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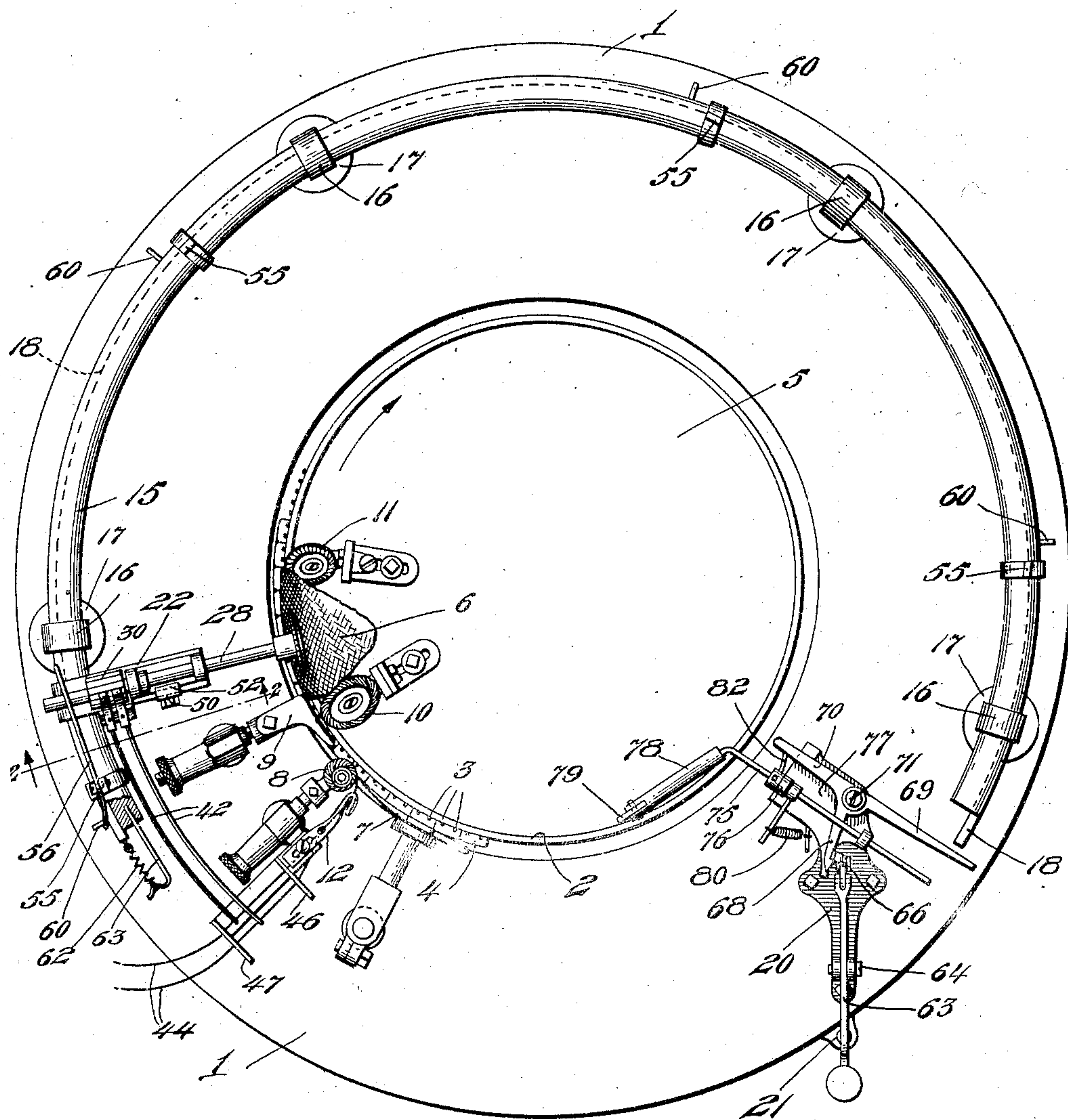
J. F. MALONEY

KNITTING MACHINE

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3 Sheets-Sheet 1

Fig. 1.



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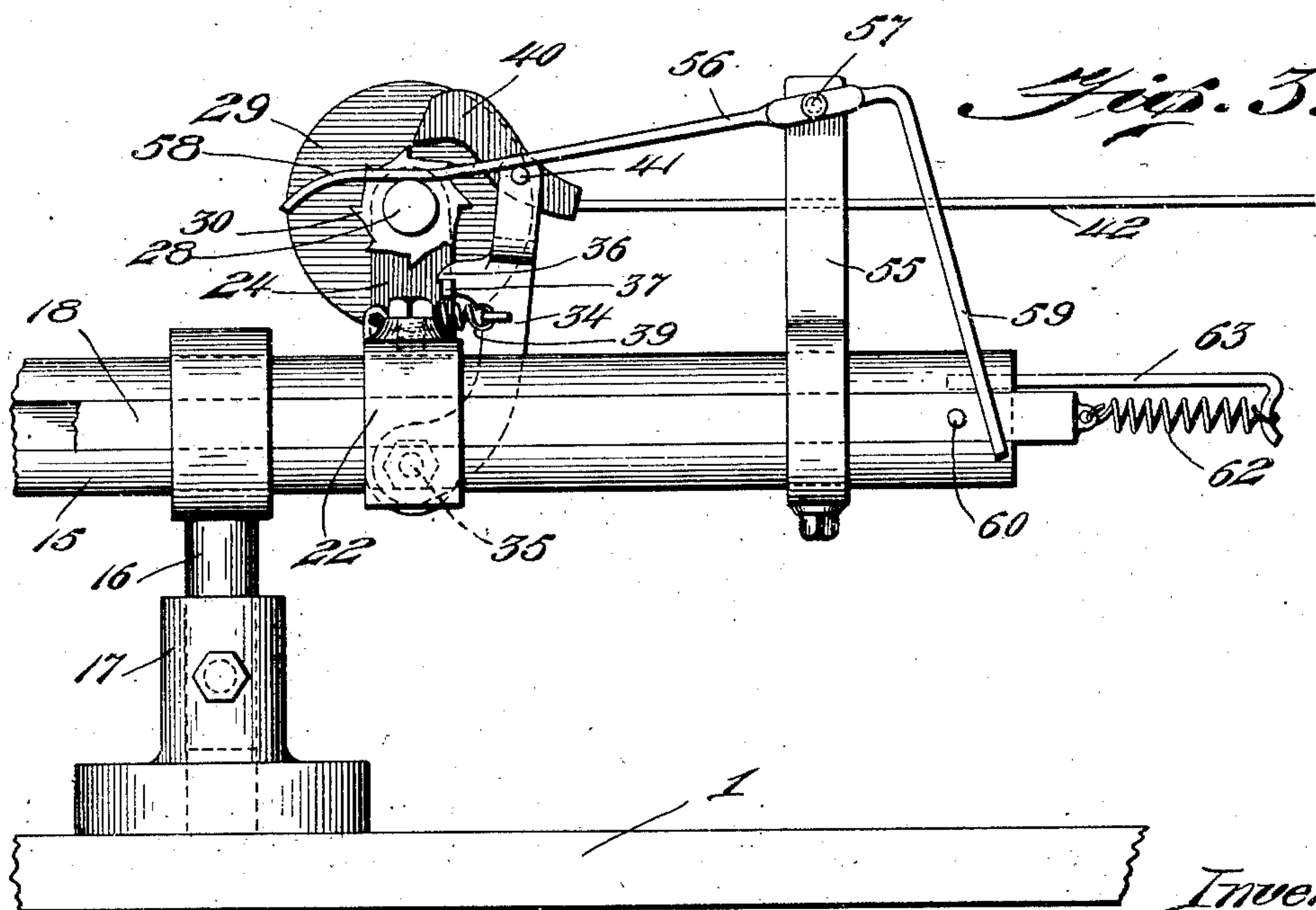
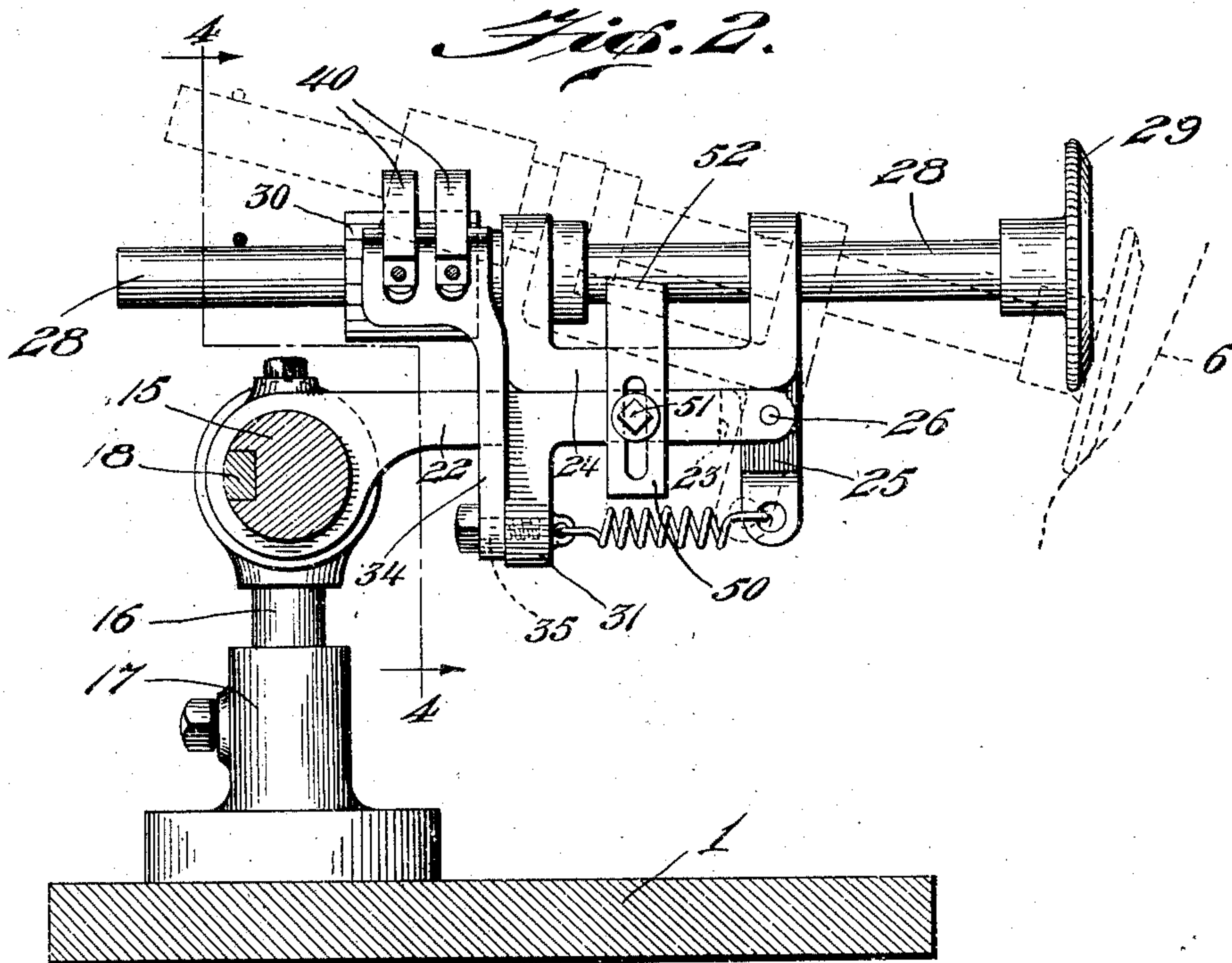
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3 Sheets-Sheet 2



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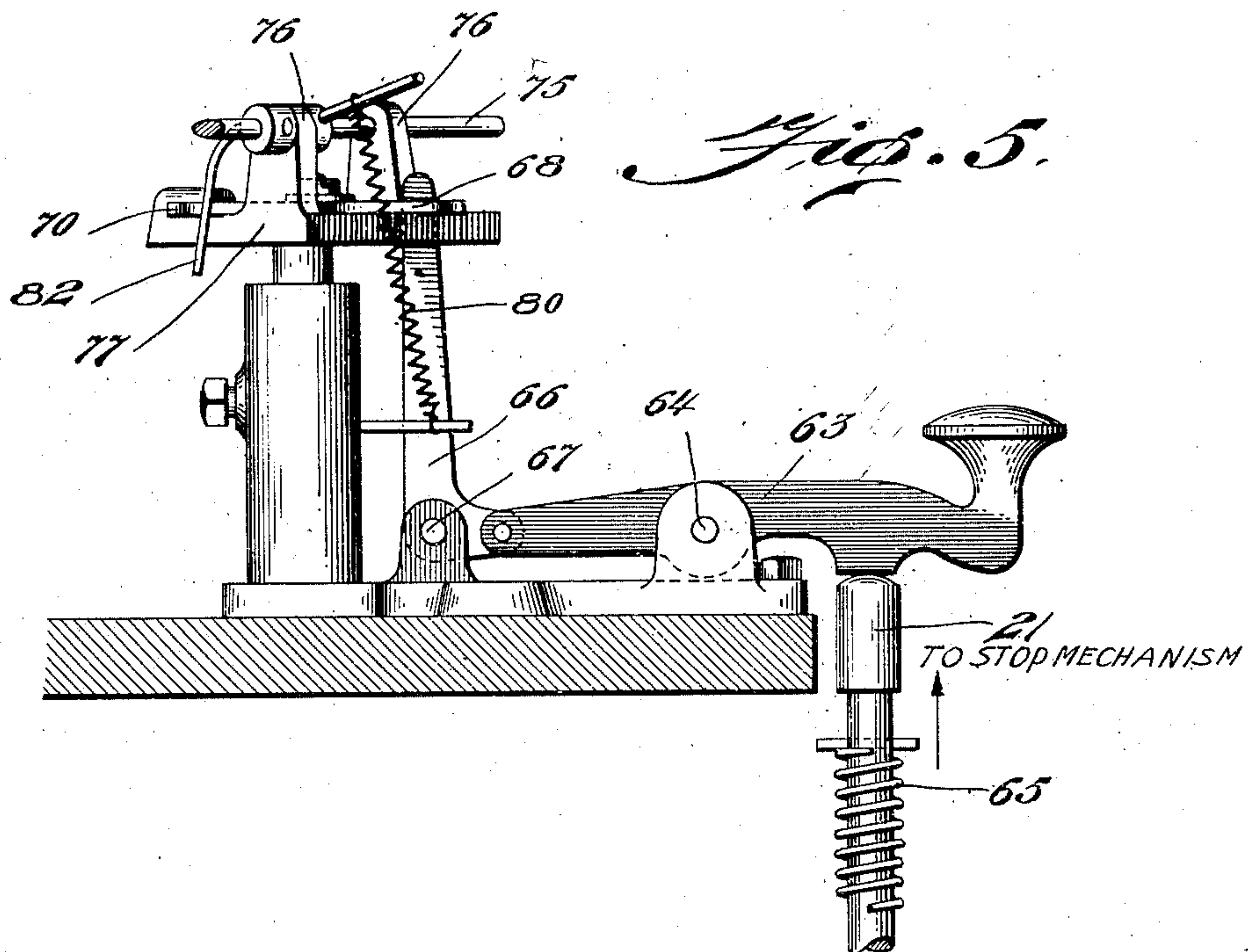
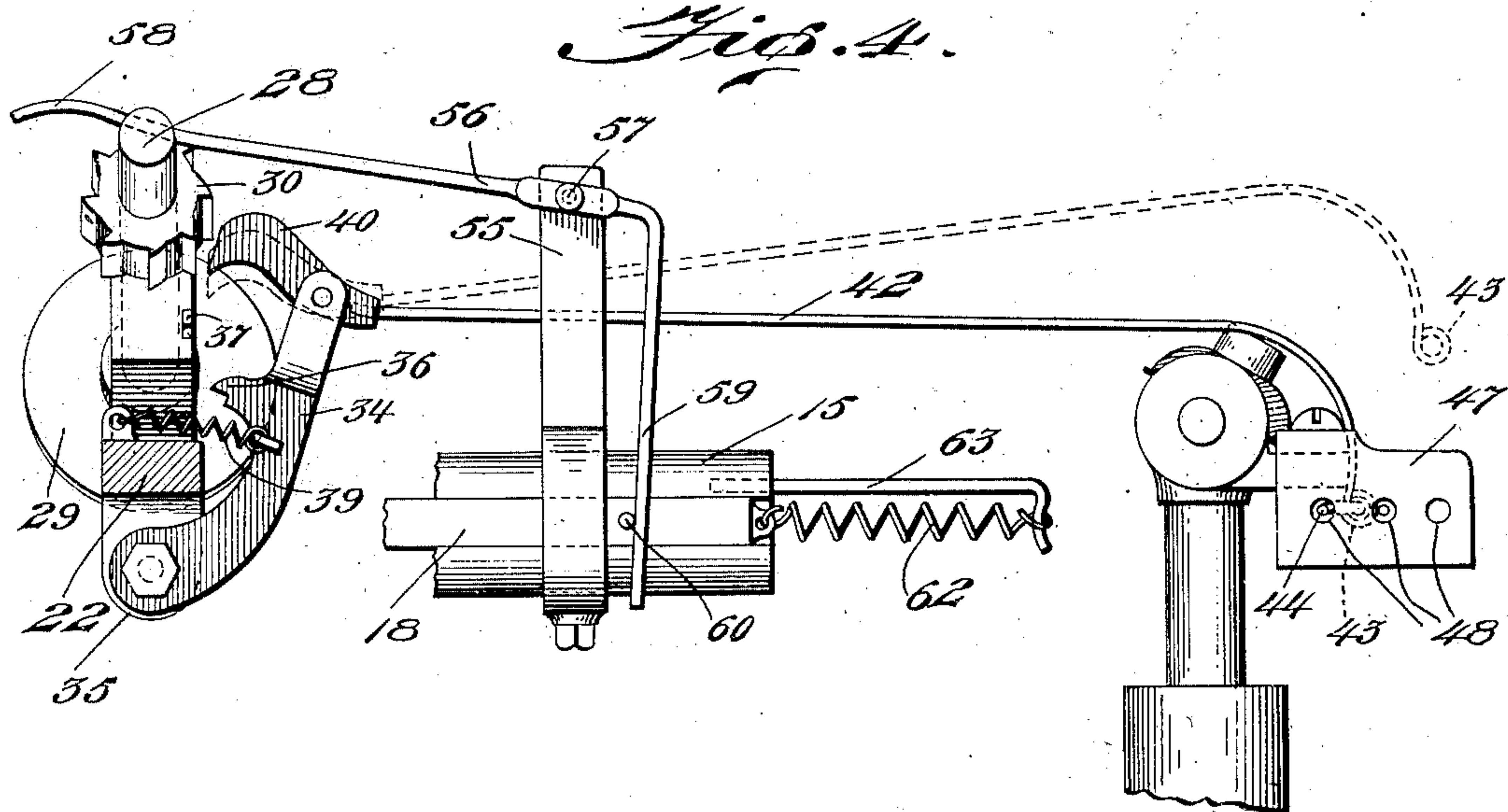
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3 Sheets-Sheet . 3



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UNITED STATES PATENT OFFICE.

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KNITTING MACHINE.

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This invention relates to an improvement in knitting machines and more specifically to an attachment for preventing pressing off the fabric and automatically stopping the mechanism upon the breakage of one or more of the threads or ends.

In devices of this character the breakage of a thread or end from which the stitches are being formed through the cooperative action of the needles and feeds results in an imperfection in the fabric which must be mended or corrected by manual operation, and frequently results in the fabric being entirely removed from the needles by the cast-off wheel, thus making it necessary to entirely reposition the fabric on the needles before again commencing operation.

One object of the present invention is to overcome these difficulties or lessen the amount of labor required in correcting them by providing a device of the character described adapted to immediately depress the fabric upon the needles on the breakage of one of the threads and thus prevent disengagement of the fabric from the needles with the consequent necessity of replacing the same; and also to automatically stop the mechanism upon breakage of a thread and thus permit the repair of the breakage with a minimum expenditure of time and labor.

Another object of the invention is to provide a simple and efficient means adapted to cooperate with the usual stop mechanism for automatically stopping the machine immediately upon the breakage of a thread.

A further object of the invention is the provision of a mechanism of the character described comprising a pivotally mounted revoluble shaft having a wheel thereon contacting with the fabric and adopted for continuous rotation during the knitting operation, with simple and efficient means operable upon the breakage of a thread to move the shaft about its pivot and thereby stop the knitting mechanism and depress the knitted fabric upon the needles.

Other objects and advantages of the invention relate to various details of the mechanism and arrangement of the parts adapted to provide a simplified and efficient mechanism for the purpose specified which will operate with certainty and precision to perform the functions described.

In the drawings accompanying the application and forming a part thereof I have shown a preferred form of my invention as applied to a circular knitting machine of the usual type, which, however, is to be understood to be for the purpose of illustration only, as I am aware that various changes may be made in the construction, proportion and arrangement of the parts, and in the substitution of various equivalent mechanisms for those shown as used for transmitting impulses from one operating element to another without departing from the spirit and intent of the present invention, and without exceeding the scope of the appended claims.

Referring to the drawings:

Fig. 1 is a plan view of one type of circular knitting machine illustrating a form of my invention, and showing an arrangement of various operating parts of such machine in their relation to my improved mechanism,

Fig. 2 is a side elevational view taken along the line 2—2 of Fig. 1 of the rotatably supported pivotally mounted shaft provided with a wheel adapted to contact with the fabric, and illustrating in full lines the normal position of the shaft and its attendant mechanism and showing in dotted lines the position of the parts after the mechanism has been tripped by the breakage of a thread.

Fig. 3 is an end elevational view of the mechanism shown in Fig. 2, and illustrating the arrangement of the parts in their normal operative position,

Fig. 4 is a view taken along the line 4—4 of Fig. 2 showing approximately the position of the parts after the shaft has been tripped,

Fig. 5 is a side elevational view of the stop mechanism.

In the drawings 1 designates a table or circular support for the feeds, 2 is a circular needle-head provided with a plurality of bearded spring needles 3 secured thereto by means of the usual needle blocks 4, while 5 is an internal circle or other support for the landing wheel and cast-off wheel. The table 1 is shown as of circular form merely for convenience of illustration, and may of course be of any desired shape, and while the outer actuating devices are shown as mounted upon the table they may be mounted upon the usual outside circles such as are employed in machines of this character.

The circular needle head 2 rotates in clockwise direction as seen in Fig. 1 to bring the needles successively into operative engagement with the actuating devices and thereby effect manipulation of the thread to form loops and produce a circular knitted fabric, a portion of which fabric is indicated at 6. The actuating devices comprise a push down 7, a stitch wheel 8, a presser plate 9 cooperating with the landing wheel 10, and a cast-off wheel 11. The actuating devices above named are of the conventional type, the outer members 7, 8 and 9 being mounted upon the usual supports, and the inner members 10 and 11 being supported by an inner circle plate or in any other suitable or convenient manner. A thread guide 12 is carried by the stitch wheel support for guiding one or more threads into operative position relative to the needle-head.

An annular bearing 15 is mounted upon the table 1 being supported thereon by posts 16 adjustably mounted in brackets 17, and an annular slide 18 is mounted in a groove formed in one side of the annular bearing 15, being supported therein by any suitable anti-friction devices if desired, whereby the slide may move freely in the annular bearing 15. A stop mechanism indicated generally by the numeral 20 is mounted upon the table 1 and is adapted to actuate a shipper lever 21 to stop the knitting mechanism. The stop mechanism is adapted to be actuated by the slide 18 to stop the knitting mechanism as the slide is operated by the pivotally mounted shaft after a manner which will now be described.

A supporting arm 22 is carried by the annular bearing 15 and located next to the presser plate 9, which arm is bifurcated at its inner end as indicated at 23 and supports a U-shaped bracket 24 provided with a downwardly extending lug 25 which is positioned within the bifurcated end of the arm 22 and is pivotally supported therein by a pin 26. A shaft 28 is rotatably mounted in the U-shaped bracket 24 and provided at one end thereof with a wheel 29, the circumference of which may be milled if desired, and which contacts with the fabric web 6 to rotate the shaft 28 with the travel of the fabric. A ratchet wheel 30 is fixed to the shaft 28 and rotates therewith.

The supporting arm 22 is provided with a depending lug 31 which is connected with the lug 25 by a coiled spring 32, and a latch 34 is pivotally supported by a pin 35 carried by the lug 31, the latch 34 being provided with a dog 36 normally engaging a projection 37 on the U-shaped bracket 24, as is shown in Fig. 3 to hold the bracket 24 in its full-line position as shown in Fig. 2. A coiled spring 39 connects the latch 34 with the supporting arm 22 and tends to draw the latch 34 into the position shown in Fig. 3. A plurality of pawls 40, in the present instance two in

number although a greater number may be used if desired, are pivotally supported by a pin 41 in the upper end of the latch 34 and in position to permit operative engagement of the pawls with the ratchet 30 carried by the shaft 28. Each of the pawls 40 is provided with a rearwardly extending arm 42 provided at its end with a loop 43 through which passes one of the threads 44 as the same is drawn to the thread guide 12.

Supplemental guide plates 46 and 47 are carried by the thread guide 12 and spaced from each other to provide additional guiding means for the threads, the plates 46 and 47 being each provided with a plurality of aligned guide openings 48 through which the threads 44 pass. The loops 43 at the ends of the arms 42 are normally positioned between the plates 46 and 47 as shown in Fig. 1. An adjustable stop plate 50 is secured to the arm 22 by a lock nut 51 and is provided with an inturned upper edge 52 adapted to engage over the side of the U-shaped bracket 22 to limit the movement of the bracket 22 about its pivot 26.

An upright standard 55 is carried by the annular bearing 15 and provided with a pivotally mounted arm 56 supported by a pivot pin 57. One end 58 of the arm 56 normally lies upon the shaft 28, while the opposite end 59 extends downwardly as shown in Fig. 3 into position for operative engagement with a stud 60 carried by the annular slide 18. A coiled spring 62 connects that end of the slide 18 which is located at the left of Fig. 1 to a bracket 63 carried by the annular bearing 15 whereby the slide is normally retracted and resiliently held in the position shown in Fig. 3 of the drawings.

Standards 55 and studs 60 are arranged together throughout the extent of the annular slide being located adjacent to each set of actuating devices, and the arrangement of these parts as shown in Fig. 1 is adapted for use with four sets of actuating devices although a greater or less number may be used as desired, as will be readily apparent to those skilled in the art.

Located adjacent to the end of the slide 18 at the right as seen in Fig. 1 is a stop mechanism indicated generally by the numeral 20, which is mounted upon the table 1, and comprises a lever arm 63 pivotally mounted as at 64 with which a shipper arm 21 pressed upwardly by coiled spring 65 engages upon one side of its pivot 64. The opposite end of the lever 63 is pivotally connected to an elbow lever 66 which is pivotally supported at 67 and extends upwardly into engagement with a latch 68. The latch 68 forms part of a triangular lever having arms 69 and 70 extending therefrom and which is pivotally mounted at 71. The arm 69 of the triangular lever extends to a point in proximity to the end of the slide 18 and is actuated by the slide

18 when the slide is moved by the tilting of the shaft 28 through the lever 56 and against the tension exerted by the spring 62.

A shaft 75 is mounted in bearings 76 carried by the frame 77 and is provided with an angular arm 78 extending to a point slightly within the circumference of the circular needle-head where it is provided with a pivotally mounted finger 79 adapted to contact with the fabric formed, the pivotally mounted finger being adapted to engage any opening in the fabric caused by improper formation of the stitches and thus cause the finger 79 to turn about its pivot and effect rotation of the shaft through the tension exerted by the coiled spring 80. When the shaft 75 is rotated as above described an arm 82 carried thereby contacts with the arm 70 of the triangular lever to turn the same about its pivot and release the elbow lever 66 from the latch 68, the spring 65 acting upon the shipper lever 21 tends to raise the outer end of the lever 63 when the elbow lever 66 is released from the latch 68 thus stopping the knitting mechanism by permitting upward movement of the shipper lever. The shipper mechanism is of the conventional construction and for that reason it has not been shown in detail.

In the operation of my improved mechanism the circular needle-head rotates in a clock-wise direction as seen in Fig. 1 and the several actuating devices operate in the usual manner to press down the loops below the beards, form new stitches, raise the fabric and finally press the fabric from the needles in position for the operation of the next succeeding set of actuating devices. The fabric formed extends upwardly from the needles in tubular form and is drawn upwardly by the usual take-up mechanism (not shown).

Heretofore, when one or more of the threads passing through the thread guide broke during the operation of the machine the needle-head would continue to rotate for a considerable period and there being no newly formed stitches to hold the fabric to the needles part or all of the fabric would become disconnected from the needles before rotation of the needle-head was stopped.

The shaft 28 rotatably supported by the bracket 24 and provided with the wheel 29 contacting with the fabric 6 continues its rotation during the movement of the needle-head and so long as the operation of the machine continues without breakage of a thread the operating parts continue to occupy the position shown in Fig. 3 and in full lines in Fig. 2. However, when one of the threads passing to the thread guide 12 through guides 46 and 47 breaks, it releases the arm 42 carrying the loop 43 through which it passes, and the weight of the pawl 40 being greater than the weight of the arm 42 causes the pawl to draw and engage the ratchet 30. Continued rotation of the shaft 28 causes the latch 34

to turn on its pivot 35 thus releasing the catch 36 from the projection 37 and permitting the bracket 24 to be thrown into the dotted line position shown in Fig. 2 by the coiled spring 32. This movement of the shaft 28 depresses the wheel 29 as shown in Fig. 2 to depress the fabric on the needles and prevent the fabric from being thrown off by the cast-off wheel 11. It also raises the arm 58 of the lever 56 to turn the lever about its pivot and cause the arm 59 to engage the stud 60 and thus move the slide 18 against the tension of the spring 62 whereby the opposite end of the slide engages the arm 69 of the triangular lever to move the latch 68 and release the elbow lever 66 thus releasing the shipper 21 and stopping the mechanism.

When the broken thread has been mended and again passed through the loop of the arm 42 the shaft 28 is returned to its normal position whereby the spring 62 will return the slide to its initial position. The stop mechanism may then be reset and the machine is ready for further operation.

From the above it will be seen that my improved mechanism is adapted to both depress the fabric on the needles and also stop the knitting mechanism immediately upon the breakage of one of the threads employed in forming the fabric.

Since in the formation of certain fabrics a plurality of threads are employed with each set of actuating devices, two pawls 40, arms 42 and loops 43 are shown, it being understood that more or less than this number may be employed as desired, and that the breakage of any one of the several threads will stop the knitting mechanism and depress the fabric thus insuring proper operation at all times and preventing the formation of imperfect fabric.

I am aware that a wheel rotatably contacting with the fabric and operable in various ways upon the breakage of a thread to depress the fabric and stop the knitting mechanism may be mounted in various ways and that a variety of mechanical expedients may be adapted to transmit the impulses originating in the movement of the depressed wheel to the stop mechanism, and it is to be understood therefore that my invention is not to be limited to the detailed mechanism employed except as the same may be properly included within the scope of the appended claims.

What I claim is:—

1. In a machine of the character described, a rotating circular needle-head, a series of bearded needles carried by said needle-head, actuating devices arranged in proximity to said needles and comprising a guiding means for supplying one or more threads to the actuating devices, said devices actuating the needles and thread to form a fabric during the rotation of said needle-head, a rotatable

shaft mounted for pivotal movement in a direction axially thereof, a wheel carried by said shaft and normally engaging the fabric formed above the needles whereby the shaft is rotated during normal operation of the mechanism, and means operable upon breakage of one or more of the threads for effecting movement of said shaft about its pivot to force the wheel against the fabric and depress the fabric.

2. In a machine of the character described, a rotating circular needle-head, a series of bearded needles carried by said needle-head, feeds arranged in proximity to said needles, means for guiding a thread into position for operative engagement by said needles and feeds, and means comprising a pivotally mounted rotatable shaft provided with a wheel normally contacting with the fabric, said shaft being movable about its pivot having a wheel normally bearing against the formed fabric and movable about its pivot for automatically stopping the rotation of said needle-head upon the breakage of the thread.

3. In a machine of the character described, a rotating circular needle-head, a series of bearded needles carried by said needle-head, actuating devices arranged in proximity to said needles, and cooperating therewith to form a fabric, means for guiding a thread into position for operative engagement by said needles and actuating devices, and a wheel normally in contact with the fabric above the needles and rotatably supported by a pivotally mounted shaft, and means for automatically actuating the shaft about its pivot upon breakage of a thread to depress the fabric.

4. In a machine of the character described, a rotating circular needle-head, a series of bearded needles carried by said needle-head, actuating devices arranged in proximity to said needles and cooperating therewith to form a fabric, means for guiding a thread into position for operative engagement by said needles and actuating devices, a rotatable shaft mounted for pivotal movement in a direction axially thereof, a wheel carried by said shaft and normally engaging the fabric formed above the needles whereby the shaft is rotated during normal operation of the mechanism, means operable upon the breakage of a thread for effecting movement of said shaft about its pivot, and means for actuating said stop mechanism upon movement of said shaft about its pivot.

5. In a machine for knitting circular fabric, the combination with a rotatable circular needle-head, a series of needles carried by said needle-head and actuating devices cooperating therewith to feed a thread to the needles and form the fabric, and means comprising a pivotally mounted rotatable shaft provided with a wheel normally contacting with the fabric, said shaft being movable about its

pivot, having a wheel normally bearing against the formed fabric and movable about its pivot for automatically stopping the rotation of said needle-head upon the breakage of the thread.

6. In a device for automatically depressing the fabric upon the needles of knitting machines adapted for forming circular knitted fabric, a pivotally mounted rotatable shaft provided with a wheel normally in contact with the fabric, whereby the shaft is rotated during the normal operation of the knitting mechanism, means for guiding a thread, and means actuated upon abnormal movement of said guiding means for moving said shaft about its pivot to tilt the wheel and depress the fabric.

7. In a device for automatically stopping the mechanism of circular knitting machines adapted for forming circular knitted fabric, a pivotally mounted rotatable shaft provided with a wheel normally in contact with the fabric, whereby the shaft is rotated during the normal operation of the knitting mechanism, means for guiding a thread, means actuated upon abnormal movement of said guiding means for moving the said shaft about its pivot, and means operated by movement of said shaft about its pivot to stop the knitting mechanism.

8. In a device for automatically depressing the fabric and stopping the mechanism of knitting machines adapted for forming circular knitted fabric, a pivotally mounted rotatable shaft provided with a wheel normally in contact with the fabric, whereby the shaft is rotated during the normal operation of the knitting mechanism, means for guiding a thread, means actuated upon abnormal movement of said guiding means for moving the said shaft about its pivot to tilt the wheel and depress the fabric, and means operated by movement of said shaft about its pivot to stop the knitting mechanism.

9. An attachment for circular knitting machines comprising a rotatable pivotally mounted shaft, a wheel carried by said shaft and normally contacting with the knitted fabric to rotate said shaft, a ratchet wheel carried by said shaft, a thread contacting means provided with a pawl adapted to engage the ratchet upon breakage of the thread, and means for moving the shaft about its pivot upon rotation of the shaft after engagement of the pawl with said ratchet to depress the fabric.

10. An attachment for circular knitting machines comprising a rotatable pivotally mounted shaft, a wheel carried by said shaft and normally contacting with the knitted fabric to rotate said shaft, a ratchet wheel carried by said shaft, a thread contacting means provided with a pawl adapted to engage the ratchet upon breakage of the thread, means for moving the shaft about its pivot upon

tation of the shaft after engagement of the pawl with said ratchet, and means operable upon movement of said shaft about its pivot to stop the knitting mechanism.

5 11. In a circular knitting machine, an automatic stop mechanism comprising a lever, an annular bearing, an annular slide mounted in said bearing and having one end thereof located in proximity to said lever when in re-
10 tracted position, resilient means normally retaining said slide in retracted position, and means comprising a pivotally mounted rotatable shaft having a wheel normally bearing
15 against the formed fabric and movable about its pivot for actuating said slide to effect operation of the stop mechanism upon the breakage of one of the threads.

12. An attachment for circular knitting

machines comprising a rotatable pivotally
mounted shaft, a wheel carried by said shaft 20
and normally contacting with the knitted fabric to rotate said shaft, a ratchet wheel carried by said shaft, a thread contacting means
provided with a pawl adapted to engage the
ratchet upon breakage of the thread, means 25
for moving the shaft about its pivot upon rotation of the shaft after engagement of the pawl with said ratchet, a stop mechanism, a
slide for actuating said stop mechanism, and
means for moving said slide to actuate the 30
stop mechanism upon movement of said shaft about its pivot.

In testimony whereof I have affixed my signature.

JOHN F. MALONEY.