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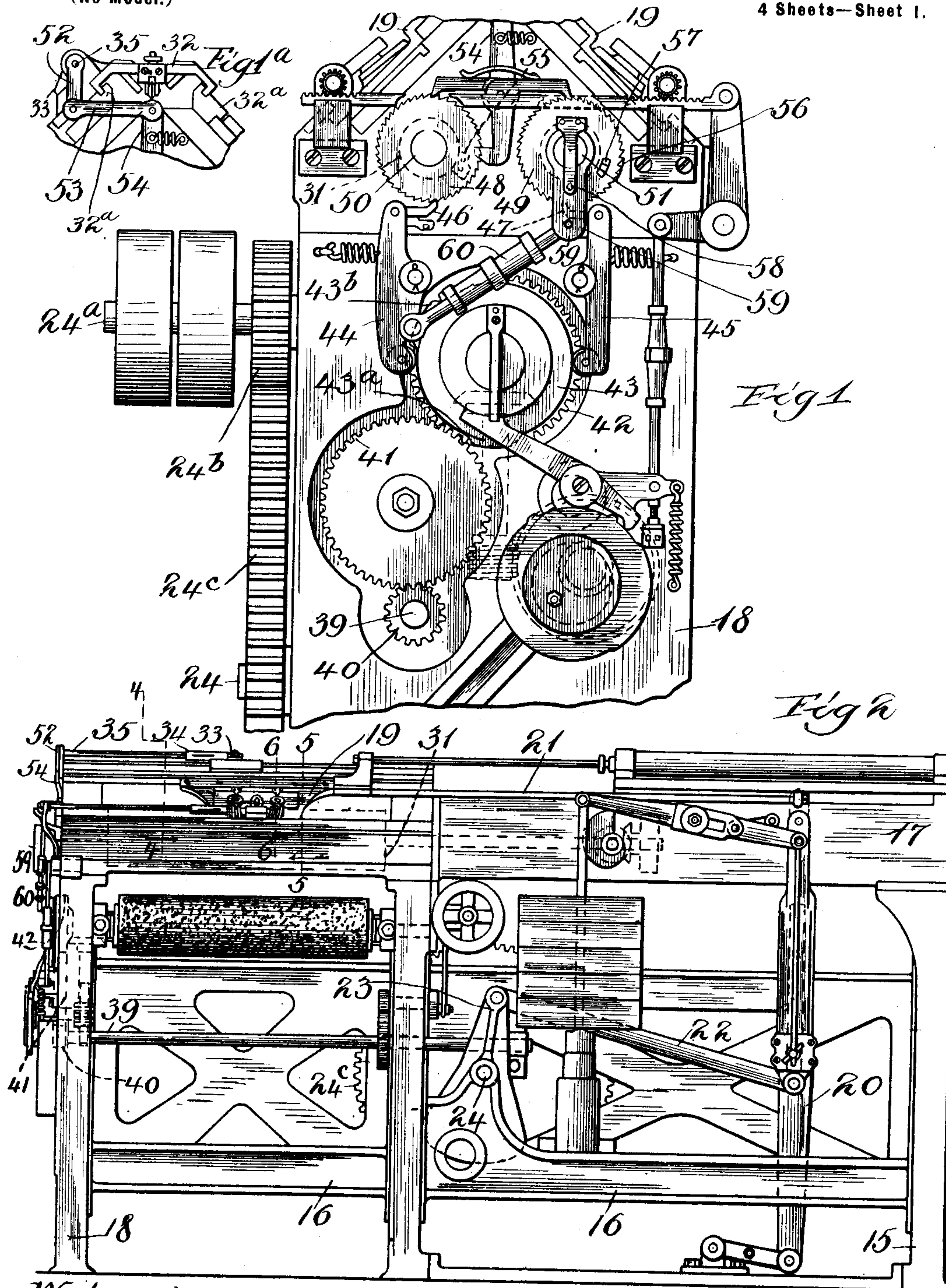
Patented June 4, 1901.

**G. E. RUTLEDGE & U. G. LEE.
KNITTING MACHINE.**

(Application filed Jan. 3, 1900.)

4 Sheets—Sheet 1.

(No Model.)



Witnesses
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Wm. Geiger

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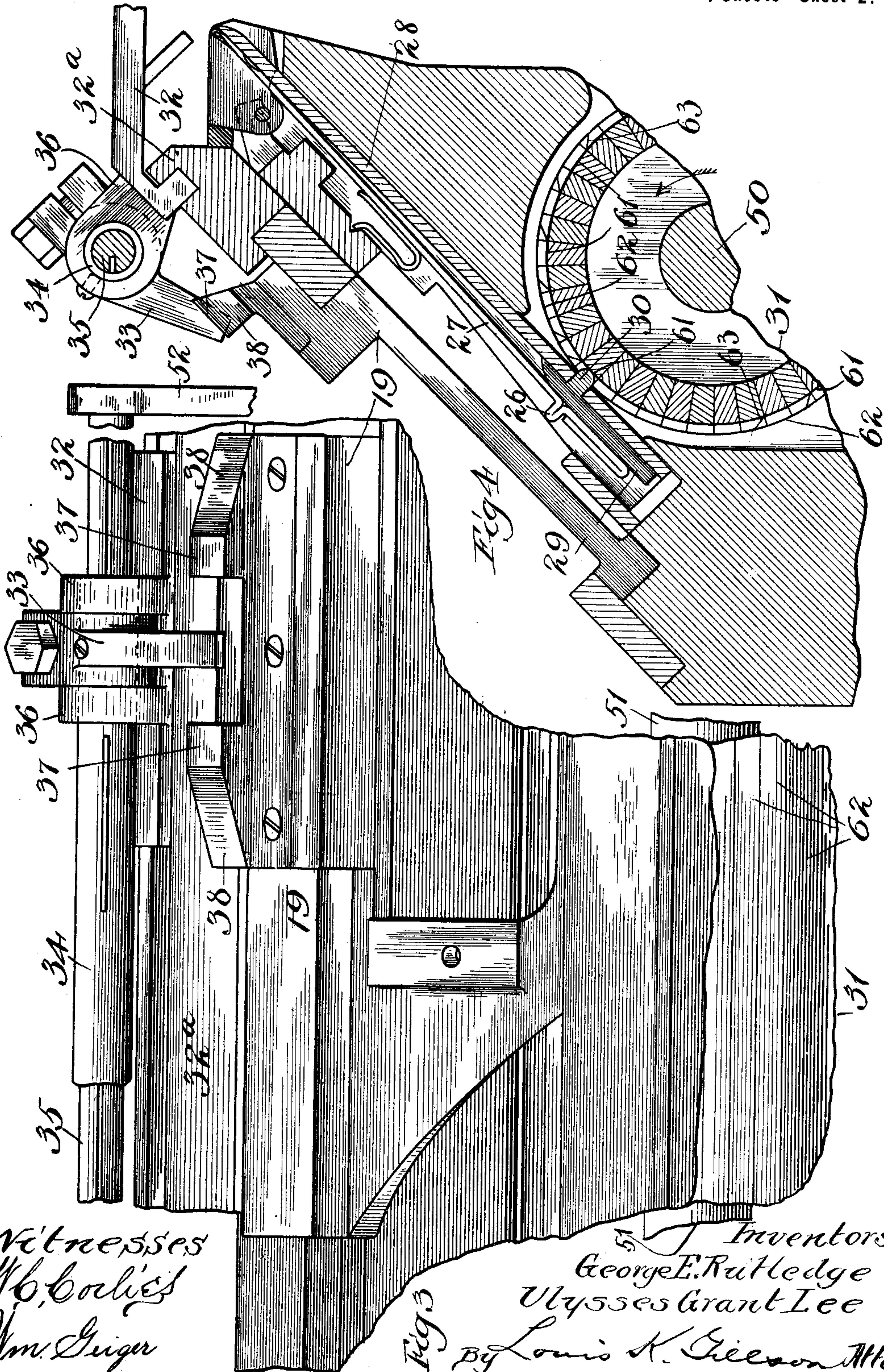
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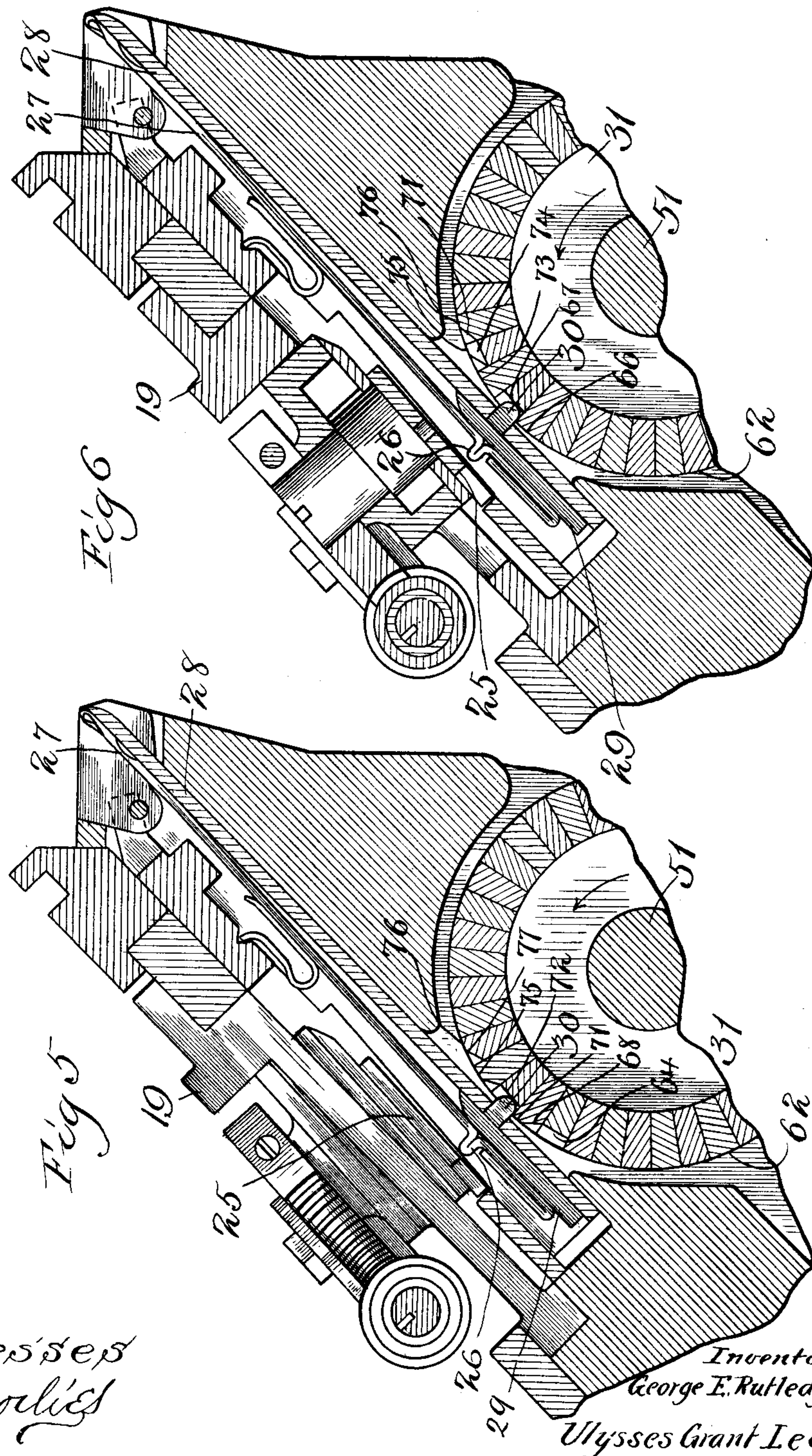
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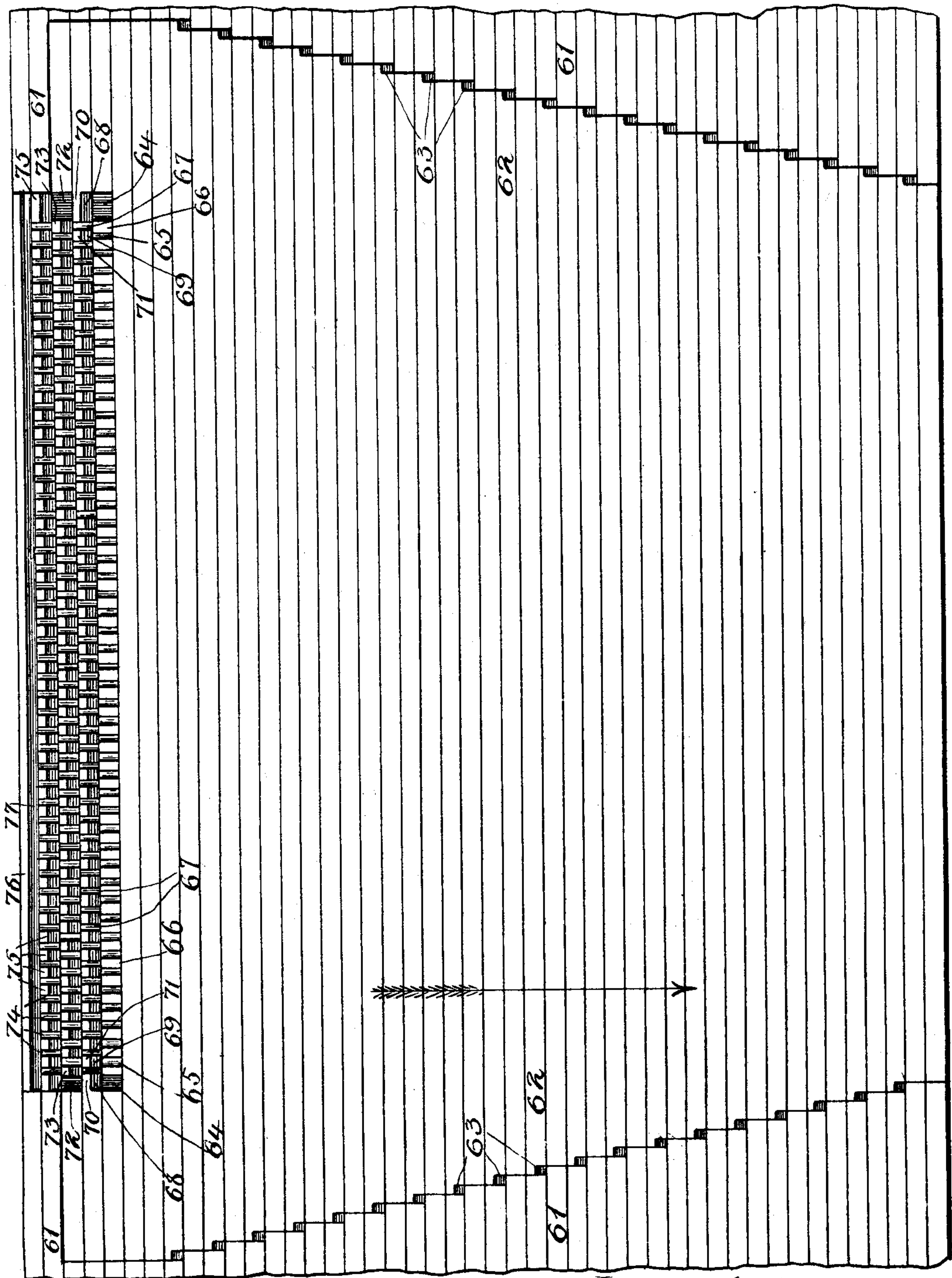
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Fig 7

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Att'y

UNITED STATES PATENT OFFICE.

GEORGE E. RUTLEDGE AND ULYSSES G. LEE, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE GEORGE D. WHITCOMB COMPANY, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,794, dated June 4, 1901.

Application filed January 3, 1900. Serial No. 234. (No model.)

To all whom it may concern:

Be it known that we, GEORGE E. RUTLEDGE and ULYSSES GRANT LEE, citizens of the United States, and residents of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

This invention relates to straight-knitting machines in which two banks of needles of the hook-and-latch type are employed and so disposed that the needles of the one bank cross the plane in which the needles of the other bank move and in which there are employed fashioning devices or cylinders for varying the pattern of the fabric by throwing into and out of action the needles as may be required.

The object of the present invention is to adapt machines of this kind to knit a fabric having relatively close and open work, the change being made from the relatively close work to the more open work automatically and by the dropping out or discontinuing of intermediate wales, the discontinued wales being automatically secured against a raveling action due to the tension on the fabric by the introduction into the last stitch thereof of a key stitch or loop which is not directly connected with the wales which are continued.

The manner of working out the invention and the construction by which the desired results are attained are fully hereinafter described, and are sufficiently illustrated in the accompanying drawings to enable others skilled in the art to make the machine.

In the drawings, Figure 1 is a detail end elevation of the machine. Fig. 1^a is a detail of the upper portion of the same end. Fig. 2 is a side elevation of the same. Fig. 3 is a detail plan of the machine. Fig. 4 is a sectional detail on the line 4 4 of Fig. 2. Figs. 5 and 6 are sectional details on lines 5 5 and 6 6, respectively, of Fig. 2. Fig. 7 is a development of pattern-cylinder.

We have not deemed it necessary to show all of the parts of a knitting-machine, and as to certain of the parts shown which are not

essential to the present invention no description is here given.

The frame of the machine consists of the uprights 15, the longitudinal rails 16 and 17, and the end plate 18. Suitable cross-rails are of course employed for the purpose of strengthening the frame, but it has not seemed necessary to further illustrate the frame than as described.

A cam-carriage 19 of ordinary construction rides upon each side of the top plates of the machine, these carriages being caused to reciprocate by means of a lever 20, connected thereto by means of the rods 21 and actuated by a pitman 22, leading from a crank 23, fixed upon the shaft 24, to which shaft power is applied through the medium of the gear-wheel 24^c, fixed thereupon, and an intermeshing pinion 24^b, fixed upon the power-shaft 24^a. Each carriage 19 is provided with the usual cams, as 25, for advancing and retracting the needles 27, each of which is provided with an upstanding finger 26 for engagement by the cams. These needles are seated in suitable slots in the needle-plate 28, the rearward end of each resting upon a supporter 29, which is provided with a downwardly-projecting finger 30, extending through an aperture in the needle-plate and riding upon the periphery of the pattern-cylinder 31.

The frame 32 of the yarn-carrier spans the throat of the machine and slides in grooves formed in the longitudinal rails 32^a. Any suitable form of yarn-carrier may be employed. It has not seemed necessary for the purposes of this case to illustrate this feature.

The yarn-carrier frame is detachably connected with one of the carriages 19 by means of a dog 33, fixed upon a sleeve 34, which slides upon but is in non-rotative engagement with a shaft 35, journaled at the ends of the bed of the machine. The dog 33 is located between two brackets 36, rising from the yarn-carrier frame 32 and forming journals for the sleeve 34.

The free end of the dog 33 falls between upstanding shoulders 37, rising from the carriage 19, the adjacent faces of such shoulders being abrupt and their rearward faces inclining downwardly, as shown at 38. When the

dog 33 is between the shoulders 37, the yarn-carrier frame is of course caused to reciprocate with the carriage 19, but remains at rest when this dog is lifted out of engagement with such shoulders. By dropping the dog into its normal position while the carriage is moving across the bed of the machine the inclined shoulder 38 will pass under it, so as to allow it to again fall between the two shoulders.

The pattern-cylinders and the above-described mechanism for controlling the connection between the yarn-carrier frame and the carriage are actuated from the shaft 24 through the medium of the shaft 39, these two shafts being suitably connected by means of gears. (Not shown.) A pinion 40 is fixed upon the end of the shaft 39 and intermeshes with a gear-wheel 41, which in turn drives a gear-wheel 42, with which there is mounted a cam-wheel 43, coöperating with spring-controlled rocker-arms 44 and 45, which respectively carry spring-controlled pawls 46 and 47, which pawls actuate the ratchet-wheels 48 49, mounted, respectively, upon the shafts 50 and 51 of the pattern-cylinders.

The periphery of the cam 43 is provided with two enlargements 43^a and 43^b, so disposed that both act upon each of the rocker-arms 44 45 in turn, thereby normally causing the advance of each cylinder in turn by two steps.

As will be hereinafter seen, it is important at certain stages of the work to move the pattern-cylinders in unison, and to that end a plate 56 is attached to one of the ratchet-wheels, as 49, so as to prevent the entrance into the teeth thereof of the pawl 47, and in the disk-face of the same segment of this ratchet-wheel there are formed a succession of ratchet-teeth 57, adapted to be engaged by a spring-controlled pin 58, passing through an arm 59, swinging upon the end of the shaft 51, this arm being connected, by means of a rigid link-bar 60, with the rocker-arm, as 44, which coöperates with the other pattern-cylinder, so that while the pawl 47 is in engagement with the plate 56 the rocker-arm 44 is in engagement with the ratchet-wheel 49 through the medium of the link-bar 60, arm 59, pin 58, and ratchet-teeth 57.

The shaft 35 carries at one end a crank-arm 52, connected, by means of the link-bar 53, with a spring-controlled rocker-arm 54, the free end of which lies in the path of a block 55, fixed upon the disk-face of the ratchet-wheel 48, so that during each revolution of this wheel the arm 54 is rocked upon its pivot, so as to partially turn the shaft 35 to lift the dog 33 out of engagement with the shoulders 37, this action being timed to coincide with the simultaneous movement of the two pattern-cylinders.

The pattern-cylinders are formed with two diameters or with depressed portions, as 61, and elevated portions, as 62, so that when the needle-supporters are riding upon the depressed portion the needles are out of action

and when lifted by the elevated portions of the cylinders the needles are brought into action.

At 63 are shown a succession of steps upwardly from the depressed portion of the cylinder to its elevated portion, these steps being taken in succession and alternately upon opposite ends of the cylinder and their function being to throw into action widening-needles at each side of the fabric.

The machine herein shown and described is adapted for the knitting of undershirt-sleeves provided with a cuff portion and being widened at the shoulder end, the knitting operation being commenced with the cuff and terminating at the shoulder, and immediately upon the completion of one sleeve a change is automatically made from such completed article to the cuff of the next article, necessarily involving the dropping out of action and the casting off of the stitches from the widening-needles at each side and intermediate needles which are not employed in the fabrication of the cuff, this being formed as comparatively open work.

At the commencement of the body portion of the sleeve—that is, the portion immediately above the cuff—the pattern-cylinder is so positioned that the needles rest upon that part of its face at which the central elevated portion is the narrowest and the marginal depressed portions are the widest, so that the fabric formed is of the minimum width. The cam-wheel 43 is now at rest by reason of the action of the clutch mechanism controlling it, and in consequence the pattern-cylinders remain motionless. When that part of the sleeve is arrived at from which it is desired to widen, the pattern-cylinders are set in motion by the rotation of the cam-wheel 43, the two projections of which cause the advance of each cylinder two steps in succession, thereby throwing up a needle first upon one side of the machine and then upon the other at each side of the fabric. This movement continues until all of the widening-needles have been brought into action. The pattern-cylinder may now remain at rest, so that the machine may be operated through several rounds of the fabric before further change is made, thereby forming at the upper end of the sleeve a short section of uniform width. The sleeve now being completed, a succession of movements occur in making the change from the completed sleeve to the cuff of the next sleeve in such manner as to cast off the stitches from the widening-needles and also from such intermediate needles as are not to be employed in the fabrication of the cuff and to form into the last stitch of each of the intermediate wales which are to be dropped a loop which is disconnected from the wales which are continued into the cuff. For the purpose of making this change the face of each pattern-cylinder is provided with a number of depressions extending through the width of the cuff, the two end depressions 64

64 being in the machine as herein shown, although not necessarily so for the purposes of this invention, of sufficient width to receive the fingers of the supporters of a plurality of needles, and the intermediate depressions 65 65, as well as the elevations therebetween, being of sufficient width to receive and to support the finger of but one needle-supporter. By this arrangement of the pattern-cylinder those needles which are to be employed in the fabrication of the cuff are dropped out of action, holding the yarn, of course, in their hooks. While the cylinder is in this position the cam-carriage is reciprocated one or more times, thereby forming one or more rounds of stitches upon the needles resting upon the elevated portions 66 which have been employed in knitting the wales through the completed sleeve which are to be dropped out of the cuff and also upon the widening-needles. The next movement of the pattern-cylinder drops the supporters of the needles which are not to be used in the fabrication of the cuff into a series of depressions 67, the needles last out of action riding up the incline 68 69 upon the elevated portions 70 and 71, the widening-needles remaining in action. One round of stitches is now knitted, when the pattern-cylinder is advanced another step, dropping the needles which are to be used in the formation of the cuff into the depressions 72 and bringing the needles which are not to be employed in the cuff up upon the elevated portion 73, the widening-needles still being in service. At this point in the operation the dog 33 is elevated, thereby disconnecting the yarn-carrier frame from the carriage, and the latter is caused to reciprocate once across the bed of the machine, the dog 33 being dropped before its return and finding its way in the manner hereinbefore described again into engagement with the shoulders 37. By this operation it will be seen that the needles which are in action will have been advanced and retracted, thereby casting off the stitches last formed upon them, but without drawing loops therethrough. During the operation of changing from one article to another, as just described, the two pattern-cylinders move together, so that the action of the needles in both banks is the same, and consequently the stitches formed on both sides are alike, and at that stage of the operation at which certain needles are discharged of their stitches the action is simultaneous as to both banks of needles. During the process of widening the fabric the pattern-cylinders move alternately, so as to bring up but one needle at a time. The pattern-cylinders being again advanced one step, the widening-needles are dropped to the depressed portion 61, the intermediate needles, which are not to be used in fabricating the cuff, enter depressions 74, and the needles which are to be employed in knitting the cuff ride up upon the elevated portions 75. The pattern-cylinders now re-

main at rest until the cuff is completed, when they are again advanced one step, thereby bringing all of the needles within the width of the cuff onto the elevated portion 76. For the purpose of providing an incline upon which the needles last out of service may easily rise and for the purpose of simplifying the construction of the machine a groove 77 is formed continuously across that portion of the cylinder which is within the width of the cuff. This continuous groove is of course entirely unnecessary for the operation of the machine and is made continuous simply as a measure of economy in manufacturing the cylinder. From this position the knitting operation proceeds until the point is reached in the fabrication of the sleeve at which it is desired to widen, when, as before, the alternate advance movement of the cylinders is again commenced.

The particular mechanism as shown in this application for controlling the movements of the pattern-cylinders is not herein claimed, as it is made the subject of a copending application of William K. Millholland and Ulysses G. Lee, filed January 3, 1900, Serial No. 233. The mechanism herein shown for transmitting power from the power-shaft of the machine to the cam-carriage is not claimed in this application, as it is made the subject of a copending application of William K. Millholland and Ulysses G. Lee, filed December 16, 1899, Serial No. 740,504.

We claim as our invention—

1. In a knitting-machine, in combination, needles adapted to reciprocate, means for actuating the needles, a yarn-carrier and means for actuating the same, means for making successive transpositions of needles whereby certain needles are thrown into action and intermediate needles are simultaneously thrown out of action, the arrangement of active and inactive needles in consecutive transpositions being different, means for throwing the yarn-carrier out of action intermediate of two such transpositions of needles, and means for bringing the yarn-carrier again into action intermediate of two subsequent needle transpositions.

2. In a knitting-machine, in combination, a plurality of needles, mechanism for reciprocating the needles, a pattern-cylinder for supporting the needles and having elevated portions for throwing them into action and depressed portions for dropping them out of action, such cylinder having a plurality of axially-alined series of elevations and depressions, adjacent series being differently arranged, whereby intermediate needles are divided into groups and such groups are alternately brought into and out of action, and means for discharging the needles of one of such groups of its stitches.

3. In a knitting-machine, in combination, a plurality of needles, mechanism for reciprocating such needles, a pattern-cylinder for engaging the needles with the mechanism for

reciprocating them and for disengaging them
therefrom, such cylinder being arranged to
divide intermediate needles into groups and
to bring the groups alternately into action,
5 a ratchet and pawl for turning the cylinder,
a cam for actuating the pawl, a yarn-carrier,
a dog connecting such carrier with the needle-reciprocating mechanism, and means con-

trolled by the pawl-actuating cam for disconnecting the dog from such mechanism.

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