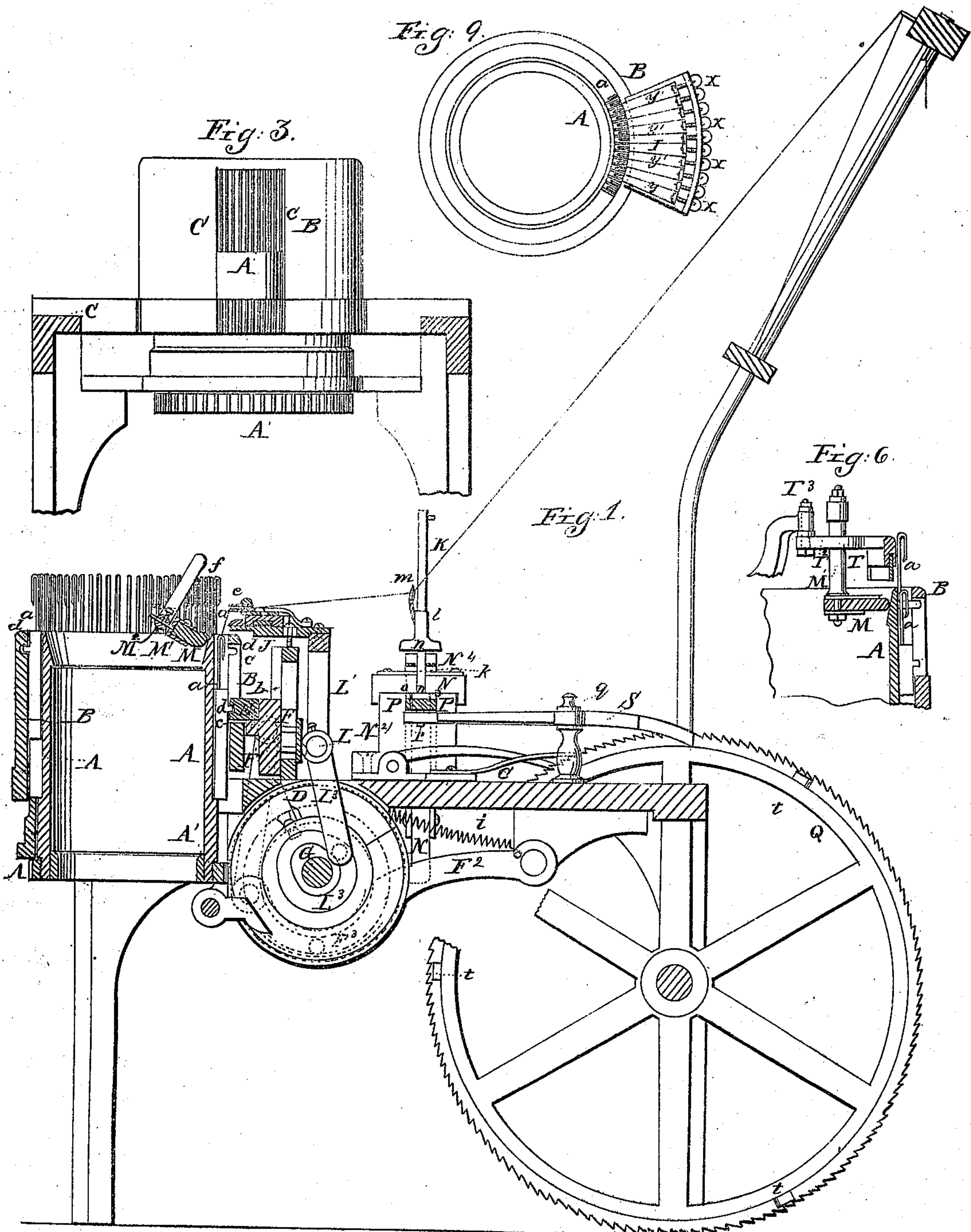


J. G. Wilson
Circular Knitting Mach.

N^o 36,199.

Patented Aug. 12, 1862.



WITNESSES:
James Baird
J. C. Coombs

INVENTOR:
James G. Wilson

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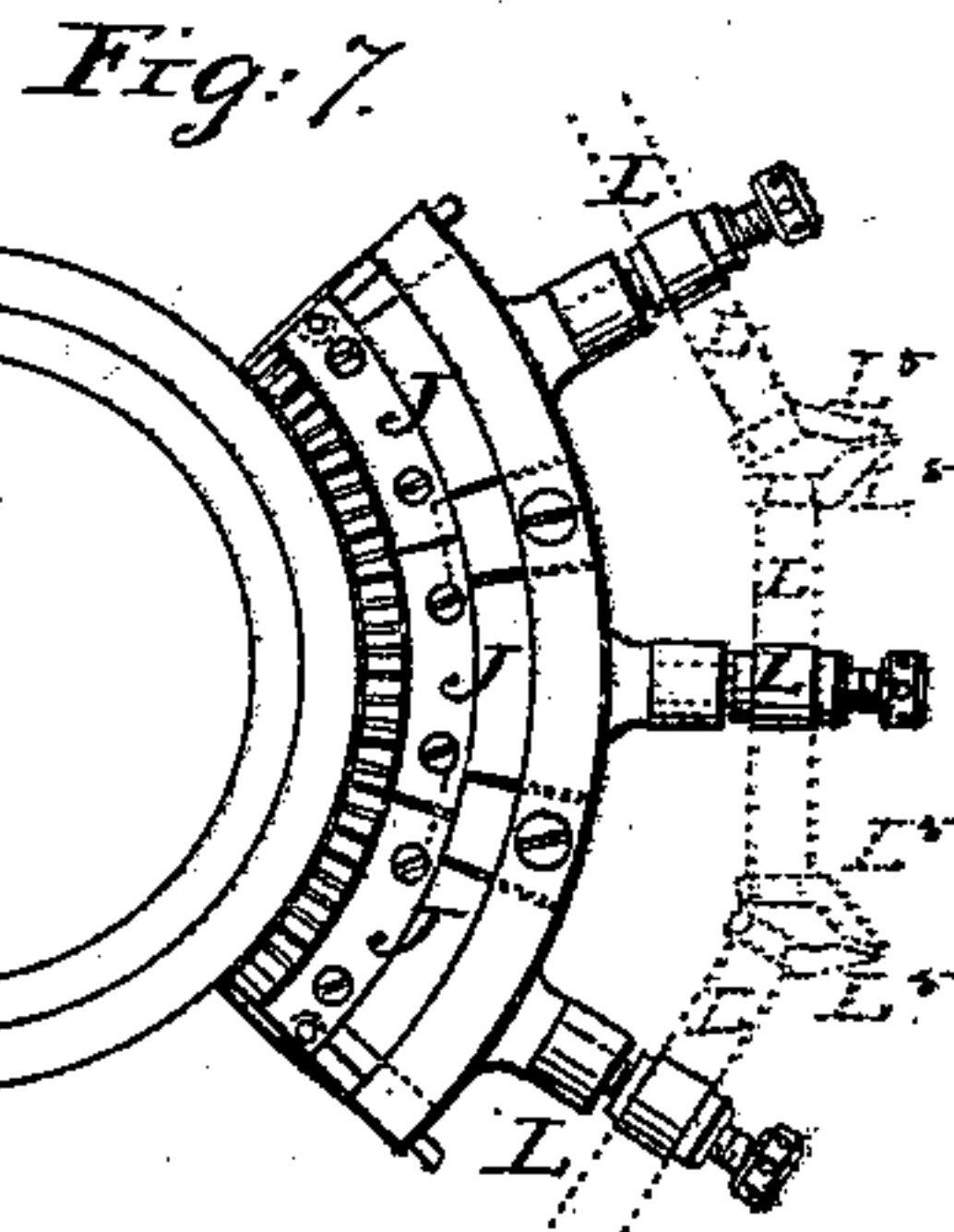
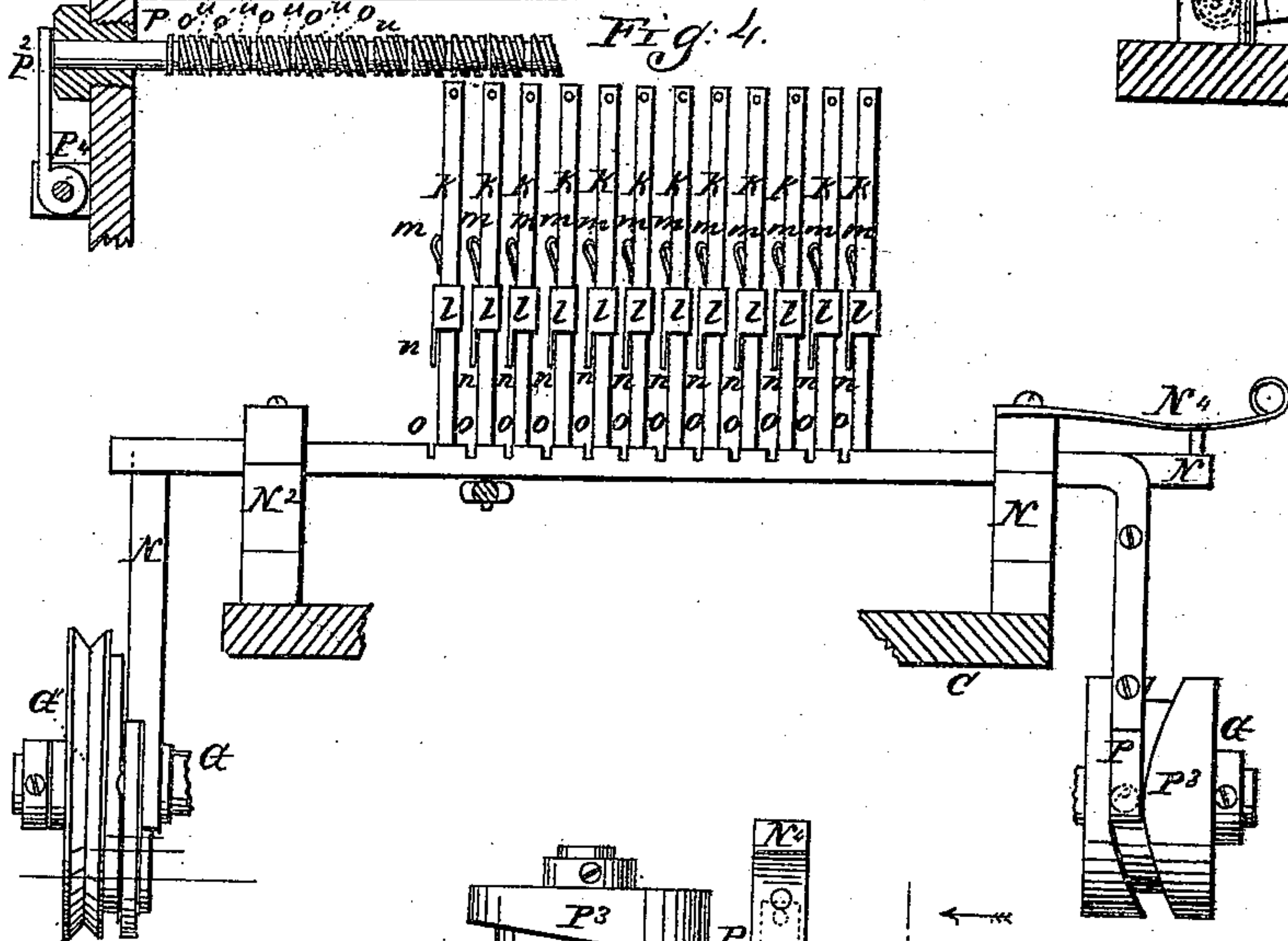
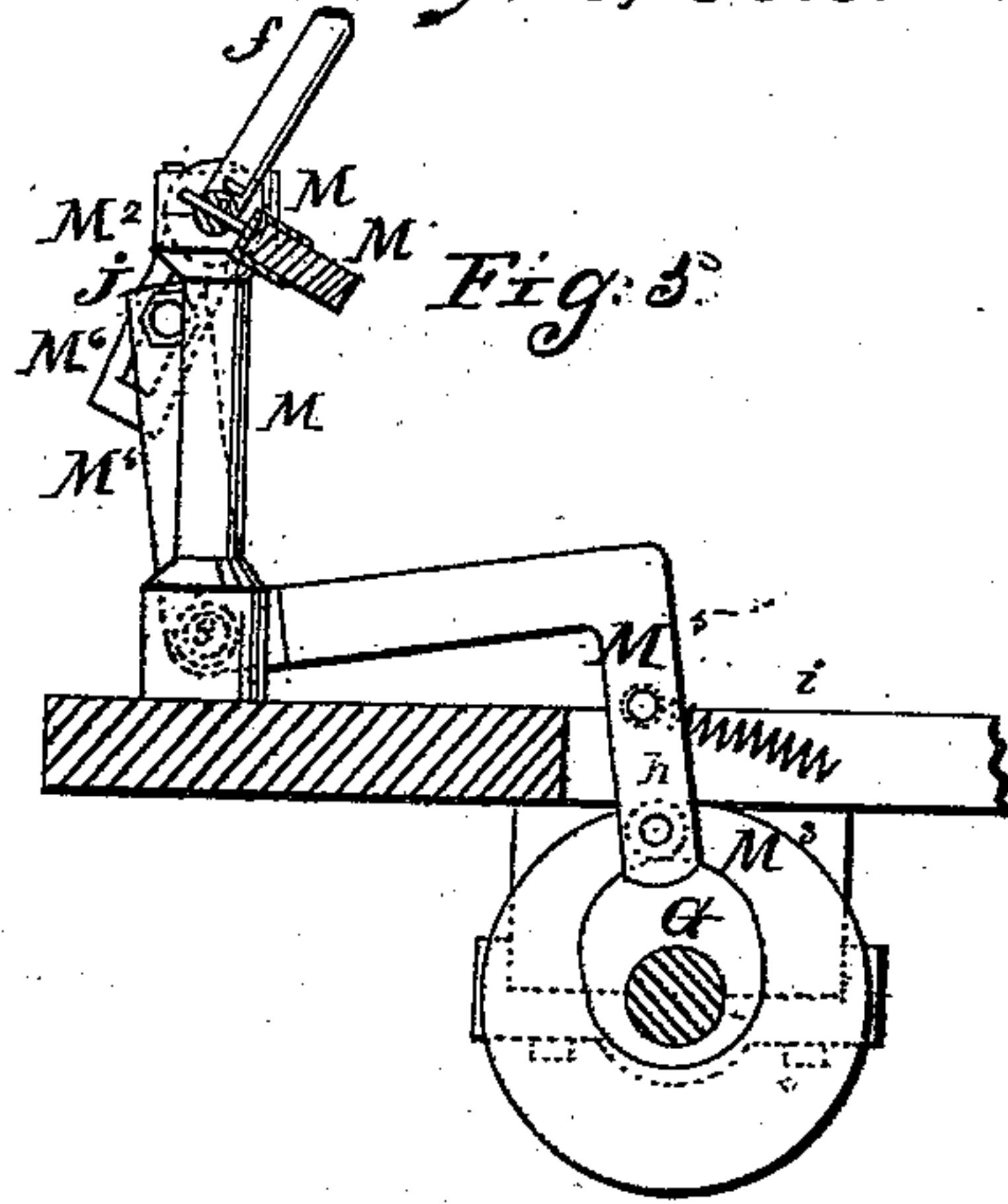
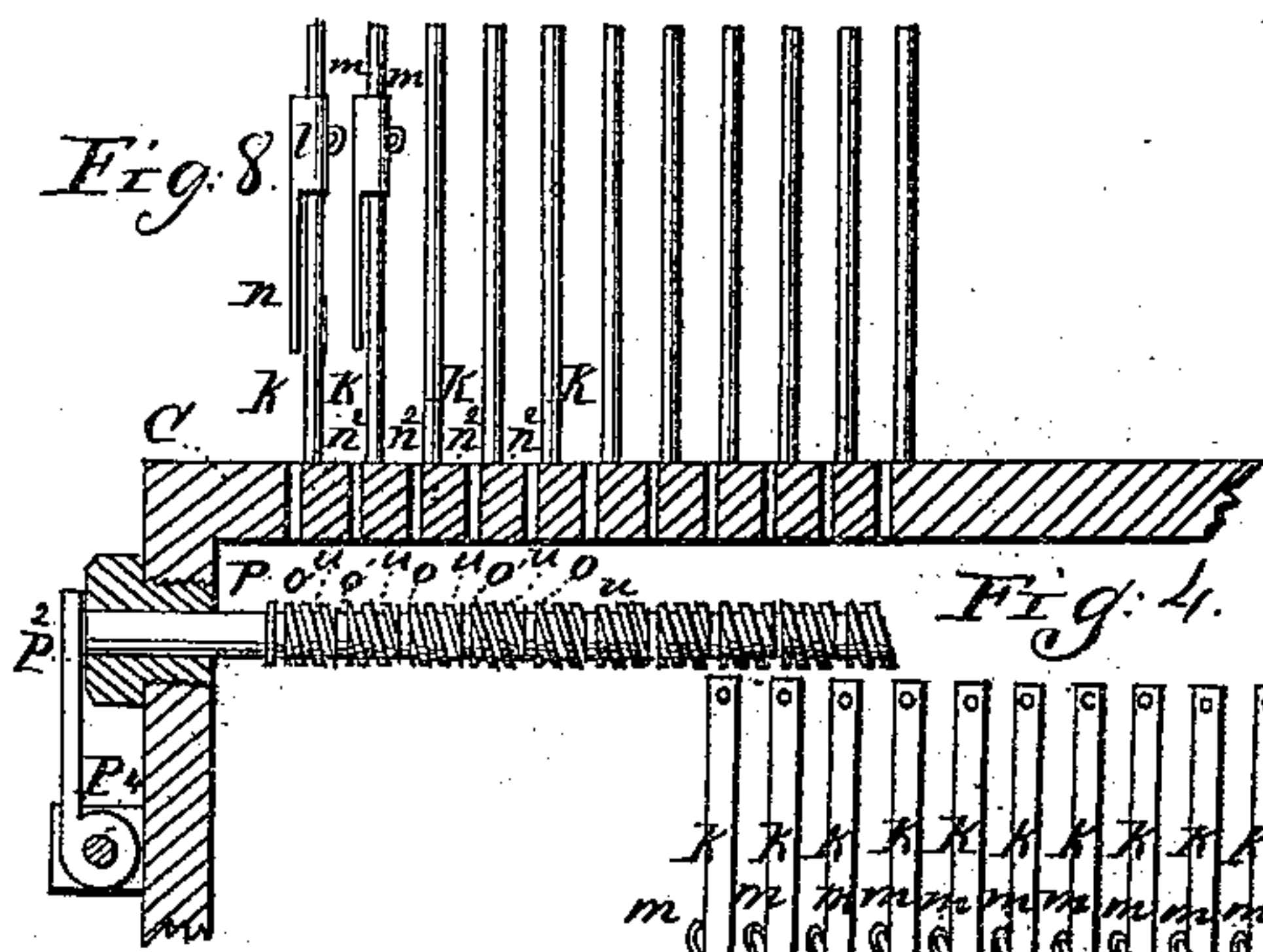
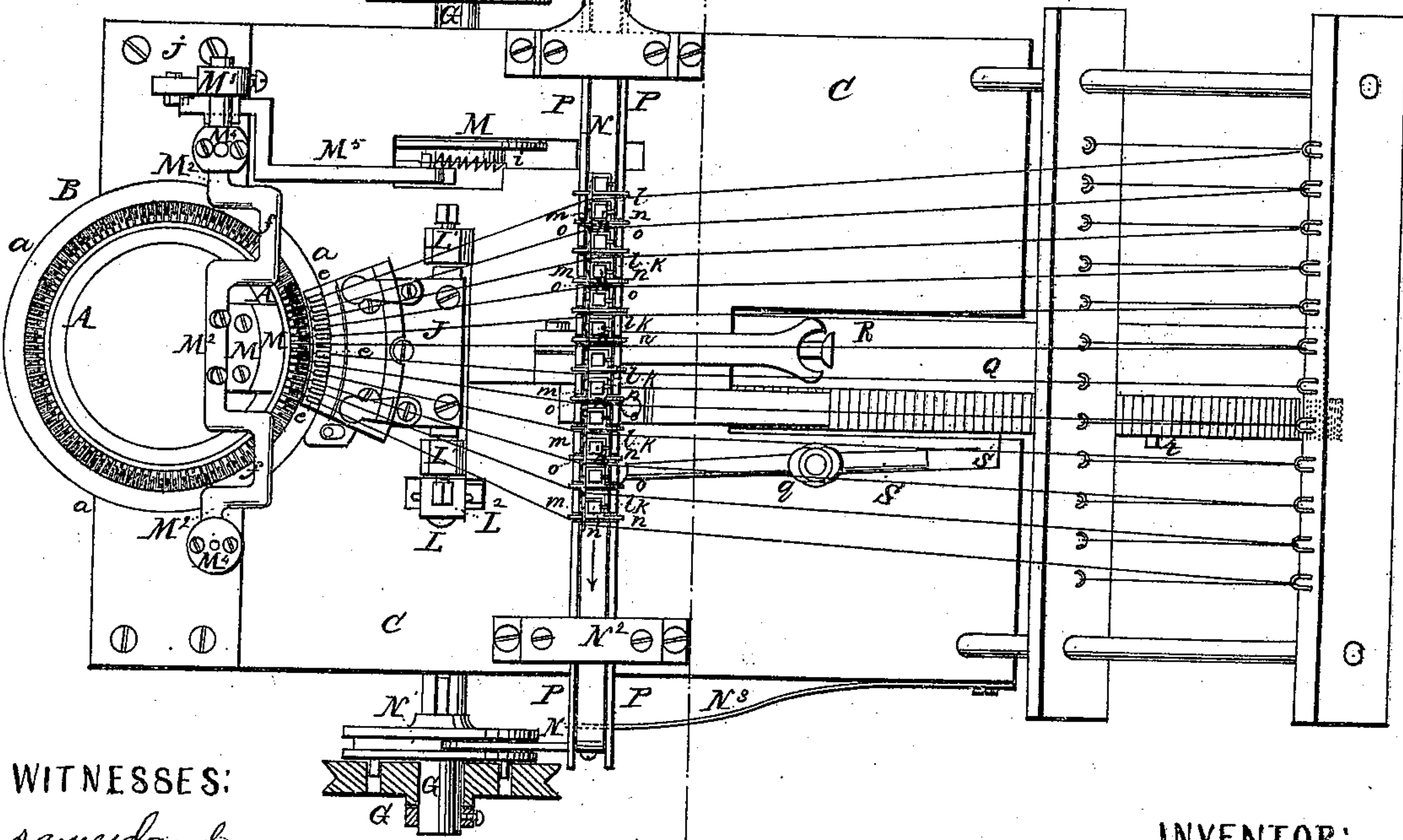


Fig. 2.



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UNITED STATES PATENT OFFICE.

JAMES G. WILSON, OF NEW YORK, N. Y., ASSIGNOR TO C. P. DIXON AND EDWARD LEARN, OF SAME PLACE.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 36,199, dated August 12, 1862.

To all whom it may concern:

Be it known that I, JAMES G. WILSON, of the city, county, and State of New York, have invented certain new and useful Improvements in Knitting Machinery; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical section of a circular-knitting machine with my improvements. Fig. 2 is a plan of the same. Fig. 3 is a back view of the needle-ring. Fig. 4 is a back view of the stop-motion for stopping the machine in case of the breakage of the yarns. Fig. 5 is a side view of some of the mechanism which is concealed in Fig. 1 by the parts in front of it. Figs. 6, 7, 8, and 9 exhibit modifications of some parts of the machine.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates in part to a substitute for the beaters, or, as they are sometimes termed, "pressers," employed in those knitting-machines in which several needles are knitted upon at once with separate yarns to operate between the needles for the purpose of holding the work to its proper place thereon while the stitches are being formed either by the movements of the needles themselves or by what are termed "stitch-hooks." The beaters or pressers above mentioned have a complicated movement, which requires complicated mechanism to effect it, and the object of this improvement is to effect the same result by a simpler movement and less complicated mechanism; and to this end it consists in substituting for the said beaters or pressers a pad of india-rubber or other moderately soft or yielding substance, so applied and having such a movement as to operate in combination with the needle-ring or needle-bar and the needles, as hereinafter specified.

Another part of the invention consists in a new and improved stop-motion to throw the driving-pulley out of gear or otherwise disengage the machine from the driving apparatus whenever one of the yarns breaks or gives out.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The machine represented has needles *a a*, of

the flexible bearded kind most commonly used in knitting-machines, arranged to work longitudinally in grooves in the exterior of the intermittingly-rotating needle-ring *A*, parallel with the axis thereof. The needle-ring is fitted into a stationary upright cylinder, *B*, secured to the bed-plate *C* of the machine. The rotary motion of the said ring is produced by means of a switch-wheel, *D*, on the horizontal main shaft *G*, gearing into a toothed-ring, *A'*, which encircles the lower part of and is secured to the needle-ring. The longitudinal movement of the needles by which the stitches are formed and which takes place during the intermissions in the rotary movement of the needle-ring is produced by means of a horizontally-grooved bar, *E*, secured to a vertical slide, *F*, which works in guides *b*, the said bar entering an opening, *c c*, in the cylinder *D* and receiving in its grooves the projections *d d* on the shanks or jacks, of one more than the number of needles it is desired to knit upon at once, and the slide *F* deriving motion through a rod, *F'*, from a lever, *F''*, which is actuated by a cam, *F'''*, on the main shaft. The presser *I*, for closing the beards of the needles to enable them to throw off the completed stitches in their descent, is attached to a plate, *J*, carried by the two arms *L' L'* of a rock-shaft, *L*, whose third arm, *L''*, carries a stud or roller, *d*, which works in the groove of a cam, *L'''*, on the main shaft *G*. The same plate, *J*, also carries the yarn-conductors *e e*, which deliver the yarn to the needles, and the cam *L'''* therefore serves to operate both the yarn-conductors and the presser *I*.

M is the pad, of india-rubber or other yielding material, which forms a substitute for the beaters, operating to press the work tight against the upper part of the interior of the needle-ring, inside of or behind the needles. This pad is made to conform to the needle-ring, as shown in Fig. 2, and long enough to extend behind at least as many needles as it is desired to knit upon at once. It is secured in a metal clamp, *M'*, which is secured to a rock-shaft, *M''*, working in bearings in standards *M''' M'''*, erected above the bed-plate *C*. This rock-shaft is bent at *f f*, to allow the needles to pass under it in their revolution without any hinderance. It derives motion from a cam, *M'''*, (see Fig.

5,) on the main shaft G, through an elbow-lever, M⁵, working on a fulcrum-pin, g, secured in the lower part of the standards M⁴, the said lever carrying at one end a roller, h, which is kept in contact with the periphery of the cam M³ by a spring, i, connecting the said lever with the bed-plate, and at the other end a stud, j, which enters a slot in an arm, M⁶, secured to one end of the rock-shaft. The cam M³ has such an action on the rock-shaft that it causes the pad to operate in the following manner, to wit: It is raised from contact with the work just before each rotary movement of the needle-ring and before the needles have completed their ascent, and pressed down again upon the work while the needles are descending, so as to hold it firmly against the needle-ring while the needles complete their descent, and thereby prevent them from dragging down the finished courses of stitches into the grooves provided in the outer face of the needle-ring for the needles to work in. As the needles start on their upward motion, it descends still farther, so that it draws the work and yarn back over the heads of the needles as they continue ascending, thus bringing the new loops onto the stems of the needles and keeping the yarn of which said loops are composed out of the way of the needles in the return of the latter for the yarn which is to form the next course of loops. While the needles are all raised, and while the rotary movement of the ring takes place, the pad remains out of contact with the work. I prefer to make this pad of elastic vulcanized india-rubber; but it may, perhaps, be made of leather, gutta-percha, or some other moderately elastic or yielding material. A similar pad may be used in combination with a straight-knitting machine applied in combination with the needle-bar and straight series of needles in substantially the same manner as it is represented applied in combination with the needle-ring and circular series of needles.

N is the shipper-bar for moving the clutch N', by which the driving-pulley G' is brought in gear with and out of gear from the driving-shaft G. This bar is fitted to slide horizontally in fixed guide-boxes N² N² on the top of the bed-plate, and has applied at one end of it a spring, N³, for the purpose of holding the clutch in gear with the pulley, and so keeping the pulley coupled with the shaft. At the outer end of the said bar there is attached to the adjacent box N² a spring-catch, N⁴, by which, when desired, the bar may be held in a position to keep the clutch out of gear with the pulley, and so keep the pulley uncoupled from the shaft.

I will now describe the application, in connection with the bar, of the stop-motion by which the pulley is uncoupled from the shaft when one of the yarns breaks.

k k are a number of upright square rods corresponding with the number of needle to be knitted upon, firmly secured in the upper bar, N, at equal distances apart and each

fitted with a slide, l, to which is attached a loop or eye, m, and a plate, n. Close to one side of each rod k there is provided in the upper side of the shipper-bar a notch, n', capable of receiving the plate n attached to that rod, and corresponding notches, o o, are provided in the upper edges of a double bar, P, which is fitted to slide in the guide-boxes on both sides of the shipper-bar, and which extends the whole length of the horizontal portion of the shipper-bar. This bar P has attached to it a roller, p, which is received in the groove of a cam, P³, on the main shaft G, and when the machine is in operation the said cam gives the bar, once during every revolution of the main shaft, and consequently during each operation of the needles, a movement back and forth equal in length to or a little greater than the movement required of the shipper-bar to throw the clutch in and out of gear with the pulley, and in the movement of the said bar P in the direction corresponding with the direction of the coupling movement of the shipper-bar (indicated thereon by an arrow in Fig. 2) the notches o o arrive opposite to the corresponding notches, n' n', in the shipper-bar. The yarns (indicated in red color in the drawings) pass through the eyes m m—one through each—on their way to their respective conductors e e, and while they remain unbroken their tension is sufficient to hold up the slides l l some distance above the shipper-bar N and the bar P; but as soon as a yarn breaks its slide l drops down its respective bar k, and the plate n, attached to the slide, then rests on the edges of the bar P, on opposite sides of the bar N, and over its respective notch n' in the latter bar, until the reciprocating movement of the bar P, produced by the cam P³, brings the notches o o opposite the notches n' n', when the plate n drops into its respective notches n' and o o, and so locks the bars N and P together, and causes N to be moved along with P in a direction to throw the clutch N' out of gear with the driving-pulley and disengage the latter from the shaft, thus producing the stop-page of the machine.

The shipper-bar N is also used to stop the machine at such stages in the progress of knitting as may be required through the agency of a studded wheel, Q, or cylinder which controls the direction and changes of direction of the rotary movement of the needle-ring, such control being effected either by means of a switch-lever, R, and switch-wheel D, as represented, or by other suitable means. The lever R is operated upon by the studs of the wheel Q to shift the switch of the wheel D and make it reverse the direction of the rotation of the needle-ring. The said wheel Q acts upon the shipper-bar through a lever, S, which works in a fixed fulcrum, q, and one end of which is connected by a fork and pin, r, with the said bar, the other end of the said lever having formed upon it a wedge-shaped projection, s, to be acted upon by wedge-shaped projections t t on one side of the wheel Q. There

is no necessary connection between the levers R and S, and it is only as a matter of convenience that the wheel Q is made to operate upon both levers.

Fig. 6 exhibits a modification of the elastic pad M which takes the place of the beaters and the application of an additional pad, T, which comes into operation to press and hold the work down upon the needle-ring just as the pad M is about to rise, and which is raised again from the work just as the pad M comes down upon it again. The pad M is represented in Fig. 6 as being attached to the lower end of an upright stem, M', which has the necessary movements imparted to it in a vertical direction, and produces the movements of the said pad in a corresponding direction. The movements of the so-applied pad M, so far as their action upon the work is considered, are essentially the same as that represented in Figs. 1 and 2, the direction only being different.

The pad T is of leather or india-rubber and secured in a clamp, T', which is attached by an arm, T², to an upright stem, T³, which is to be operated by a suitable cam on the main shaft of the machine. This pad is formed and arranged to act upon the work nearer to the needles than the pad M, so that the two can pass each other. This pad T, coming into action on the work before the commencement of the movement of the needle-ring about its axis and continuing its pressure thereon during such movement of the ring, requires to move with the needle-ring, and hence the axis of the stem T³ is made to coincide with the axis of the needle-ring and the arm T² is fitted to turn on the said stem; but a spring should be so applied to the said arm as to throw it back as far as it was moved by the needle-ring as soon as it is lifted up from the latter. By means of the two pads M and T operating in combination, as described, the necessity of attaching a weight to the work or applying a take-up is obviated.

Fig. 7 exhibits a top view of a modification of the arrangement of the yarn-conductors *e e* and presser I, which closes the needle-beards, applicable more particularly in machines in which a large number of yarns are used to knit at once on a large number of needles.

It is obvious that only one of a series of conductorse attached to a single plate and only one point in a presser I made in one piece can move in a direction radial to the center of the needle-ring, and that the movement of all the other conductors and all other points of the presser will deviate more or less from such a direction, according as they are more or less distant from that one conductor and that one point in the presser, and this deviation becomes greater as the number of conductors and length of the presser are increased. To obviate any such extreme deviation, instead of attaching all the conductors to a single plate J and making the presser I of a single piece, I attach the conductors in equal numbers to two or more

such plates and employ a number of pressers corresponding with the number of said plates, attaching one presser to each of the said plates and arranging the said plates so that one of the conductors and one point in its respective presser will move radially to the circle of needles. Fig. 7 shows three plates J J J, each operated by the arm L' of one of three rock-shafts L L L. One of these rock-shafts may be operated by means substantially like those employed to operate the rock-shaft L shown in Fig. 1, and hereinbefore described, and the others suitably arranged in relation to the needle-ring to give the required direction to the pressers, and yarn-conductors are connected with the first one by means of bevel-toothed segments L⁵ L⁵ L⁵, which cause all to operate alike.

Fig. 8 exhibits in vertical section a modification of the stop-motion. Instead of the reciprocating notched sliding bar P, there is substituted a shaft, P', which, when the machine is in operation, has imparted to it a rapid rotary motion, and which is capable of a short longitudinal movement in its bearings. This shaft, arranged below a series of stationary upright rods, *k k*, secured in the bed-plate C of the machine, has cut on it a screw-thread, and in this screw-thread there is cut, at intervals apart corresponding with the distance between the rods *k k*, a series of grooves, *o' o'*, extending directly round the shaft to the full depth of the threads, thus dividing the screw-thread into a number of short screw-threads, *u u*. One end of the said shaft P' is arranged in contact with the arm P² of a rock-shaft, P⁴, or any other means of shifting the clutch to throw the machine out of gear, and a spring is to be applied to keep the machine in gear. The rods *k k* represented in Fig. 8 are fitted with slides *l l*, furnished with eyes *m m* and plates or tongues *n n*, like those before described with reference to the rods *k k* represented in Figs. 1, 2, and 4, and when the machine is in gear one of the tongues *n n* is situated over one of the short screw-threads *u*. When a yarn breaks, its respective slide *l* drops and its tongue *n* passes through one of a number of holes, *n² n²*, provided in the bed-plate, into its respective screw thread *u*, and as the tongue is not movable in the direction of the length of the shaft the continued rotation of the latter causes the screw-thread so to act against the tongue as to produce the longitudinal movement of the shaft until a groove *o'* arrives opposite the tongue and permits the continued rotation of the shaft without any further longitudinal movement being produced, that already produced having been enough to act upon the arms P² or other contrivance provided for throwing the machine out of gear. I consider the screw and shaft P' to be the equivalent of the notched bar P.

By attaching to the slides *l l* tongues extending downward below the bar P or shaft P', and hooked at their lower extremities to act in combination with notches provided for the

purpose in the under side of the bar P or to act in the screw-threads *u u* below the shaft, the machine may be stopped by means of any excessive tension on any of the yarns, and hence breakage of the yarns may be in a great measure, if not entirely, prevented. The tension is made to effect the stoppage of the machine by drawing up the slides *l l* to such a height as to bring the last-mentioned tongues into the said notches in the under side of bar P or into the screw-threads on the shaft P'. The effect produced by the lifting of these tongues into the notches or screw-threads will be the same as that produced by the dropping of the tongues *n n* into the notches *o o* in the upper side of the bar P or into the screw-threads *u u*.

In order to provide for the knitting simultaneously on every second or third needle instead of upon immediately adjacent ones, I propose in some cases to make the presser I as shown in Fig. 9, which is a top view of a number of pieces, *y' y'*, equal to the number of needles opposite to which it works, each piece wide enough to operate upon one needle only, and to apply in connection with each piece a screw, *x'*, by which it can be drawn back out of its operative position. By drawing back the pieces *y' y'* and taking out the threads from their corresponding conductors the knitting can be performed simultaneously upon as few of the needles as may be desired, though all

the needles will be knitted upon in turn, or by taking out alternate needles an imitation of ribbed work may be produced.

What I claim as my invention, and desire to secure by Letters Patent, is--

1. The employment of a pad or pads of india-rubber or other yielding material applied and operating in combination with the needle-ring or needle-bar and needles, substantially as and for either or both the purposes herein specified.

2. Giving the pad M a compound motion, substantially as herein described, whereby it is caused first to press and to hold the work while the needles are completing their descent into the needle-ring, and afterward to give a second pressure or draw on the work to draw the loops over the heads or bends of the hooks of the needles during the ascending movement of the latter, substantially as herein described.

3. The stop-motion composed of slides *l l*, suspended from the yarns, and a notched reciprocating bar, P, or its equivalent, applied in combination with an organized knitting-machine, to operate substantially as herein specified.

JAMES G. WILSON.

Witnesses:

R. GAWLEY,
JAMES LAIRD.