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PATENTED JULY 19, 1904.

J. E. PIKE.

LACE PATTERN MECHANISM FOR STRAIGHT KNITTING MACHINES.

APPLICATION FILED JUNE 27, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

fig. 1.

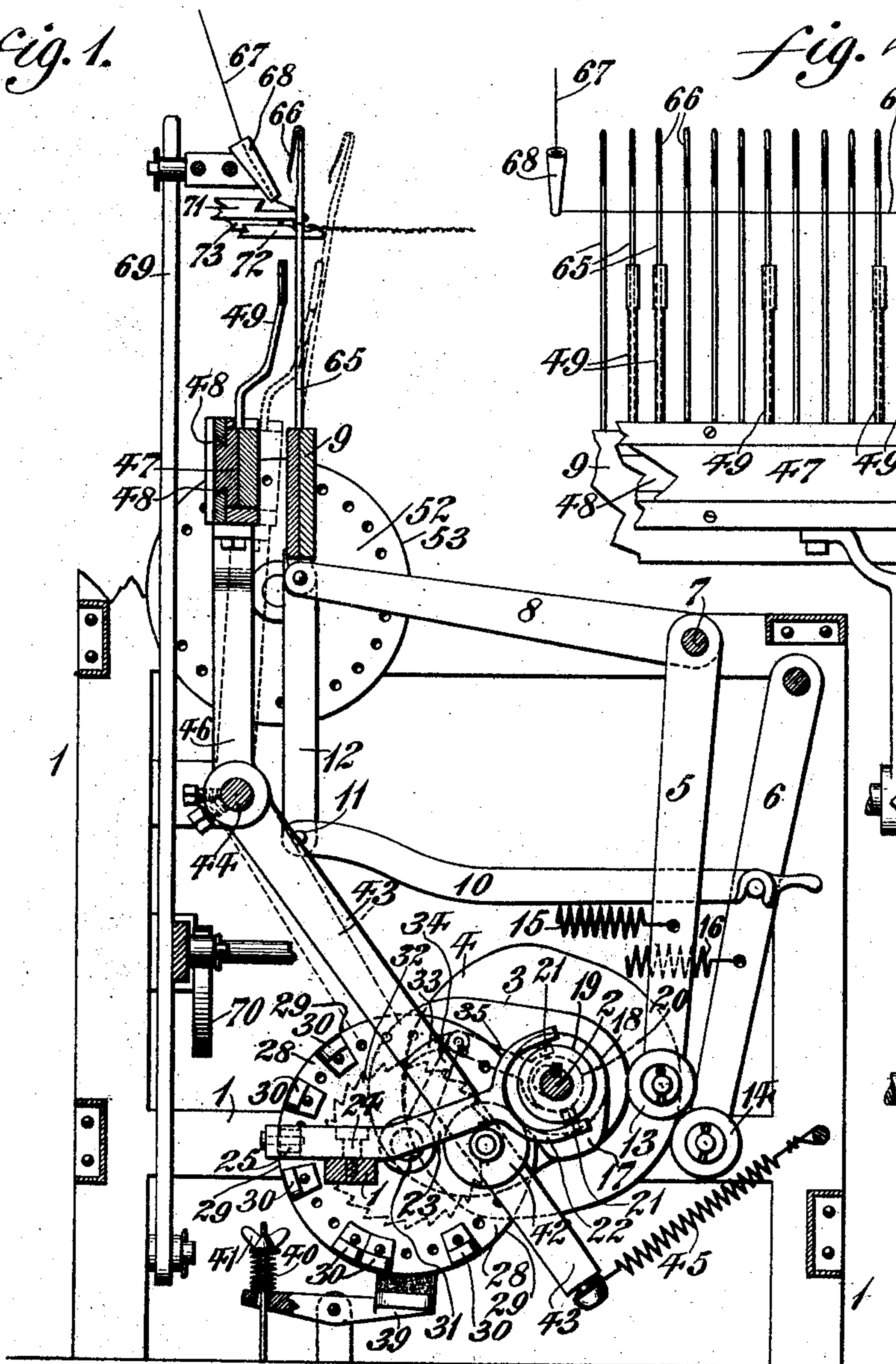


fig. 2.

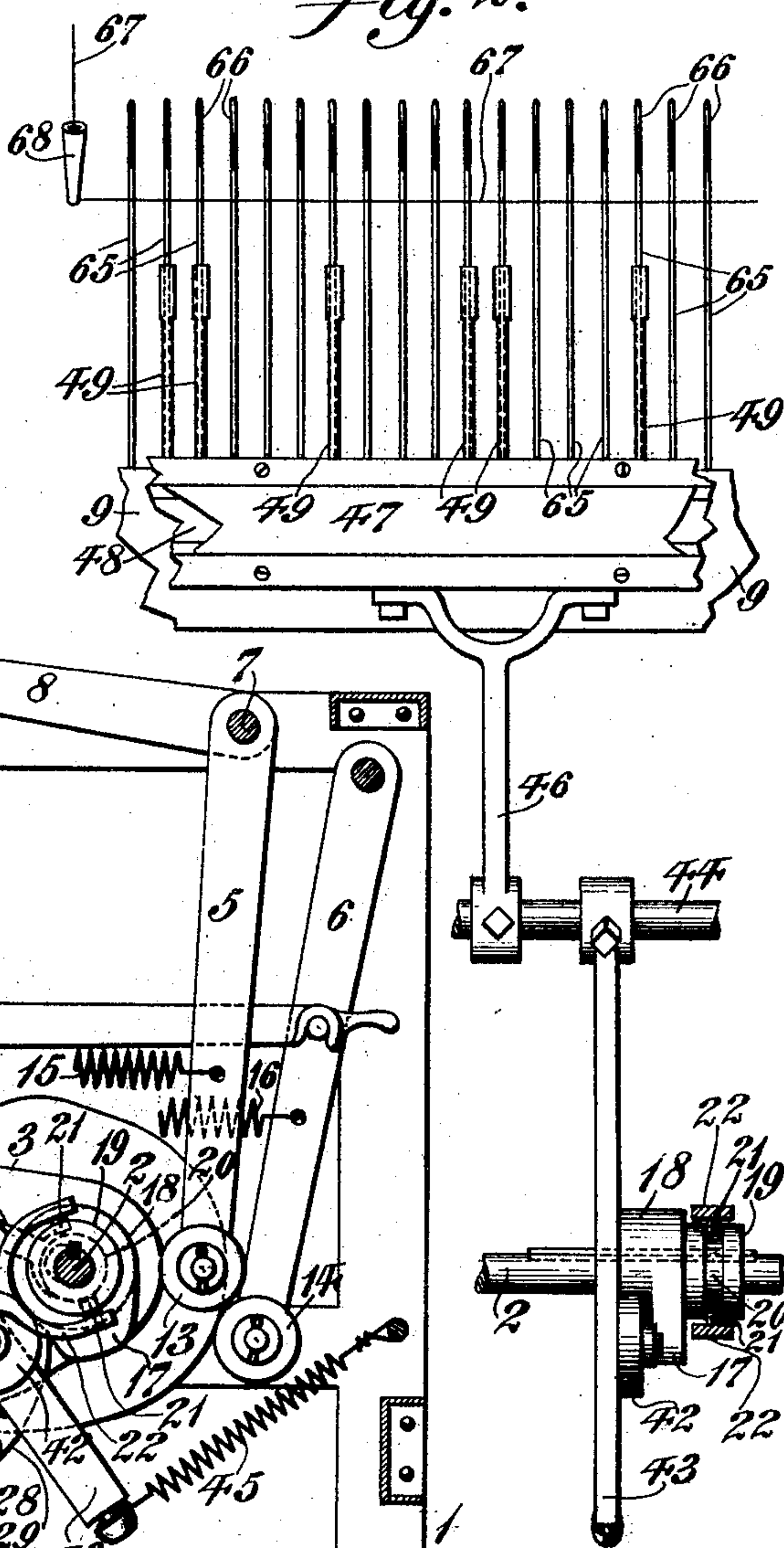


fig. 3.

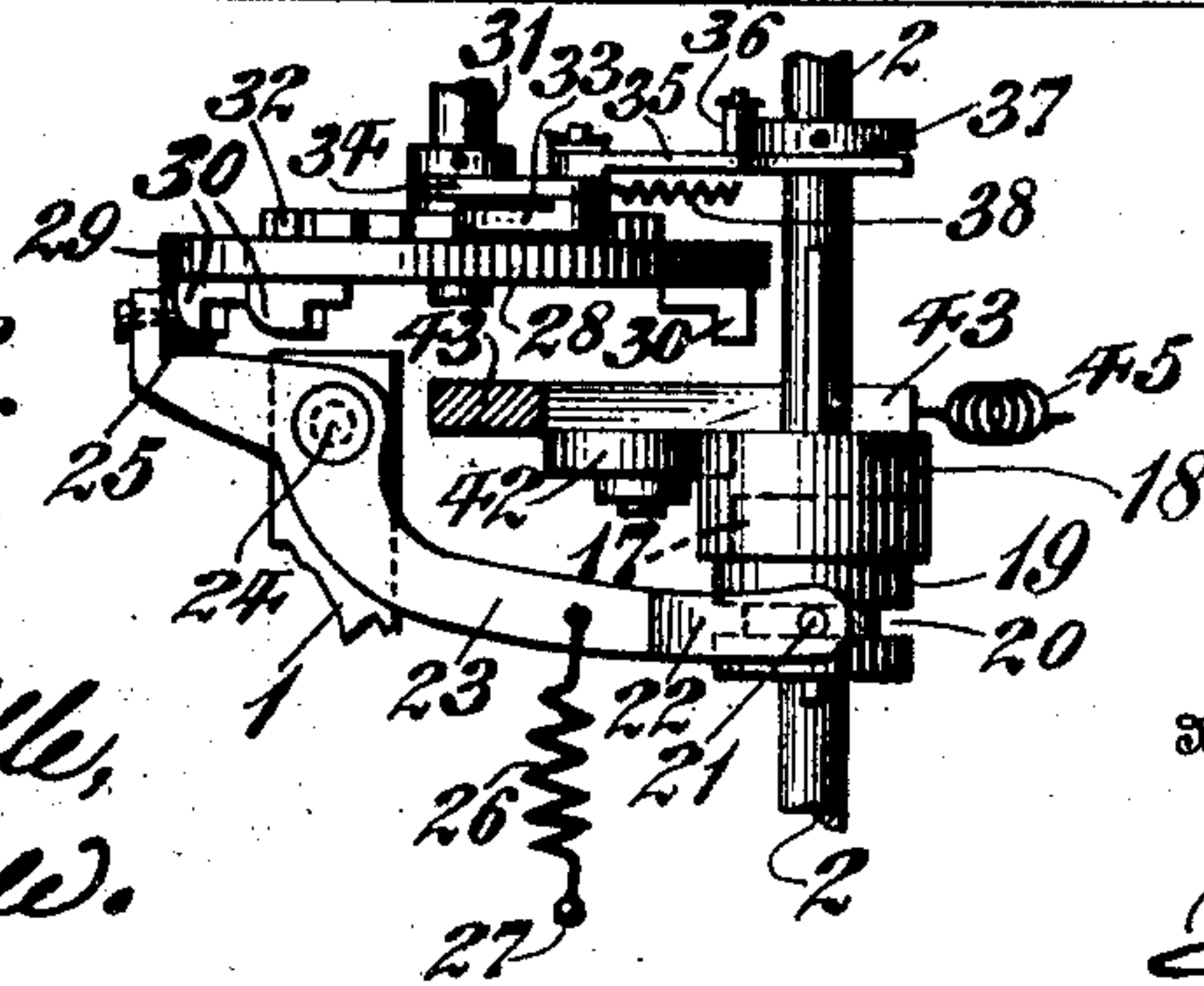


fig. 4.



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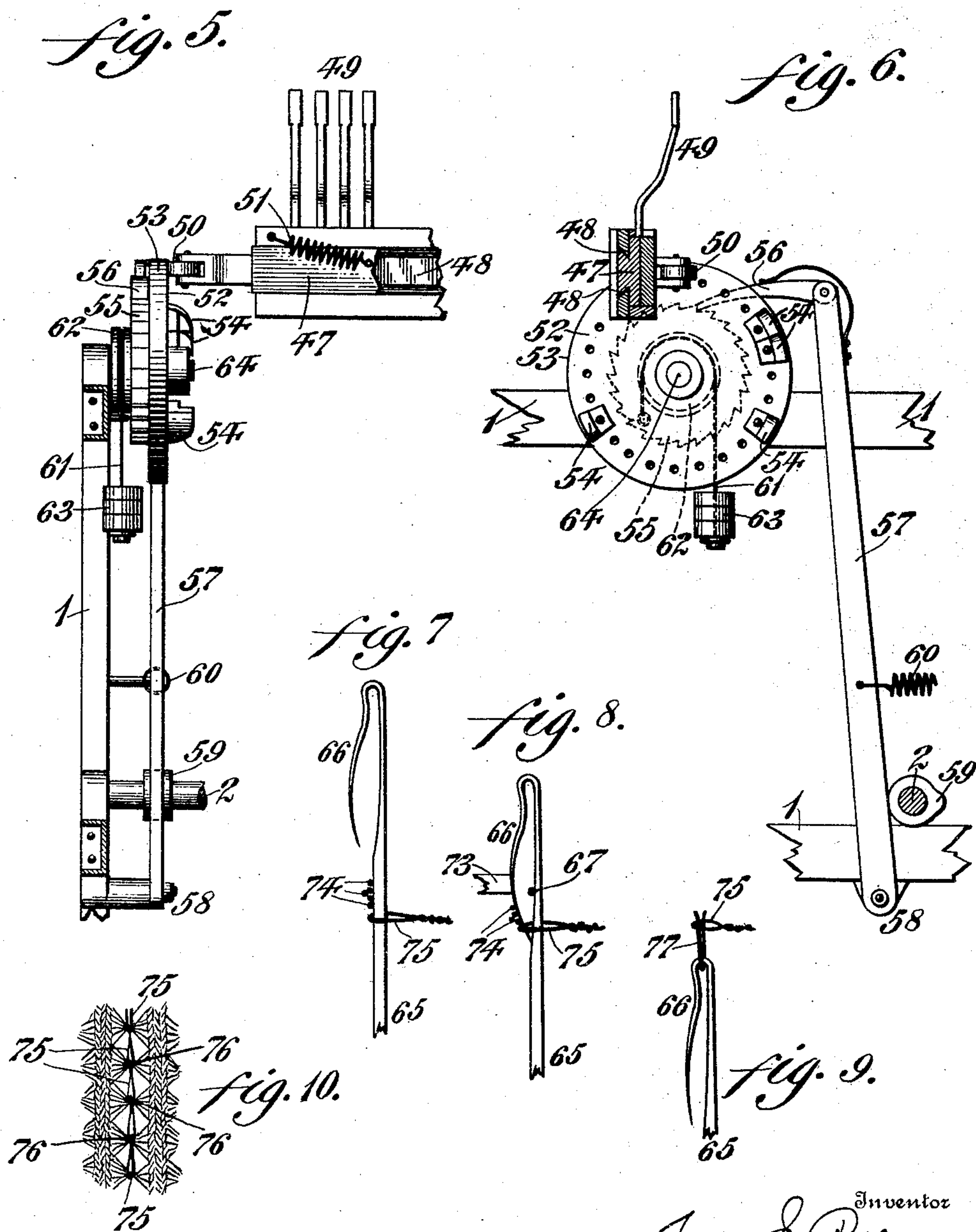
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2 SHEETS—SHEET 2.



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LACE-PATTERN MECHANISM FOR STRAIGHT-KNITTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 765,510, dated July 19, 1904.

Application filed June 27, 1902. Serial No. 113,414. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. PIKE, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Lace-Pattern Mechanism for Straight-Knitting Machines, of which the following is a specification.

My invention relates to improvements in lace-pattern mechanism for straight-knitting machines; and it consists of means whereby certain of the needles are acted upon in such a way as to cause them to produce "lace effect" or tucks in the knit fabric.

It also consists of means for gathering the threads at certain intervals, so as to produce a lace effect of various designs in the knit fabric.

It further consists of means whereby the fingers that operate in connection with the needles so as to produce lace effect may be shifted in order to produce knit fabrics of various designs.

Figure 1 represents a partial side elevation and partial vertical section of a portion of a lace-pattern mechanism for straight-knitting machines with my attachment for producing a lace effect in the knit fabric applied thereto. Fig. 2 represents a partial side elevation and partial vertical section of certain of the parts seen in Fig. 1. Fig. 3 represents a plan view of certain of the parts seen in Fig. 1. Fig. 4 represents a perspective view of a cam employed in carrying out my invention. Fig. 5 represents a side elevation of certain detached portions of the machine. Fig. 6 represents a partial end elevation and partial vertical section of certain of the parts seen in Fig. 5. Figs. 7, 8, and 9 represent side elevations of a knitting-needle and illustrate the manner of producing the "floats" or drop-stitch leaders, and also that of gathering the same at a given point so as to produce the desired effect. Fig. 10 represents a plan view of a portion of the knit fabric and illustrates the plain knitting and also the lace effect therein.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the frame of the machine, in which is journaled the shaft 2, which latter may be driven in the usual manner. The shaft 2 has secured thereon the cams 3 and 4, which operate the arms 5 and 6, respectively, it being understood that the arm 5 is secured to a rock-shaft 7, which latter has secured thereon an arm 8, which imparts rising and lowering motions to the needle-bar 9 in the usual manner. The arm 6 has coupled therewith a link 10, which is pivoted at 11 to the depending member 12 of the needle-bar 9, so as to rock the latter in the usual manner.

The rollers 13 and 14 on the arms 5 and 6, respectively, are retained against their respective cams 3 and 4 by springs 15 and 16, respectively, it being understood that the ends of said springs which are opposite to the ends that are secured to the arms 5 and 6 are secured to some suitable fixed point in the frame 1.

The shaft 2 has secured thereon a cam 17, provided with a hub portion 18 and a collar 19, the latter having a groove 20 therein, which is adapted to receive the studs 21 of the yoke 22 on one end of a lever 23, fulcrumed at 24 to the frame 1, it being noted that the opposite end of said lever 23 is provided with a roller 25, for a purpose hereinafter described.

The lever 23 has secured thereto one end of a spring 26, (see Fig. 3,) the opposite end of said spring being secured to some suitable fixed point, as at 27. The object of the spring 26 is to retain the roller 25 in contact either with the face 28 of a disk 29 or with the studs or blocks 30, secured thereon, for a purpose hereinafter described.

The disk 29 is journaled on a shaft 31 and is provided with a ratchet-wheel 32, with which engages a dog 33, to which motion is imparted by an arm 34, journaled on the shaft 31, and a link 35, it being understood that one end of said link 35 is pivoted to the arm 34

and that its opposite end is forked, so as to straddle the shaft 2, as seen in Fig. 3, and that said link is provided with a roller 36, which is in contact with a cam 37, secured on the shaft 2, it being noted that said roller 36 is retained in contact with the cam 37 by a spring 38, one end of which is secured to the arm 34 and its opposite end to any convenient fixed point.

The disk 29 is prevented from rotating when the dog 33 is moving backward by a brake 39, the tension of which may be regulated by a spring 40 and a nut 41. (See Fig. 1.)

The cam 17 is at certain times in contact with a roller 42, carried by an arm 43, which latter is secured to a rock-shaft 44, journaled in the frame 1, it being noted that said roller 42 is retained in contact with the hub portion 18 of the cam 17 by a spring 45, it being understood that there are times when said rollers 42 will be caused to contact with the cam 17 for a purpose hereinafter described.

The shaft 44 has secured thereon arms 46, only one of which is shown in the drawings, it being apparent that any desired number of these may be employed.

Fitted in the upper portion of the arms 46 is a bar 47, which is adapted to slide in ways 48, secured to the arms 46, for a purpose hereinafter described.

The bar 47 is provided with fingers 49 and a roller 50, as best seen in Figs. 5 and 6, it being noted that said roller 50 is retained in contact by a spring 51 with either the face 52 of a disk 53 or with a lug or block 54, secured to said disk, for a purpose hereinafter described.

The disk 53 is provided with a ratchet-wheel 55, with which engages a dog 56, pivoted to an arm 57, whose lower end is journaled, as at 58, in the frame 1.

The shaft 2 has secured thereon a cam 59, against which bears the arm 57, it being noted that said arm is retained in contact with the cam 59 by a spring 60, one end of which is secured to said arm 57 and its opposite end to a convenient fixed point.

The disk 53 is prevented from rotating when not driven by the dog 56 by a tension device, consisting of a cord 61, which passes over a pulley 62, secured to the ratchet-wheel 55 and provided with weights 63, it being noted that the disk 53 and the ratchet-wheel 55 and also the pulley 62 are journaled on a shaft 64, mounted in the frame 1 of the machine.

The needle-bar 9 is provided with needles 65, which have spring-beards 66, it being understood that the yarn 67 is fed to said needles by a yarn-tube 68, which is caused to travel to and fro in the path of the needles 65 by reason of the lever 69, to which a rocking motion is imparted by the cam 70 in the usual manner.

The operation is as follows: When it is desired to knit plain fabric, the lugs or blocks

30 (seen in Figs. 1 and 3) are removed from the disk 29, whereupon no motion is imparted to the lever 23, which latter is then caused to remain in its normal position, as seen in Fig. 3, it being noted that the hub portion 18 of the cam 17 is in contact with the roller 42, which being of uniform diameter will impart no motion to the arm 43 when the shaft 2 is rotating, whereupon the rock-shaft 44, the arms 46, the bar 47, and the fingers 49 will all remain stationary and in their normal positions, as seen in Fig. 1. The cam 59, (see Fig. 6,) is shifted by hand on the shaft 2, so as to move said cam out of the path of the arm 57, whereupon no motion is imparted to the disk 53 when the shaft 2 is rotating. It is apparent that when the shaft 2 rotates it imparts motion to the cams 3 and 4, which in turn transmit motion to the arms 5 and 6, which in their turn operate the needle-bar 9, so that the latter imparts motion to the needles 65 in the usual manner, so that the latter, in connection with the sinkers 71, the knock-over bits 72, and the presser-fingers 73, (which latter close the beards of the needles 65, and all of which work in the usual manner,) will produce a plain knit fabric of ordinary construction. When it is desired to knit a fabric with a lace effect, the studs or blocks 30 are secured to the disk 29 in such positions relatively to each other as may be required by the predetermined design of the fabric. The shaft 2 in rotating imparts motion to the cam 37, which transmits motion, by reason of the link 35, the arm 34, and the dog 33, to the ratchet-wheel 32, which latter imparts an intermittent rotary motion to the disk 29, whereupon when a lug or block 30 engages the roller 25 it causes the lever 23 to turn on its fulcrum 24, so as to shift the collar 19, and with it the cam 17, and thus bring the latter in the path of the roller 42, whereupon a rocking motion is imparted to the arm 43, which latter transmits a similar motion to the shaft 44, and consequently rocks the arm 46 and likewise the ways or guide 48, in which is fitted the bar 47, causing the latter and also the fingers 49, secured thereto, to move toward and from the needles 65. When that portion of the cam 17 which is of the same diameter as the hub portion thereof is in contact with the roller 42, the arms 43 and 46 and the fingers 49 occupy the positions seen in full lines in Fig. 1, and when the cam 17 is in contact with the roller 42 the arms 43 and 46 and the bar 47 and fingers 49, secured thereto, are brought into the positions seen in dotted lines in said Fig. 1, it being noted that the needles 65, which are in the path of said fingers 49, are deflected into the position seen in dotted lines in Fig. 1, whereupon the yarn 67, fed to the needles by the yarn-tube 68, is drawn through the loops already on the needles; when the latter are lowered in the usual manner, and thus additional loops are added to the fabric by such needles 65 as are not in

the path of the fingers 49, and thus produce a plain knit fabric. The needles 65, which are deflected by the fingers 49, cannot draw the yarn 67, fed to them, through the loops 5 already on said needles, because the barbs are pressed by the presser-fingers 73, due to their deflected positions, whereupon every time the yarn is fed to said needles an unlooped strand is produced in the fabric, and said unlooped 10 strand may consist of several strands of yarn, as at 74 in Figs. 7 and 8, it being apparent that the number of strands of yarn in the unlooped strands may be regulated by the relative positions of the lugs 30 when placed on 15 the disk 29, and these threads may be gathered together by any ordinary tuck-stitch. It will be apparent that the length of the floats may be regulated by the relative positions of the fingers 49. For instance, if four 20 fingers 49 are placed side by side, as in Fig. 5, a float corresponding in length to the distance between four needles 65 is produced, and if two needles 65 are placed side by side, as in Fig. 2, a float corresponding in length 25 to the distance between two needles 65 is produced. When the cam 17 in rotating leaves the roller 42, arm 43, and consequently the fingers 49, are returned to their normal positions by the spring 45, whereupon said fin- 30 gers 49 and the needles 65, which were deflected by the same, will again occupy the positions seen in full lines in Fig. 1, so that when they are lowered by the descent of the needle-bar 9 said needles 65 will have their 35 beards 66 closed by the presser-fingers 73, as seen in Fig. 8, whereupon the strands 74 of the floats, as also the loops 75 on the needles 65, are caused to slip off said needles, and in so doing are gathered together at one point, 40 as at 76 in Fig. 10, it being apparent that the series of loops 75 (seen in said Fig. 10) are interlocked by reason of the yarn 67 (seen in Fig. 8 and which is within the beard 66) being drawn through the loop 75 when the 45 strands 74 and loop 75 are cast off the needle 65, thus forming a tuck-stitch. When the yarn 67 (seen in Fig. 8) is drawn through the loop 75, it produces the vertical loop 77, (seen in Fig. 9,) which when cast off the needle 65 50 adds another loop 75 to the series of loops seen in Fig. 10.

It will be apparent that were it not for the gathering of the floats at certain intervals, as at 76 in Fig. 10, the strands 74 of yarn

would when cast off a needle 65 remain parallel to each other and would not produce the desired lace effect. 55

It will be apparent that by shifting the bar 47 at predetermined intervals the fingers 49 will likewise be shifted and caused to deflect 60 a particular set of needles 65 at certain times and another set of needles 65 at other times, which, operating in connection with the various positions in which the lugs 30 may be placed on the disk 29, enables the machine to 65 produce knit fabrics of an innumerable variety of designs.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is— 70

1. In a knitting-machine, needles therefor, suitably operated, a lever suitably supported, fingers carried by said lever adapted to be situated adjacent to certain of said needles, a cam carried by a suitable shaft, a yoke connected with said cam, and means for operating said yoke to cause said cam in its revolution to be in the path of and out of the path of said lever, whereby said fingers may be operated at various times in order to strike 80 certain of said needles.

2. In a knitting-machine, needles therefor suitably operated, a lever suitably supported, fingers adjustably carried by said lever adapted to be situated adjacent to certain of said 85 needles, a cam carried by a suitable shaft, a yoke connected with said cam, and means for operating said yoke to cause said cam in its revolution to be in the path of and out of the path of said lever, whereby said fingers may 90 be operated at various times in order to strike certain of said needles.

3. In a knitting-machine, needles therefor suitably operated, a lever suitably supported, fingers adjustably carried by said lever adapted to be situated adjacent to certain of said 95 needles, a cam carried by a suitable shaft, a yoke to cause said cam in its revolution to be moved into and out of operative relation with said lever, whereby said fingers may be operated at various times in order to strike 100 certain of said needles, and means for varying the position of said fingers with respect to said lever.

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Witnesses:

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WM. CANER WIEDERSHEIM.