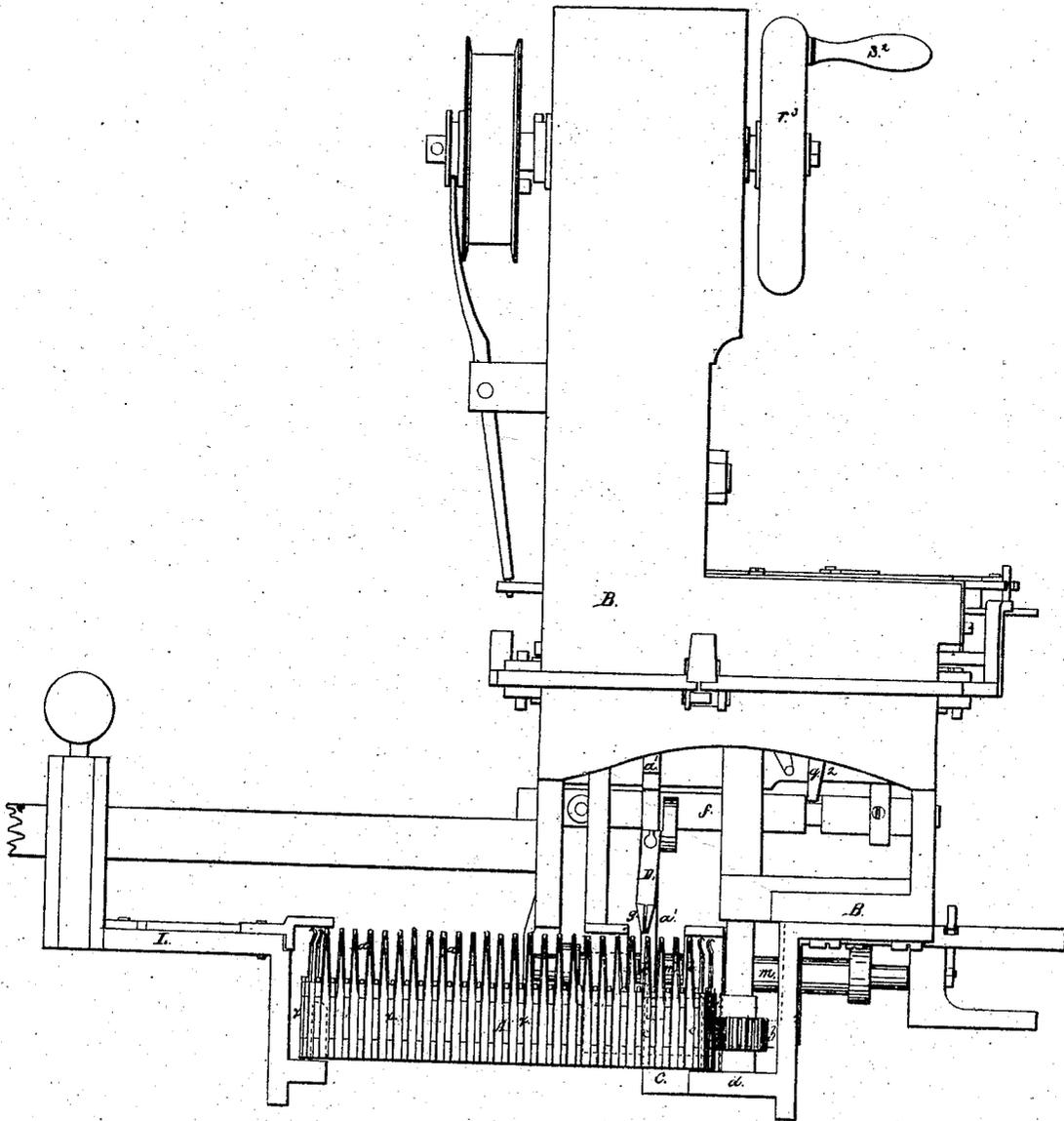


R. Ellis.
Knitting Machine.

N^o 8163.

Patented Jun. 17, 1851.

Fig. 1.



R. Ellis. Knitting Machine.

N^o 8/63.

Patented Jun. 17, 1851.

Fig. 2.

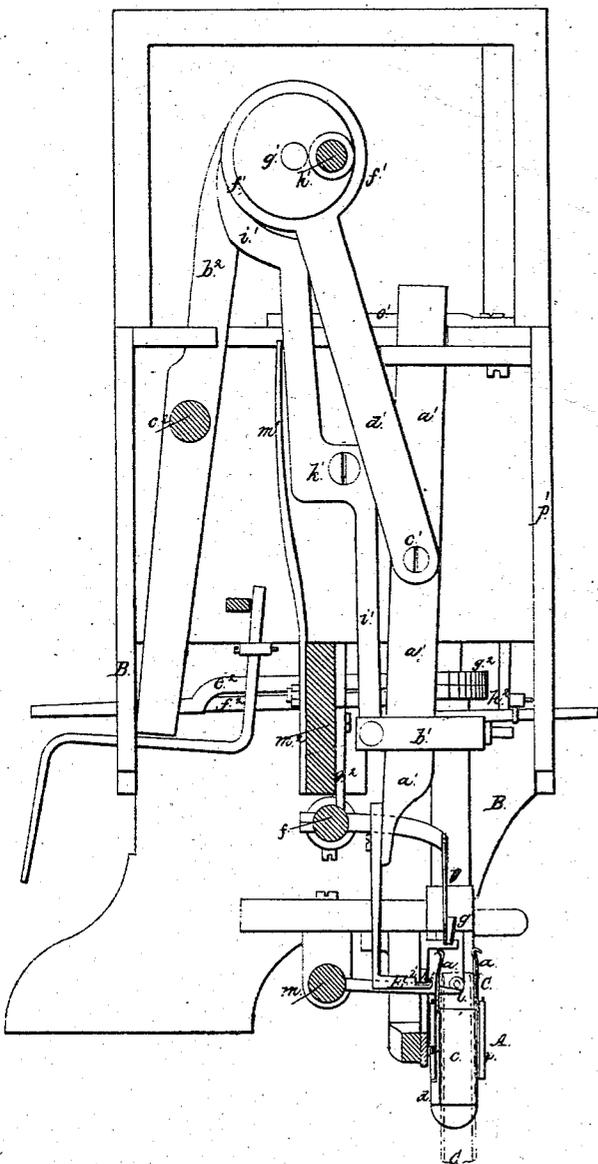


Fig. 3.

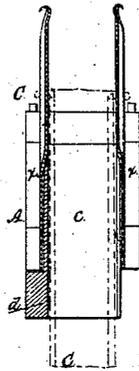


Fig. 4.

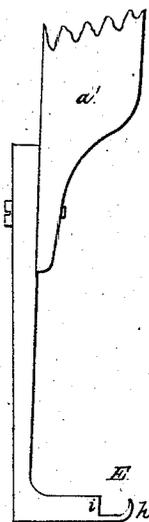
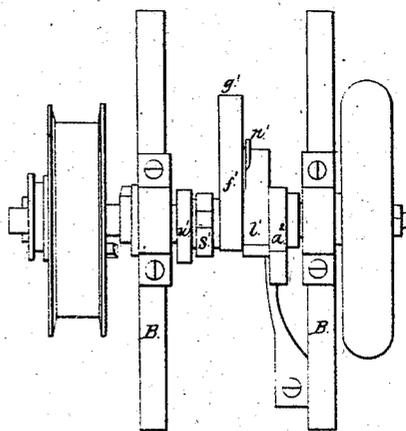


Fig. 5.



R. Ellis. Knitting Machine.

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Fig. 9.

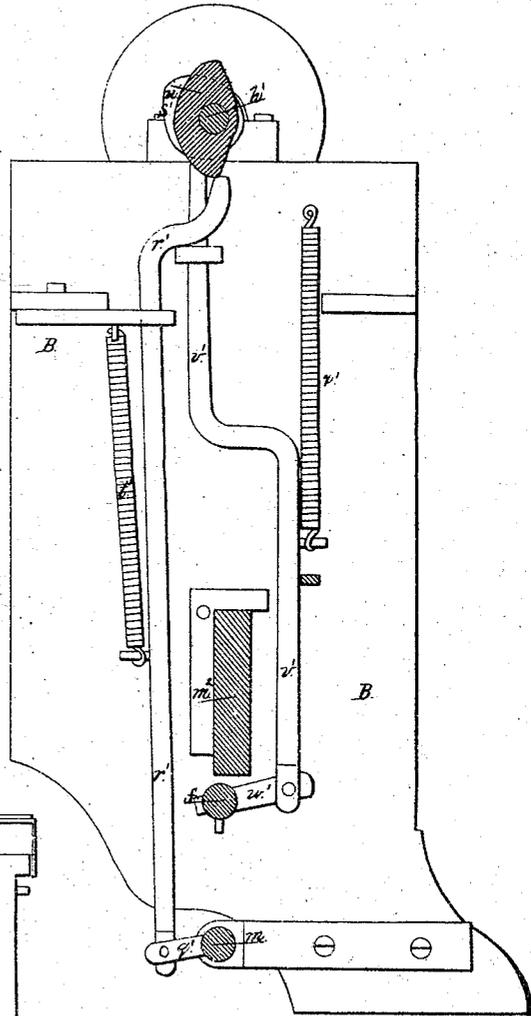


Fig. 7.

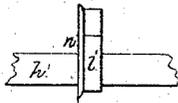


Fig. 8.

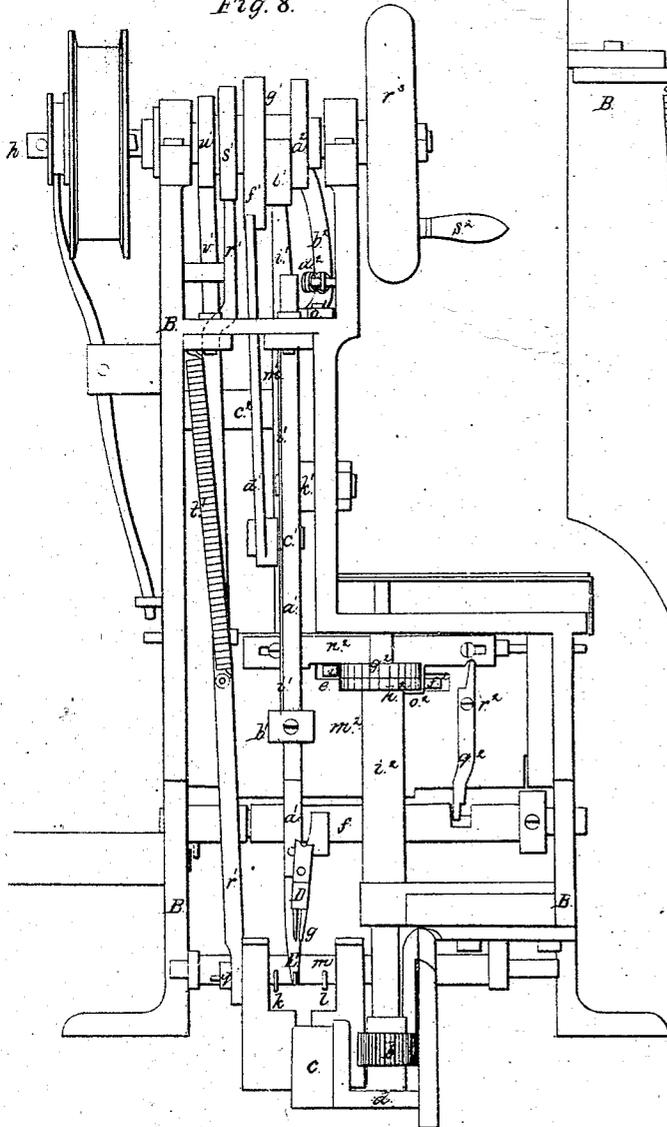


Fig. 6.



R. Ellis. Knitting Machine.

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Fig. 10.

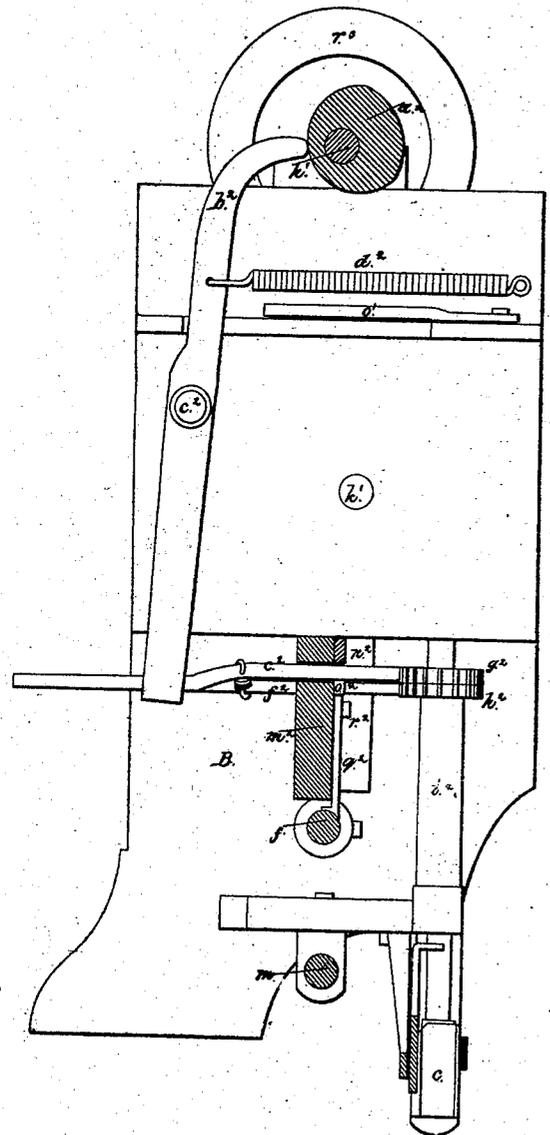


Fig. 12.

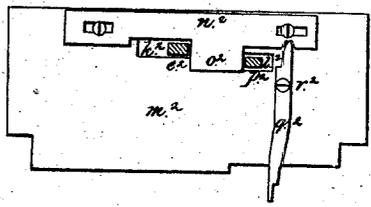
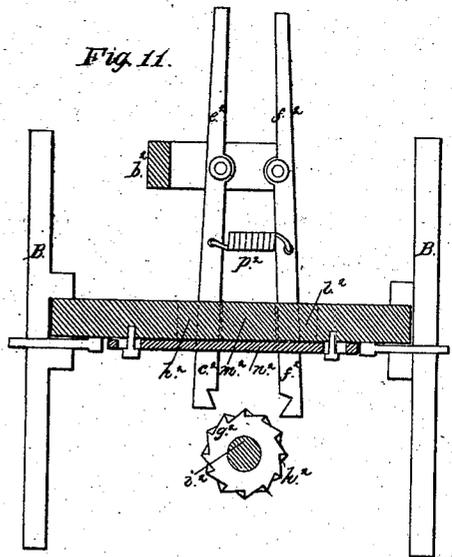


Fig. 11.



UNITED STATES PATENT OFFICE.

RUFUS ELLIS, OF NORTHAMPTON, MASSACHUSETTS, ASSIGNOR TO WILLIAM M. CHASE.

KNITTING-MACHINE.

Specification of Letters Patent No. 8,163, dated June 17, 1851.

To all whom it may concern:

Be it known that I, RUFUS ELLIS, late of Northampton, in the county of Hampshire, but now of Boston, in the county of Suffolk,
5 State of Massachusetts, have invented an Improved Knitting-Machine; and I do hereby declare that the same is represented and described in the following specification and accompanying drawings, letters, figures, and
10 references thereof.

Of the said drawings, Figure 1, denotes a front elevation of the said improved knitting machine. Fig. 2, is a vertical and transverse section of it, the same being taken
15 in such manner as to exhibit the yarn guide or director, the stitch hook, and the contrivance for forcing the work down toward the roots of the needles, after the formation of each new loop. Such other figures as
20 may be necessary to a proper representation of the various parts of my improvements, will be hereinafter referred to, and described.

The machine, as improved, is not what is
25 usually termed a stocking loom, but is more properly named a knitting machine, for the reason that it forms each stitch of the work, in regular succession, and not a number of stitches at once as does the stocking loom.
30 It is a machine in character, like others in use, although it differs from the same in sundry important particulars, which constitute my invention, and which I shall hereinafter describe.

In the drawings above mentioned, A, denotes the endless chain-belt, of knitting needles, which is so made, that the needles, *a, a, a, &c.*, instead of being arranged or made to stand horizontally, and at right angles to
40 the vertical surface of the belt, are made to stand vertically, or in the plane of the belt, as seen at, *a, a, a, a*, Figs. 1 and 2.

The driving pinion, *b*, instead of being arranged within the belt, as it has been in
45 other machines of this character, is disposed on the exterior surface of it, and works against, or engages with, the projecting points of the belt. That part of the inner surface of the belt, which is immediately adjacent to the pinion, is supported by, and works around, a stationary vertical post or
50 guide, *c*, (see Fig. 3, which is a vertical section of the belt and its support,) that extends upward from a horizontal arm, *d*, which projects from the main frame, B.
55 The opposite end of the endless belt, is sup-

ported by a straining contrivance, L, which is similar to such as are in common use, in such machines. The work or knitting hangs
60 within the endless belt, instead of without it, or on the outside of it. In Figs. 2, and 3, the work is denoted at C, by red lines.

The yarn guide or director, is seen at D. It consists of a curved arm, made to extend
65 from a horizontal rocker-shaft, *f*, and to have a small conical and split tube, *g*, on its outer end, through which tube the yarn is carried from the bobbin placed in any convenient position.

The stitch hook is seen at E. It is arranged in rear of the chain belt of needles,
70 and is formed as represented in side view, on an enlarged scale, Fig. 4, that is to say, it is made not only with a hooked end, as seen at *h*, but with a shoulder, *i*, a short distance in rear of the said hooked end, the shoulder performing the important office of pressing or casting the loop (taken up by
75 the hook) over the hooked point of the needle, the same having been effected in other machines of this kind, by what is usually
80 termed, the "bent finger." By my improvement I am enabled to dispense with such bent finger, and the machinery for operating it. In order that the stitch hook may not
85 only take up the loop, but cast it over the end of the needle and the yarn laid on the needle by the yarn director, and this to form or make a new stitch, the hook should have the following movements imparted to it:
90 First it should be made to pass into the groove of the needle, and under the stitch on the needle. Next it should be made to rise upward so as to carry the stitch up to the hooked end of the needle. Next it
95 should be moved laterally far enough to be opposite the space between the needle (first operated upon,) and the next needle. Next it should be moved forward between the two
100 needles, and so as to cause the shoulder *i*, to press or force or cast the stitch over the hooked end of the needle. The stitch hook should next be drawn backward and depressed so as to disengage it from the stitch.
105 The movements of the stitch hook may be produced by various kinds or combinations of mechanism. No such machinery forms any part of my invention, and I lay claim to none in particular, but employ such as may be suitable; that adopted by me is as follows, viz:
110

The stitch hook, E, is fastened to the

lower end of a bar, a' , which works or slides freely up and down through a piece of metal, b' , and is jointed by a joint screw, c' , to a connecting rod d' , on whose upper end is a strap, f' , passing around an eccentric g' , fixed on the main driving shaft, h' , of the machine. The upward and downward movements of the stitch hook are effected by such eccentric during its entire revolution. In order to produce its forward and back movements, a lever, i' , working on a fulcrum k' , is jointed at its lower end to the rear end of the piece of metal, b' . The upper end or arm of the said lever, rests against a cam, l' , fixed on the driving shaft, (see Fig. 5.) which denotes a top view of the said shaft, and the cams applied to it. See also Figs. 6, and 7, the former of which, is a side view of the said cam and the wing cam to be hereinafter described, while the latter is a top view of the same, made so as to show the form of the wing cam. During the revolution of the cam l' , the lever, i' , will be moved forward and backward, by the action of the said cam and a spring, m' , made to bear against the rear side of the said lever. The small wing-cam, n' , placed on the side of, or to project above the cam, l' , serves to press the upper end of the lever, i' , laterally, in order to produce the required lateral motion of the stitch hook. A spring, o' , see Fig. 5, presses the end of the lever, i' , against such wing cam.

Both the stitch hook, and the yarn guide, are arranged between the arms of the presser, which presser consists of two arms, k , l , extended at right angles from a horizontal rocker shaft, m , and long enough to play between the needles. These arms should be made to operate so as to press the work down to the roots of the needles, after the formation of each stitch. They should next be raised upward far enough to allow of the movement of the chain-belt, which having taken place, they should be depressed, so as to hold the work down, until the stitch hook has fairly hooked under, or taken up the stitch, on the needle, against which it may be acting.

The presser should next be elevated with the stitch hook, so as to allow the work to rise. While the stitch hook is casting the stitch, or loop, over the hook of the needle, the presser should be stationary, but as soon as this has been effected, and the stitch hook has withdrawn itself from the stitch, the presser should be depressed, so as to force the work down to the roots of the needles. Such movements may be attained by any suitable machinery, applied to the rocker-shaft of the presser, such mechanism constituting no part of my invention; but that which I employ may be thus described: Fig. 8, is a front elevation of the machine as it appears when its front plate p' , and the end-

less chain A, are removed from the remainder of the mechanism. Fig. 9, is a vertical cross section of the machine; the same being taken looking toward the left, through the cam, which operates the presser.

From the shaft m , of the presser, an arm, q' , extends toward the front and is jointed at its outer end, to an upright and bent bar, r' , whose upper end is forced upward against the cam, s' , by means of a spring, t' , one end of which is attached to the bar, r' , and the other to the frame or box, B, as seen in Figs. 8 and 9. The cam s' , is fixed on the driving shaft, and during its revolution, it, in conjunction with the spring, t' , produces the rocker motions of the shaft m , such as will cause the presser to operate in the manner required.

Directly after each movement of the chain belt, the yarn guide or director, D, should be moved forward beyond the back needles, so as to lay the yarn on that needle, on which the new stitch is to be made; after the stitch has been formed the yarn guide should be retrograded and carried back of the needles, in order that the chain belt may perform its next movement, without obstruction. The mechanism for operating the yarn guide, or director, D, consists of a cam, u' , fixed on the driving shaft, a slide rod or bar, v' , (whose lower end is jointed or hinged to the outer end of an arm, w' , extended from the shaft f ;) and a spring, x' , which forces the bar, v' , up against the cam, the said cam being shown in Fig. 9, by dotted lines.

The machinery for moving the chain belt forms no part of my invention, except so far as the arrangement of the gear or pinion b , and the joints, x , x , x , &c., of the chain belt is concerned. On the main driving shaft, there is another cam a^2 , which operates against the upper end of a lever b^2 , which turns upon a fulcrum, c^2 , see Fig. 10, which is a transverse section of the machine, taken through such cam, and looking toward the right, serves to show the machinery actuated by it. A spring, d^2 , is used to draw the upper end of the lever against the cam. The lower end of the lever, is bent at right angles, or horizontally, and has two impelling pawls e^2 , f^2 , jointed to it, and made to extend forward and respectively to act in concert with two ratchet wheels, g^2 , h^2 , fixed upon the upright shaft, i^2 , of the pinion b , which works the chain belt. These ratchet wheels, and pawls are seen in Figs. 2 and 11, the latter figure being a horizontal section of the machine taken just above the pawls, and so as to exhibit them. The teeth of one of the ratchet wheels is arranged in a direction opposite to those of the other—in order that when its pawl is in action with it—a motion of the shaft, i^2 , may be produced in a direction the reverse of that effected by the movements of the other pawl, and its wheel. By

the movement of either pawl, an intermittent rotary motion of the shaft, i^2 , will take place.

5 The two pawls pass respectively through slots k^2 , l^2 , made in a vertical stationary plate m^2 , see Fig. 12, which is a front view of the plate m^2 , and the shifting contrivance attached to it. Such shifting contrivance is a slide n^2 , which is capable of being moved
10 longitudinally and has a projection o^2 , extending down between the two pawls. When the slide is moved in one direction it bears against one of the pawls, and throws it out of action upon its ratchet wheel, and at the
15 same time in consequence of the two pawls being connected by a spring p^2 , it draws the other pawl against the other ratchet wheel, thereby creating a reverse motion of the shaft, i^2 . The object of the two pawls is to
20 enable the movement of the endless belt, A, to be reversed, so as to cause the knitting to be produced in an opposite direction; one pawl however is sufficient to produce the movement necessary to knit in one direction.

25 The shaft, f , which carries the yarn director D, is made to slide longitudinally in its bearings, and is connected into the slide, n^2 , by a lever, q^2 , which turns upon a fulcrum, r^2 , and has its ends inserted in notches
30 made in the slides, n^2 , and the shaft, f , and this so that the movement of the slide in one direction, may create a sliding movement of the shaft sufficient to move the yarn guide into the proper position to commence
35 the knitting in the reverse direction.

The shifting contrivance may be operated by the attendant or by any other proper means. Some parts of other mechanism which I append or attach to the above described machine, and for purposes not necessary to mention, may be seen in the drawings. As such mechanism forms no part of my invention, I make no further reference to it, or description of it.

45 On the driving shaft, there may be a fly wheel, r^3 , from which a crank, s^2 , may ex-

tend, and for the purpose of enabling a person to put the shaft in motion, or the said shaft may be revolved by a pulley applied to it, and made to receive an endless belt
50 from any suitable driving drum.

By having the endless chain of needles made and operated in the above described manner, the chain extends around the work, instead of the work encompassing the chain, 55 as it does in other well known knitting machines. My improved arrangement and disposition of the work, exposes all the joints of the links of the chain, so that a workman or attendant can readily remove one or more
60 of the needles, or insert one or more of the needles, with much greater convenience than can be done on the said well known machines, as in the latter he would be obliged to wholly or partially remove the work from
65 the needles, in order to accomplish the addition, or subtraction of one or more of the needles, such addition or subtraction being for the purpose of enabling him to "widen" or "narrow" the work. 70

My improvement affords great advantages in knitting a heel, as the same can be effected in a much more perfect manner, without that strain upon the work and needles, that is incident to the old and well-known machines. 75

What I claim as my improvement is—

The arrangement of the needles in the plane of the endless belt, instead of at right angles to it, in combination with the arrangement of the driving pinion, b , and the projecting joints, x , x , x , &c., of the links of the belt, on the outside of the belt; the belt being supported, and the whole being applied to the stitch hook, yarn guide, and
85 presser, and made to operate together, and with the work hanging on the inside of the belt, substantially as hereinbefore specified.

RUFUS ELLIS.

Witnesses:

N. AUSTIN PARKE,

W. R. P. WASHBURN.