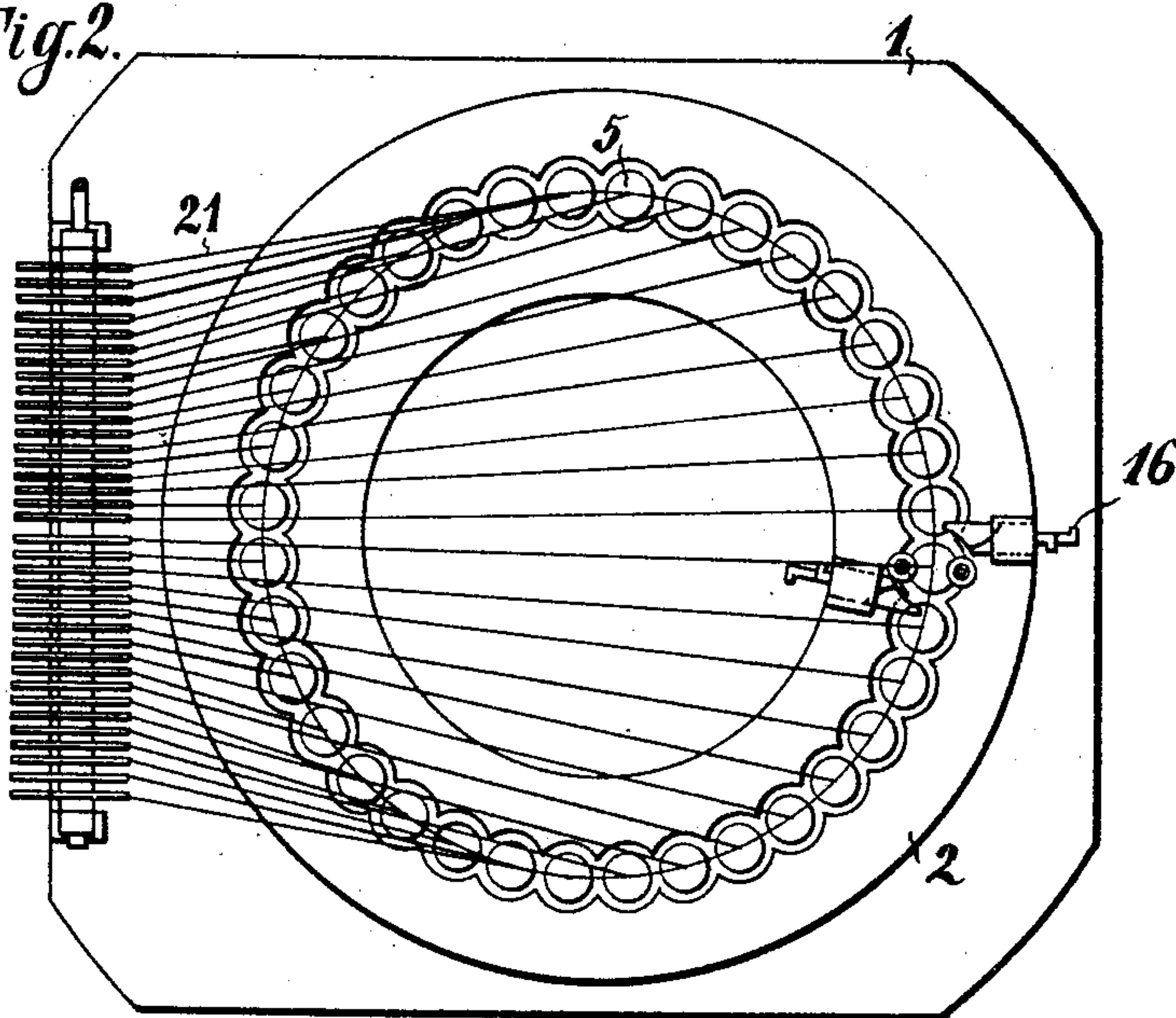


Fig. 2.



WITNESSES

*Walter Abbr*  
*E. W. Collins*

INVENTOR

*Friedrich August Schmidt*  
BY

*Howen and Howen*

ATTORNEYS

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3 SHEETS—SHEET 2.

Fig. 3.

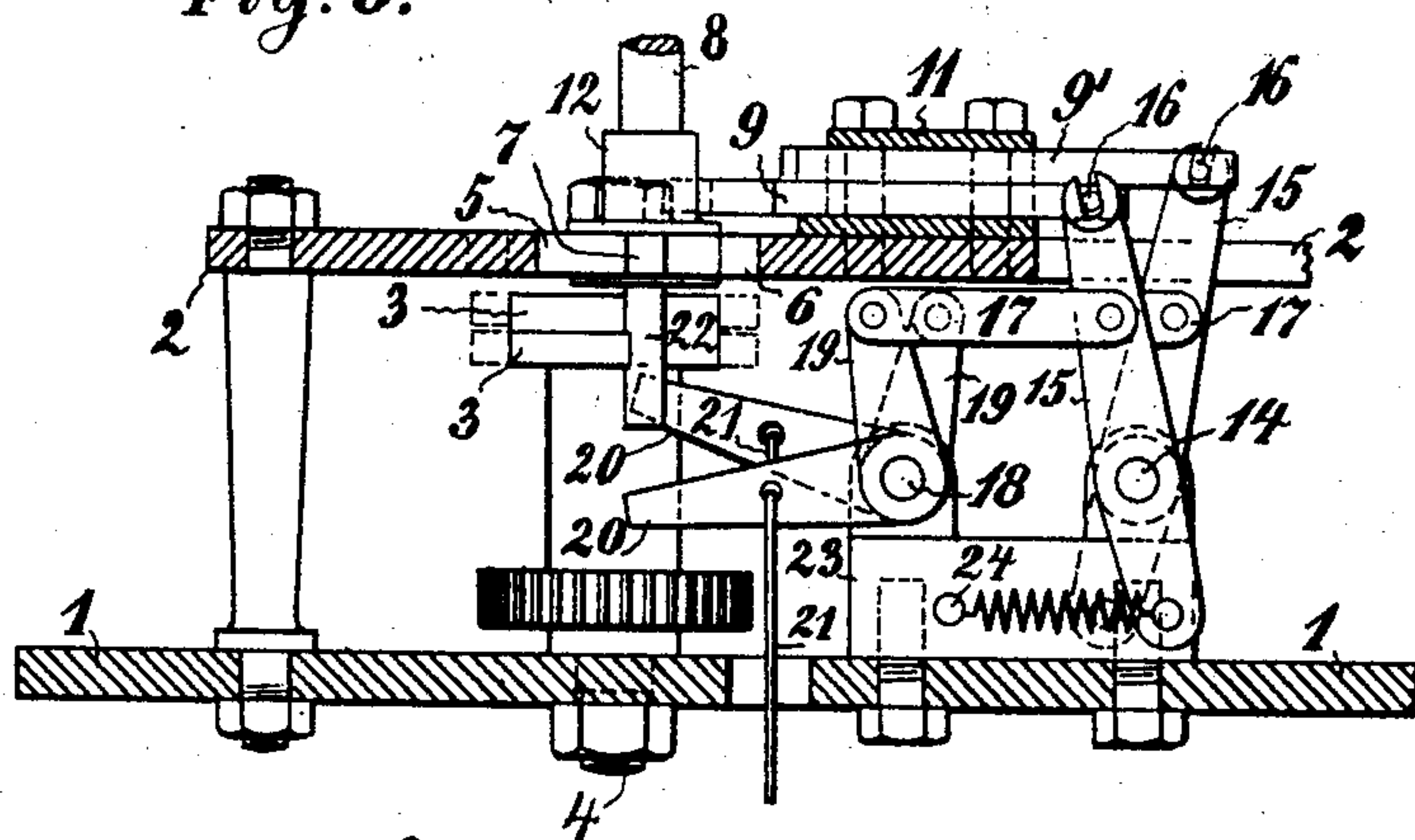


Fig. 4.

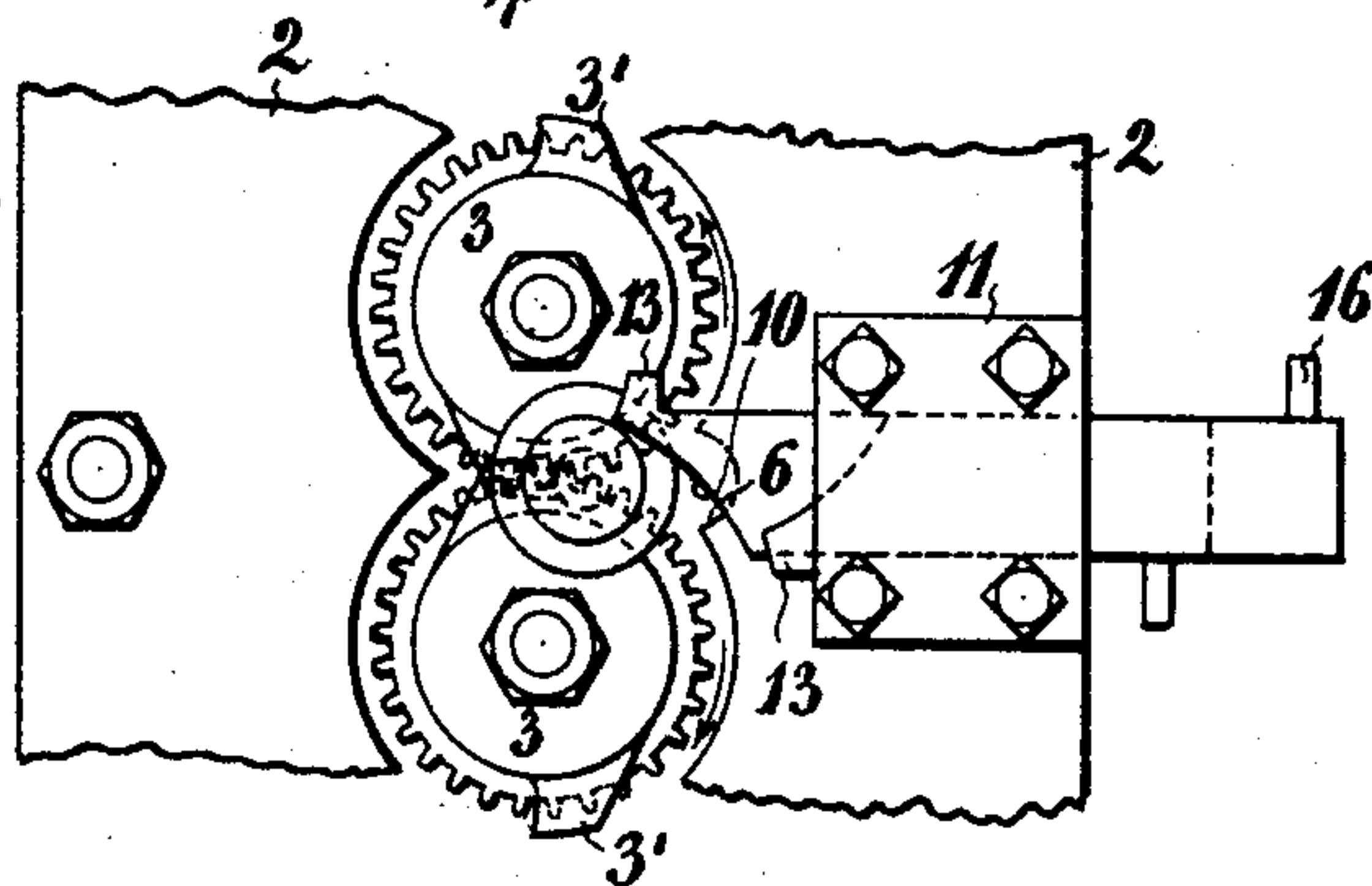
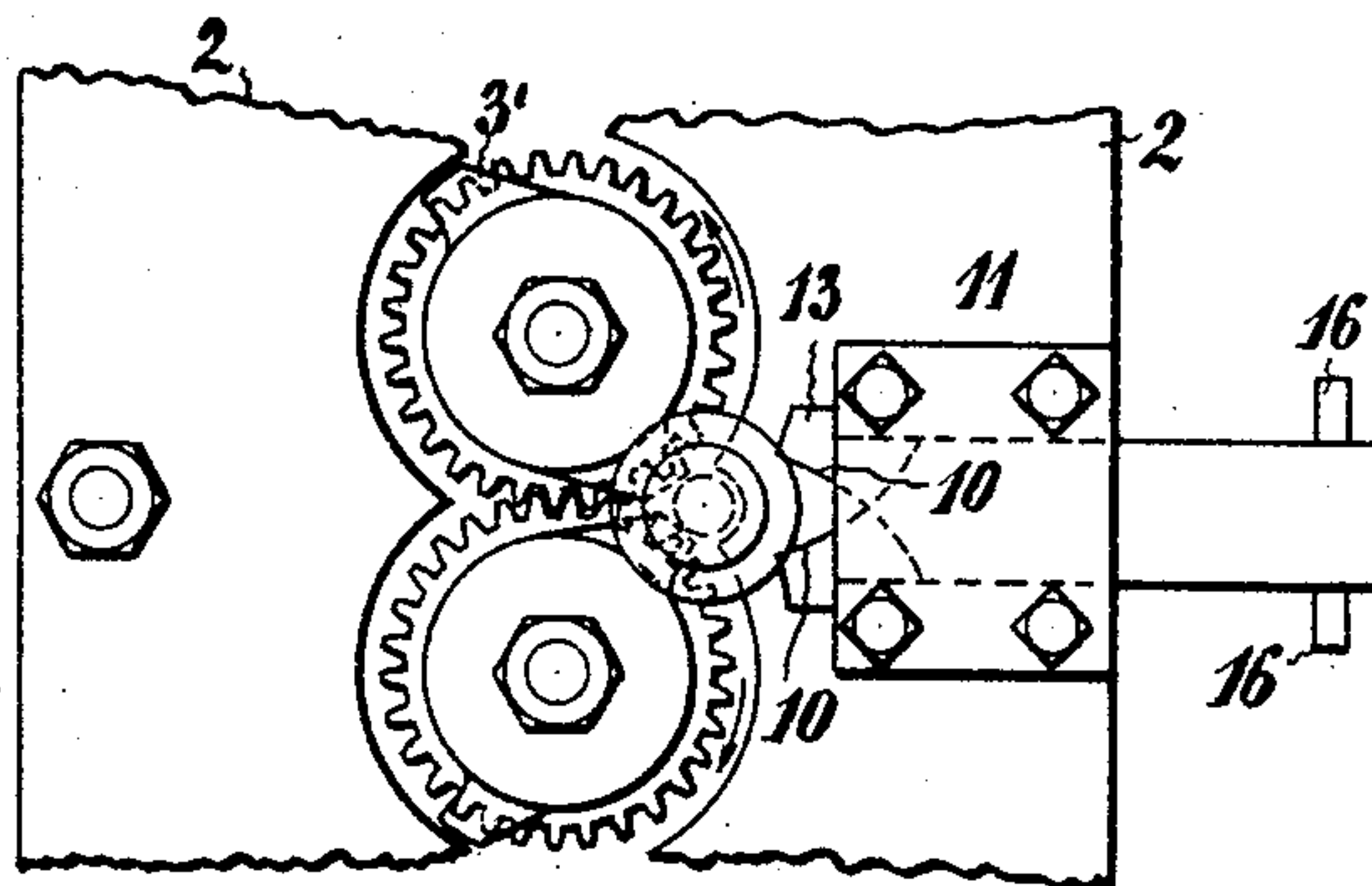


Fig. 5.



WITNESSES

*Walter Abbe*  
*E. W. Collins*

INVENTOR

*Friedrich August Schmidt*  
BY

*Howar and Howar*

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3 SHEETS—SHEET 3.

Fig. 6.

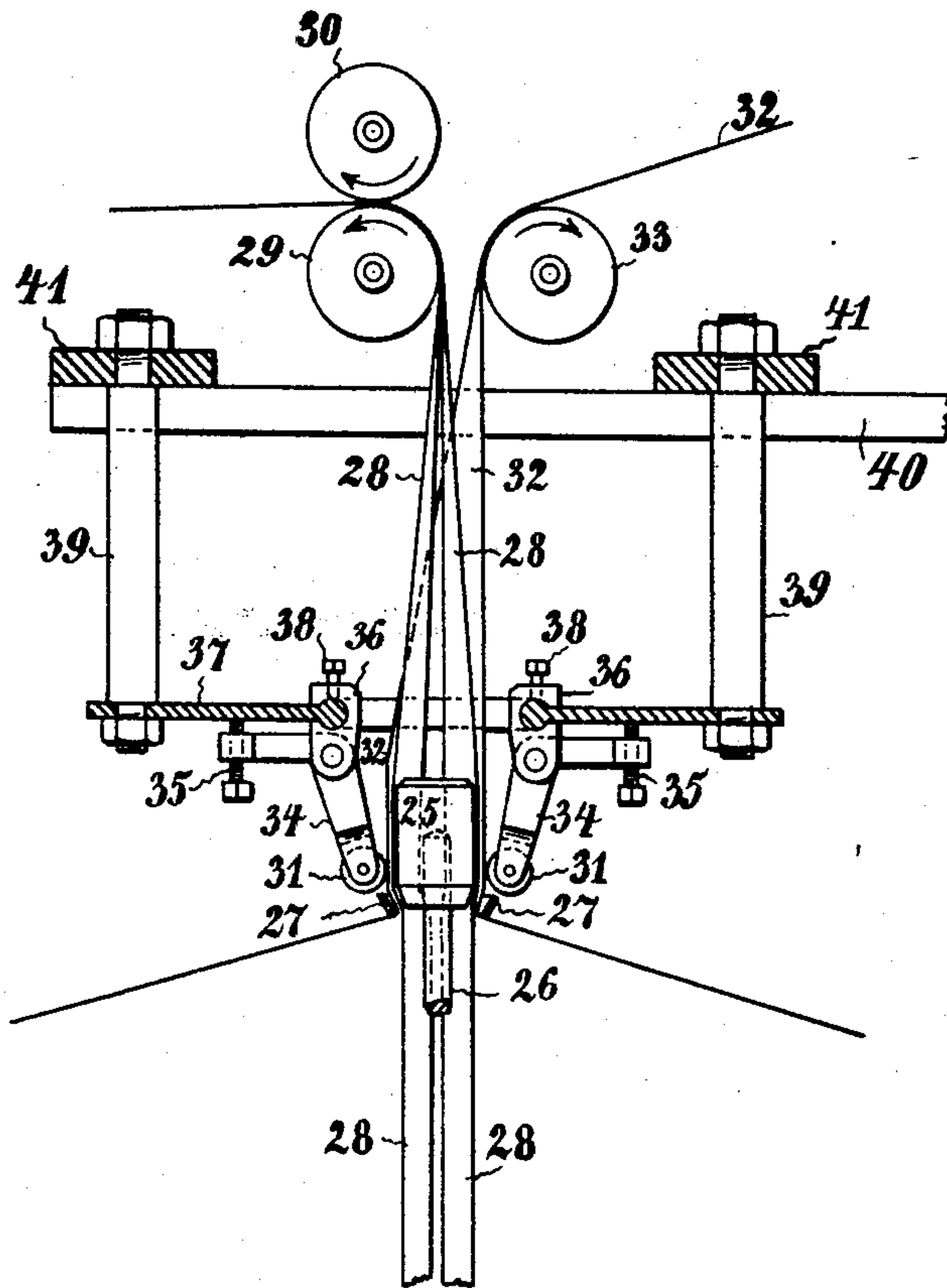
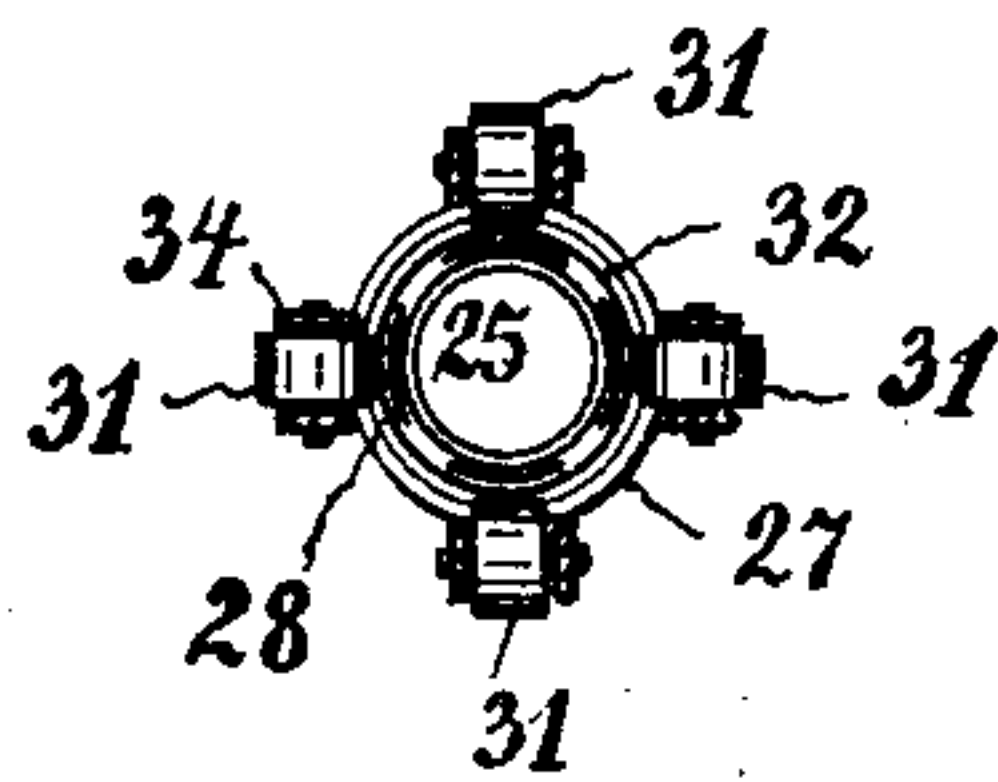


Fig. 7.



WITNESSES

*Walter Abbe*  
*E. W. Collins*

INVENTOR

*Friedrich August Schmidt*

BY

*Howson and Howson*

ATTORNEYS



# UNITED STATES PATENT OFFICE.

FRIEDRICH AUGUST SCHMIDT, OF BARMEN, GERMANY.

## LACE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 779,876, dated January 10, 1905.

Application filed May 19, 1904. Serial No. 208,745.

*To all whom it may concern:*

Be it known that I, FRIEDRICH AUGUST SCHMIDT, a subject of the King of Prussia, Emperor of Germany, and a resident of Löwenstrasse 7, Barmen, Germany, have invented certain new and useful Improvements in Lace-Making Machines, of which the following is a full, clear, and exact description.

The present invention relates to a lace-making machine for manufacturing open flat fabrics, which is distinguished from hitherto-known lace-making machines by the means for guiding and directing the bobbins and for drawing off the finished fabric.

In the production of lace it is necessary for it to be possible for any desired bobbin to be brought to rest at any desired crossing-place any desired number of times and for any desired length of time and to be set in operation again and for it to be possible for any bobbin to be crossed with a bobbin situated on the right or left. Devices, indeed, are known in which the stopping and starting are effected by means of a single device; but the guidance of the bobbins is always brought about by a special device—for instance, by the well-known tongue-switches, which swing to and fro. The stopping of the bobbin in the case of the well-known devices is brought about by guiding the bobbin into a blind siding, which is arranged at any part of a race, but nevertheless not at the crossing-place of two races, in which siding it remains until started again. This arrangement of the siding has the disadvantage that a turning or directing of the bobbins at the place where they are stopped is impossible, as the bobbins after again coming within reach of the driving-wings must always be first moved up to the next crossing-place, where a turning or directing by means of the well-known tongue-switches is possible. An additional defect possessed by the lace-making machines hitherto known for manufacturing open flat fabrics is that the fabric, when it is produced over a tube-shaped body moving over the mandrel, is formed into a closed fabric by means of supplementary threads at its corners or edges, which assumes its flat open form after cutting the supplementary threads employed. The at-

tempt was made to avoid the use of supplementary threads by holding the edges together by means of chains carrying needles arranged in the mandrel. This arrangement again had, in the case of the aforesaid machines, the disadvantage that as the fabric was drawn off directly over the mandrel a tearing of the fabric was possible.

The present invention has for its object the avoidance of the above-mentioned defects. The three operations of the stopping, starting, and turning or directing of the bobbin are rendered possible by means of merely a single device, by the stopping of the bobbin taking place not at a place at a distance from the switch, but directly at the latter. For this purpose for the customary tongue-switch a peculiar switch system is substituted, by means of which the bobbins are not only turned or directed, but also set in operation again. The switch system consists of two switch-slides actuated by any suitable mechanism, which when they are both drawn back move the bobbin out of the reach of the driving-wings and allow it to enter a siding provided under the switches in the guide-plate, in which it remains until set in operation again. The front ends of the switches are so formed that on being pushed forward they again bring the stationary bobbin into the path of the driving-wings and according as to whether the one or the other switch is pushed forward turn or direct the same toward the one or the other side.

According to the present invention the drawing off of the finished fabric is brought about by producing the fabric in a flat open form over bands sliding along the mandrel, a number of outer rollers pressed radially inward, instead of which bands can also be employed pressing the fabric tightly against the inner bands sliding over the mandrel, so that a tearing of the fabric is out of the question, and consequently the supplementary threads are superfluous, as the fabric has not been subjected to a pull by the drawing-off rollers.

In the accompanying drawings, which illustrate one embodiment of the present invention, Figure 1 is a central vertical section of a lace-making machine. Fig. 2 is a plan of the guide-plate. Fig. 3 is a partial sectional



side elevation of a bobbin-switch. Fig. 4 is a plan of the bobbin-switch in the working position. Fig. 5 is a plan of the bobbin-switch in the position of rest of the switch. Fig. 6 is a longitudinal section through the drawing-off device, and Fig. 7 is a transverse section through the same.

On the base-plate 1 of the machine the driving-wheels 3 are mounted, their number corresponding to the number of threads, said wheels rotating on the bolts 4. The races of the bobbin-carriers are bounded in the ordinary manner by the guide-plate 2 and the plates 5, mounted on the bolts 4. In the guide-plate 2 a recess 6 is provided at the place where the driving-wings 3' of two neighboring driving-wheels diverge, into which recess the neck 7 of the bobbin-carrier 8 can enter in order to get out of the reach of the driving-wings. In order to set the bobbin-carrier in operation again and in order at the same time to direct it to the one side or the other, the two switch-slides 9 9' are arranged on the guide-plate 2, said switch-slides being guided in a box 11, mounted on the guide-plate. The front ends 10 of the two switch-slides 9 9' are given a form corresponding to the circular race of the bobbin-carrier, for the purpose of directing and restarting the bobbin, so that on pushing forward the switch the front end 10 comes against the stop 12 of the bobbin-carrier, and so brings the latter within the reach of the driving-wings. The direction of the bobbin toward the one or the other side is effected by pushing forward the one or the other switch. Projections 13 prevent the switches being pushed back too far into the box by coming against the box. The pushing forward and backward of the two switches 9 and 9' is effected by means of two levers 15, turning upon a common axle 14, said levers engaging with pins 16, fixed on the back ends of the switches. By means of the links 17 the levers 15 are connected with the one arm of the bell-crank levers 19, turning on the pivots 18. The other arms 20 of said bell-crank levers are engaged by the draw-wires 21, connected with a suitable pattern device. The length of the latter arms is so adjusted that when the switches are in their position of rest the pin 22 of the bobbin-carrier can slide past them, bringing the neck 7 of the bobbin-carrier into the recess 6 in the guide-plate. For bringing the whole switch system back into its position of rest the springs 24 are employed, which engage with the shorter arms of the levers 15 and which are mounted on a foot 23, said foot being arranged on the base-plate 1 and serving at the same time as a bearing for the pivots 14 and 18. If a stationary bobbin is, for example, to be again set in operation along a race running to the right, a bell-crank lever 19, by means of the pattern device, is pulled by the draw-wire 21, so that the end of the le-

ver-arm 20 leaves the bobbin-pin 22 free to be moved toward the direction of running. It will be seen that the levers moving the switch-slides are under the action of the springs 24, so that the switch-slides are afterward drawn back into their normal position, and the ends of the arms 20 are elevated so as to catch the pins 22 of the bobbin-carriers when the said pin strikes them to guide the carrier into the recess 6. The switch-slide 9 is simultaneously pushed forward and presses the bobbin-carrier again into the reach of the driving-wings, which engage it and carry it farther. On restarting a bobbin on a race running to the left the switch-slide 9', lever 15, and bell-crank lever 19, determined for this purpose, are set in motion in the same manner. The same cycle of events takes place if a running bobbin is to be guided from one race to the other. On stopping a bobbin the switches and levers remain in the position of rest, in which they are kept by the springs 24. The bobbin then runs with its pin 22 between the two lever-arms 20 and remains stationary in the recess 6 in the guide-plate 2.

The fabric is produced in a well-known manner over a mandrel 25, carried by its rod 26, said mandrel being arranged in the middle of the thread-assembler 27. Over the circumference of the mandrel 25 a series of bands, corresponding in number to the width of the fabric to be produced, is conducted. These bands are either endless or of a length corresponding to the length of the lace and are kept in progressive motion by one or more drawing-off rollers 29 30. Pressure-rollers 31, corresponding in number to the number of bands, cooperate with these bands 28, serving as fabric-carriers, said pressure-rollers being arranged above the thread-assembler 27 directly over the place where the crossing of the interlaced strands takes place and pressing the fabric tightly against the bands 28, thus insuring the driving of the fabric by means of the latter, so that it can be drawn off from the roller 33 without tearing. The pressure-rollers 31 are carried by bell-crank levers 34, the pressure exerted on the fabric 32 being regulated by a set-screw 35, arranged in the second arm of the lever. The bell-crank levers 34 are mounted revolvably in bearings in supporting-arms 36, which can be displaced as desired along the inner edge of the plate 37, which is provided with a central opening, and be screwed fast in the desired position by means of the binding-screws 38, so that an accidental displacement of the bell-crank levers is out of the question. The plate 37 is supported by the pillars 39 and the cross-bars 41, resting on the transverse bars 40. On the transverse bars 40 the rollers 29 30, effecting the drawing off of the bands 28, are also arranged, said rollers being only diagrammatically indicated in the drawings.

I use the term "rollers" in a broad enough



sense to include their well-known equivalents—such as bands, either endless or otherwise—so long as such equivalents are adapted to be pressed inward against the lace being  
5 formed on the mandrel.

Instead of the pressure-rollers 31 represented in the drawings bands similar to the bands 28, serving as fabric-carriers, can be employed, which can be drawn off either by  
10 the rollers 29 30 or by special rollers.

It is of course to be understood that the scope of the present invention is not confined to the particular embodiment illustrated in the drawings and described, but that said scope  
15 is indicated by the claims.

I claim as my invention—

1. A lace-making machine provided with bobbin-carriers, a guide-plate having intercommunicating races therein, means for driving the carriers in said races, guide devices  
20 located at the crossing of said races, said guide-plate having a siding-recess therein at such crossing, and a pattern mechanism for controlling said guide devices.

25 2. A lace-making machine provided with bobbin-carriers and intercommunicating races therefor, means for driving the carriers in said races, a siding-recess being located at the

crossing of said races, guide devices located at the crossing of said races including slides 30 in pairs adapted to determine the starting and the direction of travel of said bobbin-carrier from its position of rest within said siding-recess, and a pattern mechanism for controlling said guide devices. 35

3. A lace-making machine provided with bobbin-carriers, and intercommunicating races therefor, means for driving the carriers in said races, guide devices located at the crossing of said races, a siding-recess being 40 located at such crossing, and a pattern mechanism for controlling said guide devices, in combination with a mandrel over which the formed lace is drawn, traveling bands passing along the mandrel in the direction in which 45 the lace is drawn off and pressing means for firmly pressing the lace as it is formed against the bands passing along the mandrel.

In testimony whereof I have signed my name to this specification in the presence of two sub- 50 scribing witnesses.

FRIEDRICH AUGUST SCHMIDT.

Witnesses:

OTTO KÖNIG,

J. A. RITTERSHAUS.