Sheet 1. 4 Sheets.

Mc Mullen & Hollen.

Knitting Mach.

No. 126½ Patented Feb. 11. 1837.

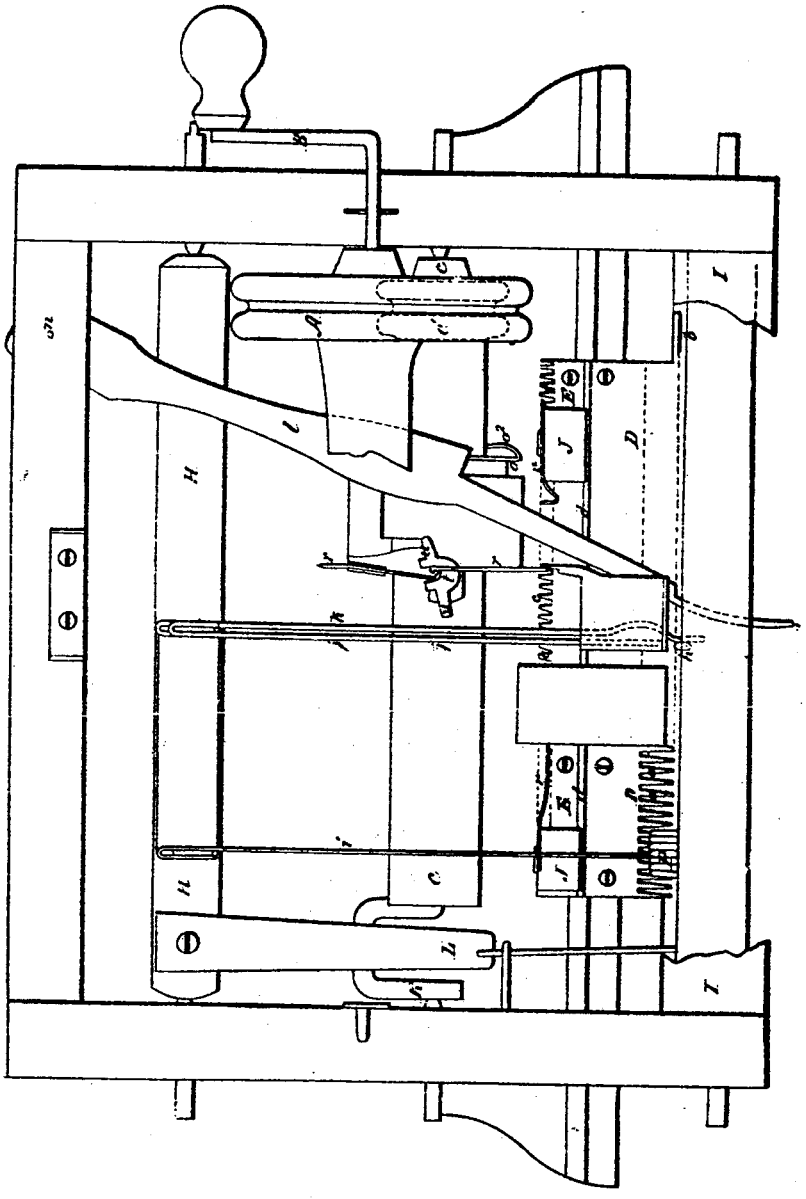

Fig. 1.

Mc Mullen & Hollen.

Knitting Mach.

No. 126½. Patented Feb. 11, 1837.

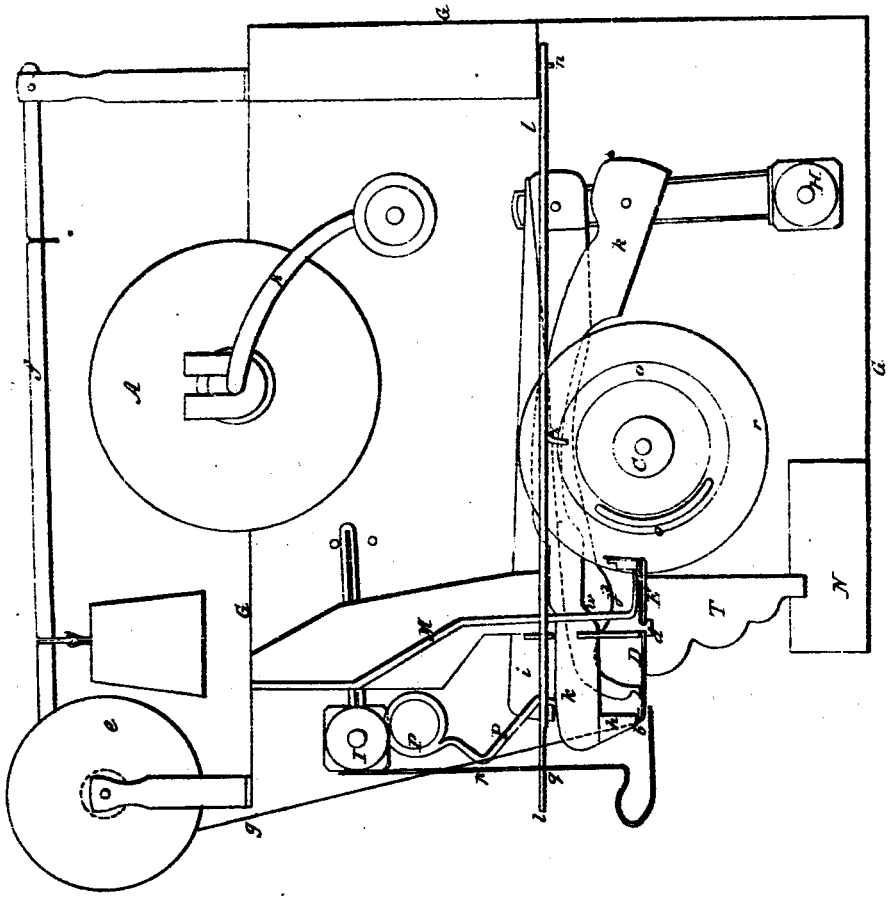

Fig. 2.

Sheet 3. 4 Sheets.

Mc Mullen & Hollen.

Knitting Mach.

No 1262 Patented Feb. 11, 1837.

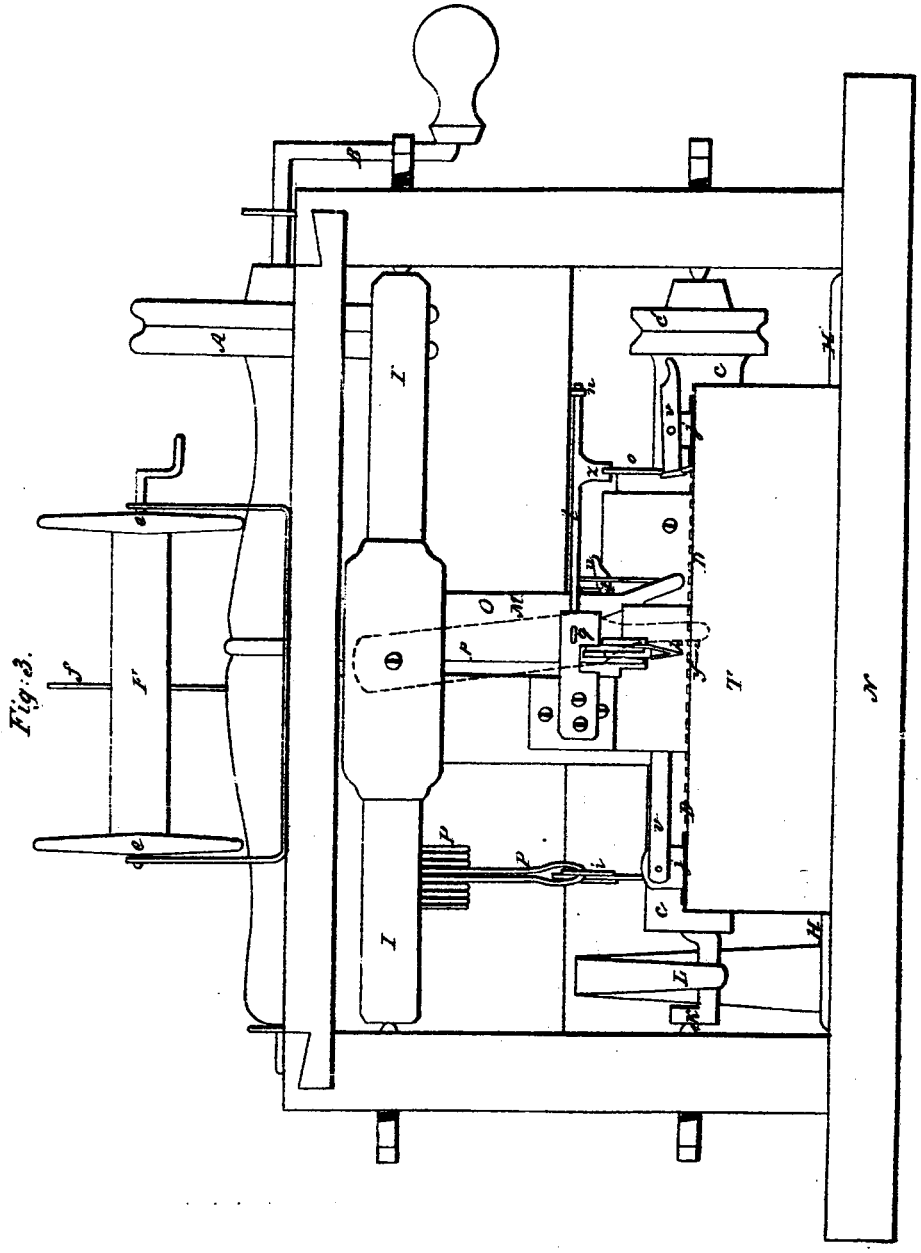

Fig: 3.

Mc Mullen & Hollen.

Knitting Mach.

No 126½.

Patented Feb. 11, 1837.

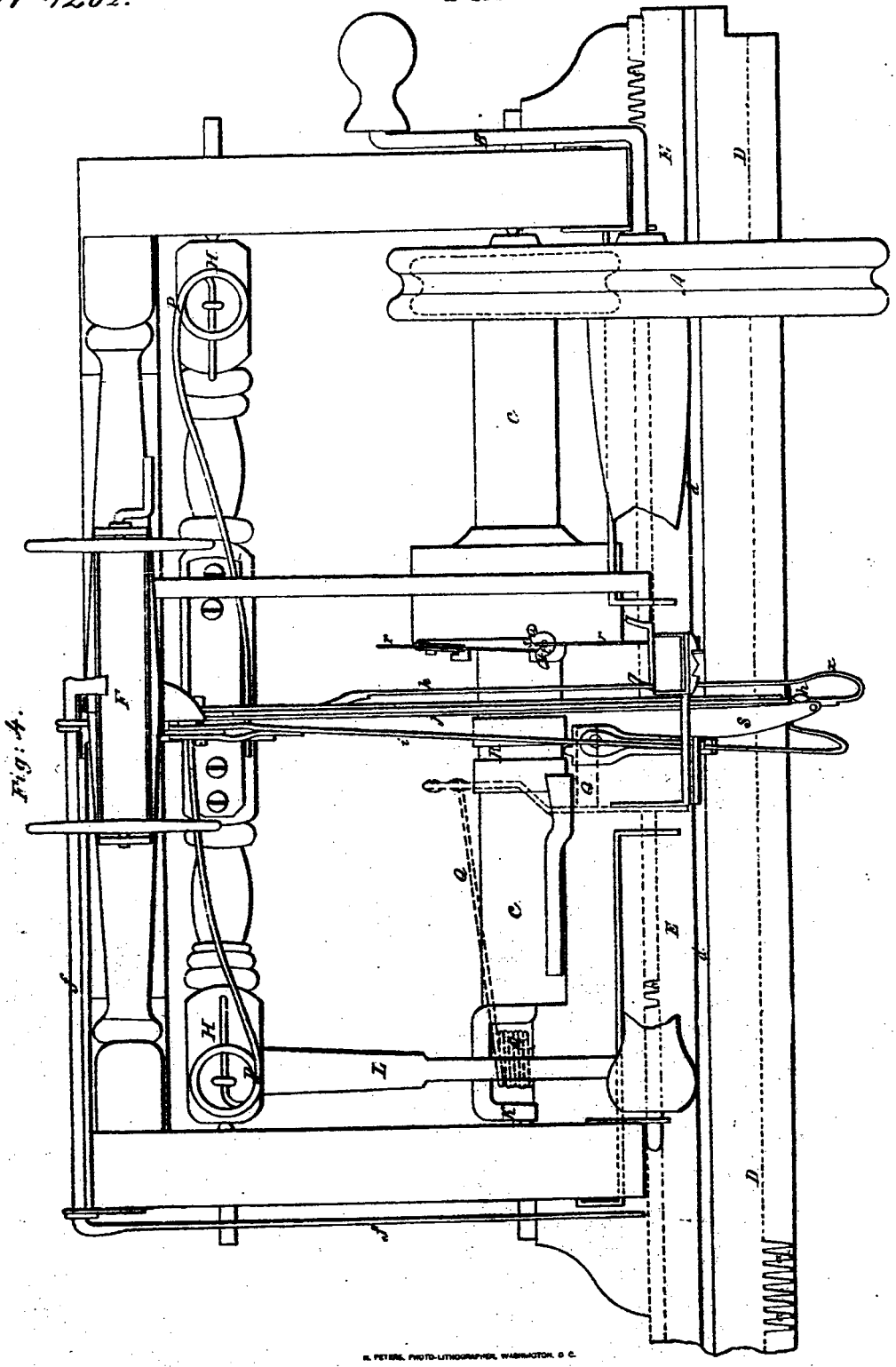

Fig: 4.

UNITED STATES PATENT OFFICE.

JOHN McMULLEN, OF SINKING VALLEY, AND JOS. HOLLEN, JR., OF LOGAN'S VALLEY, PENNSYLVANIA.

KNITTING-MACHINE.

Specification of Letters Patent No. 126½, dated February 11, 1837.

To all whom it may concern:

Be it known that we, JOHN MCMULLEN, of Sinking Valley, and JOSEPH HOLLEN, Jr., of Logan's Valley, in the county of Huntingdon and State of Pennsylvania, have invented certain Improvements in Knitting-Machines, for which Letters Patent of the United States were granted to us, dated March 5, 1837; and we do hereby declare that the following is a full and exact description of our improvements, reference being had to the drawings which accompany and make a part of this specification.

In describing our improvements, we must, necessarily, include many parts of the machine as originally patented by us, and which we shall, of course, exclude from our claims under this specification. In the respective figures in the drawings where the same parts are shown, the same letters of reference will be employed to designate them.

The frame may, in its general dimensions, be the same as formerly, but it must vary in size and form, according to the nature of the work to be performed. For knitting stockings, the length of that part which we denominate the comb, will be about eighteen inches.

Figure 1, in the accompanying drawing is a top view of the machine, which is to be turned by a band wheel A, by means of the winch B; the shaft of this band wheel is shown as broken off for the purpose of exhibiting the parts beneath it. The shaft C, which is driven by a band from the wheel A, we will call the principal shaft, as it is employed to give motion to most of the operating parts of the machine.

D, D, is the comb, the teeth of which *a*, *a*, are to be at such distance apart as will correspond with the distance of the stitches in the work to be performed, which, ordinarily, may be about one eighth of an inch. Their length is about half an inch, their thickness about that of stout pin wire, and tapering to a blunt point; they are turned up at their ends, so as to form a hook, as shown, separately, at *b*. There are gutters, or grooves, across the face of the comb, leading to each tooth, and extended along their upper sides, for nearly, or quite, half their length, to serve as a guide to a part of the instrument to be presently described.

E, is a rack, the teeth upon which, *c*, *c*, are at the same distance apart as the teeth of the comb, this being necessary to the office which they are to perform. The plate of metal which forms the rack, and that upon which the needles are formed, or placed, are on the same level, and there is between them a space, *d*, constituting a guide groove. When a stocking, or other article is to be knit, the yarn is to be looped upon the teeth, *a*, *a*, of the comb, when it is ready to be operated upon by the respective parts contrived for that purpose. The yarn is wound upon a bobbin, or spool, F, whence it is conducted down to the comb, the bobbin being acted upon by a weighted lever, or by a spring, to give the requisite tension to the thread. The end of the bobbin is seen at *e*, Fig. 2, which is an end view of the machine, *f*, being a lever which may be made ta press upon the bobbin with any required degree of force. The yarn is represented by the red line *g*, in its course from the bobbin to the comb, to which it passes through a piece of metal *h*, bent so as to form a tube to conduct it to the comb.

In order to represent such parts of the machine as would be hidden by the solid end of it, of which G, G, Fig. 2, is the outline, we shall in this figure consider the end as transparent, and, consequently, as not obstructing the view of any part of the machine within it. H, is the working shaft from which arms ascend that support and work the levers *i*, *j*, *k*, the first of which, *i*, is connected with a spiral, or other, spring P, attached to the front working shaft, I, as shown more distinctly at P in the front view Fig. 3; the motion given by it is intended to tramp the stitch, as will presently appear. The two levers *j*, and *k*, have their fulcra upon the same standard; the former, *j*, we denominate the needle, as it is that which takes hold of, and lifts, the loop of the thread in succession over each of the loops contained in the respective hooks of the comb. The needle has a hook, or pin, pointing forward, upon its lower part, in front, which point passes alternately into

each of the grooves, or gutters, on the comb and its teeth. The third lever, *k*, is that which conducts the thread down, and loops it on to the teeth of the comb. There is a fourth lever, *l*, which like, the other levers, stands in a position nearly horizontal. but is not connected with the working shaft H, but swivels laterally upon a pin which passes into the frame at its back end, at *n;* this lever is moved laterally by a plate *o*, upon the principal shaft C, which plate is circular, but bent upon its edge in such a way as to give the desired lateral movement to the tramper, *p*, Fig. 3. The outer end of this lever is rounded, and passes freely through a hole, *q*, in the tramper, guiding it laterally, and allowing it to move backward and forward with the motion of the front rocking shaft I.

The comb D, D, traverses backward and forward, as the work proceeds moving the distance of the space between the needles, in the interval of every stitch, which motion is governed by the guide plate *r*, *r'*, which revolves with the principal shaft C, and takes into the teeth *c*, *c*, on the rack E. This plate is cut from its periphery toward its center, so that its two ends at *s*, may be as far separate from each other as the distance between the teeth or the rack, or of the comb. It is thus made to act like the worm of an endless screw upon the teeth of the rack, but with this difference, that the motion produced by it is intermitting, and not continuous, the larger portion of the plate *r*, say four fifths of it, being in the plane of its revolution, and therefore, passing between the teeth of the rack without moving it, the other portion, say one fifth, having an inclination to this plane sufficient in amount to carry the rack and comb to the required distance. By turning the winch which gives motion to the machine continuously forward, it will be manifest that under this arrangement, the rack and comb would continue to travel in the same direction, while it is requisite that it should traverse backward and forward, reaching a certain point only, dependent upon the width of the stocking &c., which is being knit, and then returning; and this change of direction, we effect in the following manner. The part of the guide plate of the rack which from its inclined position, gives motion to it, is capable of having its direction reversed, so that from a right, it may become a left-handed guide; it is, for this purpose, hinged to the immovable part of the guide plate, and may be moved, or thrown over from one side to the other, and is thus moved, or thrown over, in the following manner. There is a plate *t*, which turns like a button, on a pin in the principal shaft; into a notch in one edge of which plate the hinged piece of the guide plate passes; and it is evident, therefore, that by turning the plate *t*, in one direction, or the other, and consequently changing the inclination of the guide plate, the motion of the rack will be reversed; there are two tail pieces, or projections, *u*, *u*, on opposite sides of the plate *t*, which are for the purpose of turning it, and reversing the direction of the comb. J is a slide which passes along the rack, clipping to its sides, and carrying a short lever *v*, shown more distinctly in the front view Fig. 3; this has a pin, or tooth, at one end, which falls in between the teeth of the rack, and by means of which it is held steadily in its place. There are two slides, one on each side of the article to be knit, and from the lever *v*, a pin, or tail-piece, projects inward, so that one of the tail pieces *v*, of the plate *t*, shall come into contact with it, when the comb has traveled sufficiently far, the effect of which is to cant the plate *t*, and to reverse the motion. When it is wished to widen, or to narrow a stitch, these slides are moved by hand, into a tooth on the rack, corresponding with such widening, or narrowing. The ends of the movable part of the guide plate are held by a spring latch, or catch, which may be variously constructed; it may be held in its place also, by a tooth, or pin, passing between the teeth of the comb, as these spaces correspond with those of the rack.

The rocking shaft H, receives its motion from the crank K, on the principal shaft, the wrist of which crank works within a space formed by doubling over the end of the arm L, which is attached to the shaft, the space in the doubleture allowing the wrist to slide freely in it, as in a slot.

In Fig. 3, which is a front view of the machine, T, is a sliding carriage supporting the comb and rack, and traversing in a groove in the rail N; *p*, is a piece of metal which we call the tramper, and which is colored. yellow, to distinguish it from the other parts; but, as from its situation in front of the machine, it would hide some important portions of it, it is considered as transparent. and the parts behind it are shown as distinctly as though it was removed. Its office is to push the stitches back upon the comb points, while the yarn is being wound on one of them by the tube, *h*, of the conductor lever *k*, and also to clear the stitch from the needle. In this form of the machine, the bobbin F, which is to contain the yarn, is placed in front, immediately on the top rail of the machine, and from a standard *f*, on the back rail. a lever extends, which rests upon the bobbin, and may be weighted to any required degree, to give tension to the thread.

We will now describe the manner in which

this machine operates in producing the intended effect; in doing which it will be necessary to represent its various operations separately, even where they are simultaneous and concurrent; but their connection with, and dependence upon, each other, will be readily perceived by any competent machinist.

The yarn is carried down from the bobbin through the tubular opening at *h*, in the outer end of the conducting lever *k;* which lever is worked backward and forward by the motion of the rocking shaft; it passes through a slot, or mortise, in an iron plate, O, Fig. 3, and as it passes the inclined part *w*, seen in Fig. 2, combined with the movement simultaneously given to the comb, it receives a motion by which it winds the yarn around the hook on each tooth of the comb in succession; after doing which, it is carried sufficiently forward to be out of the way of the other operating parts. This conductor, as it passes forward, is followed by the needle point, on the lever *j*, the curved part of which, j^2, in passing through a slot in the plate O, is conducted into the grooves, or gutters, leading to, and along the respective comb teeth, where the needle point catches under the stitch, which it then lifts over the hook of the tooth, and over the loop of yarn around it. To enable it to catch the stitch, it is necessary that the article being knit should be pushed back toward the bottoms of the teeth, and this is effected by the tramper, which is moved backward and forward by the rocking of the front rocking shaft I. The lower end, *y*, of the tramper passes below the comb teeth, and back again, by the rocking motion of I, but it requires, also, to be carried laterally, as it is to be moved around to the back of the needle at the moment of its retraction, to free it from the stitch which it has carried over, and this motion is effected by means of the lever *l*, the end of which passes through the hole *q*, in the tramper plate, while its fulcrum is at *n*, on the back part of the frame of the machine; a notch, *z*, on the under side of this lever receives the edge of the circular plate *o*, revolving with the principal shaft, a portion of the periphery of which plate curves laterally, in such degree as is necessary to the lateral motion of the tramper, which swivels on a joint pin on the shaft I; the slot seen on the plate *o*, is made for the purpose of giving to its edge the lateral curvature. The lever *i*, which rocks this shaft is connected to it by means of the spiral spring P, which gives to the tramper a yielding action. The manner in which the rack and comb are made to traverse back and forth has been already explained, as has, also, the use of the slide J, and its appendages, in effecting the widening and narrowing.

As in a machine consisting of so many parts, and each of which must concur in the production of one general effect, those parts may be differently formed and arranged without, in any degree, affecting their general character and intention, we have, in Fig. 4, of the accompanying drawings, given a top view of another modification of our machine, which, although substantially the same with that already described, will serve fully to exemplify the fact to which we have alluded, namely the variations in structure of which it is susceptible. In referring to it the same letters will be found to designate the respective parts of it which perform the same office in the machine first described; and their use will, in general, be sufficiently obvious, and not require any further explanation. The shaft of the driving wheel, or whirl, A, is represented as broken off; and there not being any top rail to the frame, or any front rocking shaft, some of the operating parts will be seen more distinctly in this than in the other figures, and where deemed necessary, we shall further describe them.

In this machine, the tramper, as well as the needle and conductor levers, receives its motion from the rocking shaft H. The bobbin is on the back top rail; the weighted lever *f*, is carried around the end of the frame, and on an arm rising from it presses upon the bobbin. The springs P, P, upon the rocking shaft are so connected with the tramper lever, as to temper its action. The lateral motion is given to it by means of a pin working in the groove R, on the principal shaft, which has a lateral curvature for that purpose. S, is a plate fixed one, or two, inches above the yarn conductor, having a hole in the end of it through which the yarn passes on its way to the tubular conductor. The red lines Q, Q represent a spiral spring acting upon a plate which bears upon the tramper lever, in this form of the machine.

Having thus, fully described our improved knitting machine, and explained the manner in which it operates, we claim as our improvements upon the machine originally invented and patented by us—

1. The general arrangement and combination of the respective parts thereof, by which they are made to operate with the comb and rack in a straight line instead of in the segment of a circle, as in our former machine.

2. We claim also that combination and arrangement of the parts herein described, by which the motion of the rack and comb are reversed, and the narrowing and widening

of the work effected; and in this part, we wish it to be understood that we claim as our invention, whether applied to this machine or to any other where such a severing motion may be necessary, the construction of a shifting piece, operating in the manner of that marked *r*, *r'*, in the accompanying drawing, whether the shifting, or reversing, motion be effected, precisely in the way described, or in any other which is substantially the same.

JOHN McMULLEN.
JOSEPH HOLLEN, JR.

Witnesses:
THOS. P. JONES,
ROBERT GRANT.