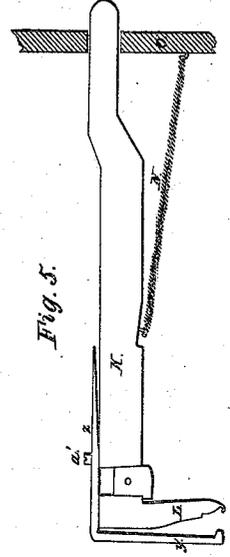
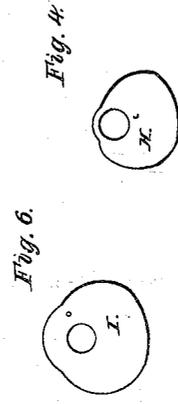
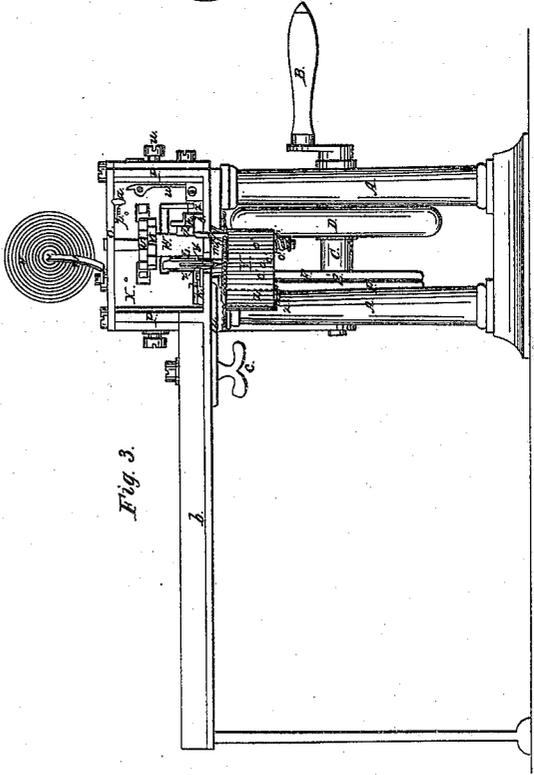
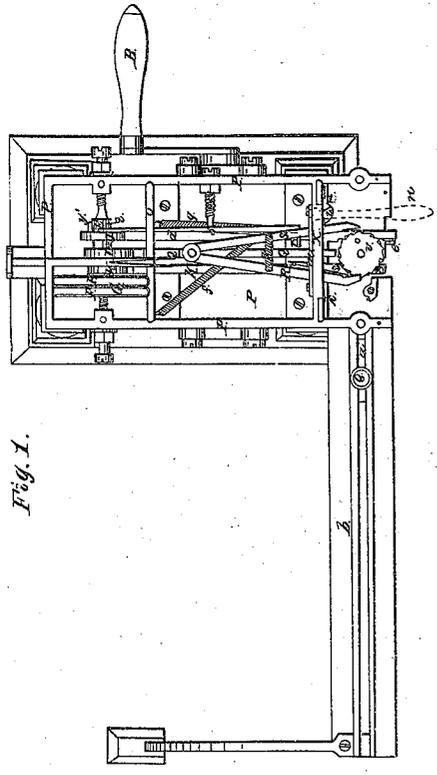
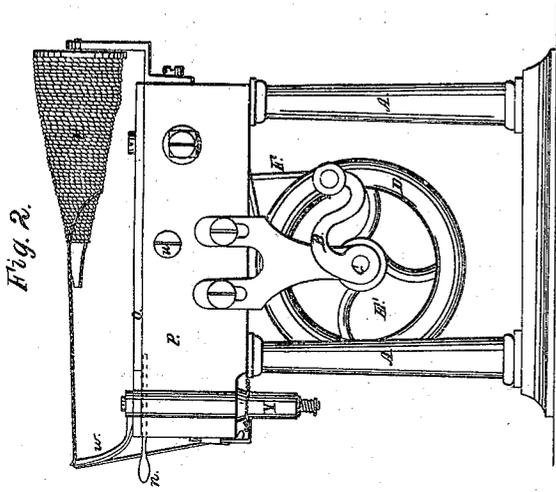


# A. French. Knitting Mach.

N<sup>o</sup>. 2,493.

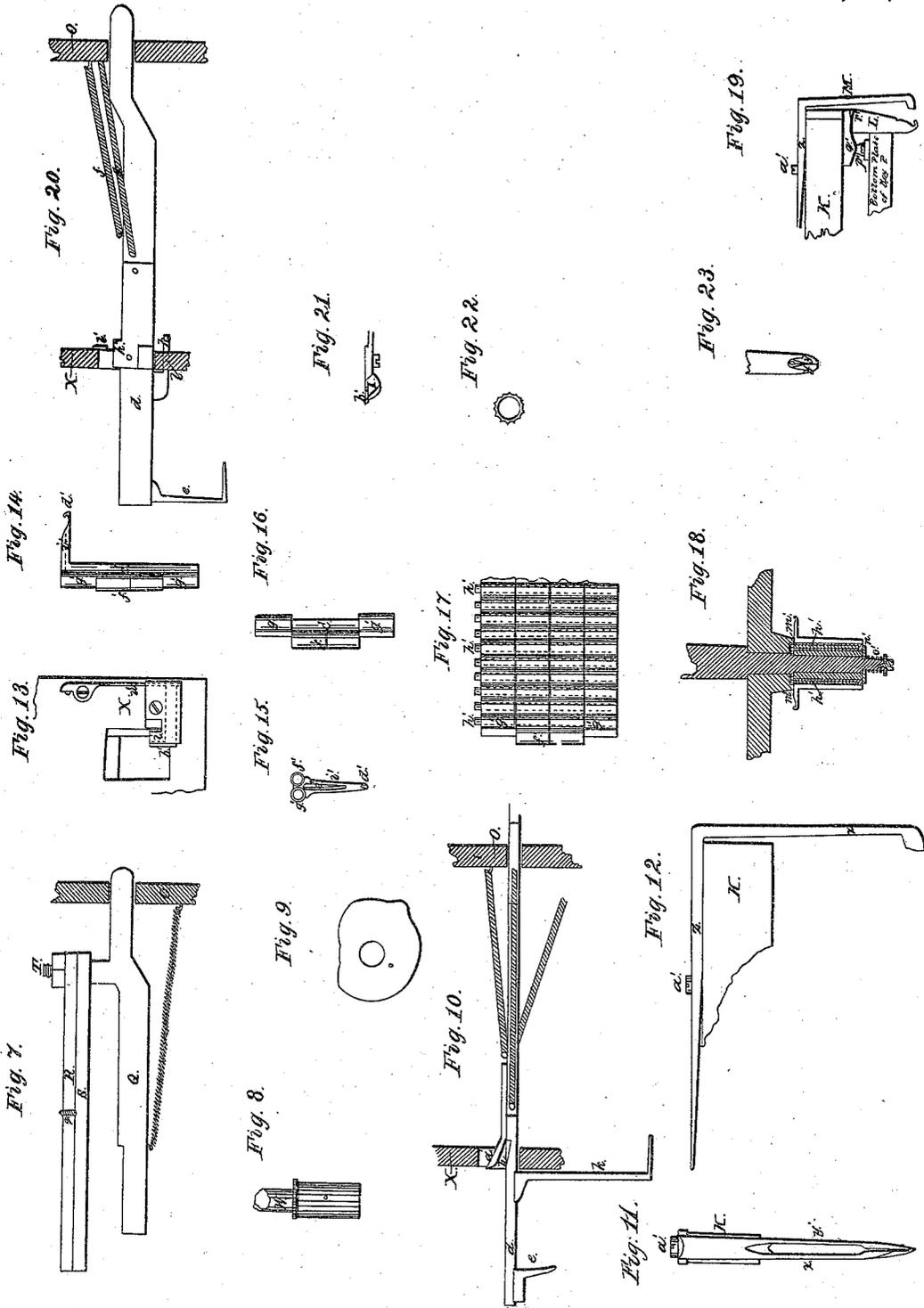
Patented Mar. 18, 1842.



# A French Knitting Mach.

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# UNITED STATES PATENT OFFICE.

ARASMUS FRENCH, OF SPRINGFIELD, MASSACHUSETTS.

MACHINE FOR KNITTING STOCKINGS AND OTHER ARTICLES.

Specification of Letters Patent No. 2,493, dated March 18, 1842.

*To all whom it may concern:*

Be it known that I, ARASMUS FRENCH, of Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Machinery for Knitting Stockings and other Articles which May Be Knit by the Same, and that the following is a full and exact description of the construction and operation of the said machinery, reference being had to the accompanying drawings, which represent said machinery and which, taken in connection with the description, form my specification.

In said specification I have set forth and exhibited the principles of my improvements by which they may be distinguished from others of a like character, together with such parts or combinations, as I claim, and for which I solicit Letters Patent.

Of the drawings above mentioned Figure 1, represents a top view of a knitting machine, constructed with my improvements, the top plate of the case which contains the principal operative parts being removed, to more clearly exhibit their arrangement. Fig. 2, is an elevation of the right hand side or that on which the crank is situated, by which the machinery is put in operation. Fig. 3, is an elevation of the front end. The remaining figures which will be hereinafter particularly described are representations of some of the working parts.

In its general features my machinery is somewhat similar to several other kinds of knitting apparatus, but in the compact arrangement and disposition of most of the parts, it differs essentially from them. It is supported on standards of four columns A, A, A, A, and is driven by the hand, applied to a crank B, fixed on one extremity of the driving shaft C; or said driving shaft may be revolved by any suitable power applied thereto. A fly wheel D, to regulate the motions of the machinery and a driving pulley E', are placed on the shaft C, over which driving pulley a band F, passes, to, and around a double grooved pulley G, on another horizontal shaft E, arranged as seen in the drawings. Upon the shaft E are placed the cams H, I, J, by which the stick hook, feeding and other apparatus are caused to perform their requisite movements. The first cam H, the shape of which is represented by side view in Fig. 4, presses

forward the bar K, on the opposite end of which, the stick hook L, and yarn holders or directing rippers *y, y*, are fixed. The bar K is drawn back by a helical or other suitable spring N, Fig. 5 attached to its lower side, and connected to the side of the partition O, which latter extends across the interior of the box P, from side to side and supports the ends of the slide bars which pass and move through it. The second cam I, Figs. 1, 6, presses forward the slide bar Q, upon the upper surface of which, two clicks or pitmans R S are attached or jointed at one end or turn upon a vertical pin T, extending upward from the slide bar Q. The slide bar Q is caused to retreat by a spring arranged on or attached to its lower side, and to the partition O, similar to the slide bar K before described. A side view of the spring and slide bar is seen in Fig. 7. The opposite extremity of each of the two clicks or pitmans R, S, acts upon the teeth of one of two ratchet wheels U, V, Figs. 1, 3, applied upon a vertical shaft W. A partition X similar to the partition O before described, supports the front ends of the clicks or pitmans, as also the slide bars, all of which pass through suitable orifices in said partition.

Upon the lower part of the vertical shaft W, or that extending through the bottom of the box P, a pinion wheel *k*, is arranged, the same being exhibited in Fig. 8. The endless chain Y, which carries the needles or hooks, passes around this pinion and is stretched out by passing over a pulley Z Fig. 3 which is connected to the end of a slide *a*, which slide may be moved laterally under the arm *b*, projecting from the side of the box P, as seen in Figs. 1, 3, the said slide being confined in position by a set screw *c*, Fig. 3.

The next cam J, see Figs. 1, 9, presses forward to slide bar *d*, which carries on its opposite end the bent finger or point *e* Figs. 1, 3, which throws the stitches from the points or needles of the endless belt. The bar *d* is retracted and acted on laterally by springs *f, g*, Figs. 1, 20, connected with it and the partition O. In order that the bar *d* may operate successfully, it must have the following movements: The bent finger *e*, being back against the stitches under the needles when the stitch hook advances, the bar *d* must advance forward and laterally

to the right, until it passes by the extremities of the hooked points of the endless chain belt Y. It then is forced or flies upward above the level of the hooked points, and is driven laterally toward the left a short distance, by and in rear of the stitch hook, which latter has advanced with the stitch or loop of yarn to the extremity of the hook of the needle. The finger or slide *d* is then driven forward far enough to push the loop or stitch over the point of the hook, and then immediately retreats under the hook or point, pressing the stitch backward under the same, until it reaches its first position.

The bar *d* is moved laterally toward the right, by a small wiper or inclined plane *h* (seen in Fig. 3 and represented bottom upward in Fig. 10), attached to its left side near the partition X, which wiper comes in contact with another wiper or inclined plane *i* Figs. 1, 3, 13, attached to the front side of the partition X. These two inclined planes meeting and sliding over each other, cause the bar *d* to have a lateral motion, until the plane or wiper *h* passes by the plane *i*, when the spring *f* which is stronger than the other spring *g*, and whose end which is attached to the side of the partition O, at an elevation somewhat, or about one half of an inch, above the top of the slide bar *d*, lifts said slide bar upward over the extremity of the hooked needles of the chain belt, and then draws the finger or bar backward and to the left, until the point or extremity of the finger, comes directly back of the stitch hook. The bar *d* is sustained in its position during its movement by the aid of an arm *k* Figs. 1, 3, 20 which is attached to the bar on its left side, and projects perpendicularly therefrom and has its end bent at right angles, as seen in Fig. 20, and inserted in an elongated slot *l*, Fig. 3, permanently formed through the partition X. The arm acts as a stop to prevent the bar *d* from being retracted too far, by the arm coming in contact with the front side of the partition X.

The bar *d* is next pressed forward by the cam J, until the finger passes by the end of the hooked needles or points of the chain belt, when the finger is depressed below the same, by a lever *r, s, t*, Fig. 1, whose end *r* is bent so as to rest over and bear upon the top of the slide bar *d*, while the other end *t* extending backward over the shaft on which the cams H, I, J, are arranged, is lifted by a small pin *y'*, inserted in and projecting from, the side of the cam J, or a small cam arranged on the cam shaft. The lever *r, s, t*, has its fulcrum at *s*, on the end of a screw *u*, projecting inward through the side of the box in which the machinery is arranged. When the bar *d* recedes or is drawn back by the springs, the outer side *a'*, Fig. 10, of the wiper *h*, which is parallel to the inner in-

clined side, comes in contact with the side of a small slide *b'*, Figs. 3, 13, (the latter figure being an enlarged front view of the inclined wiper *i* and parts adjacent, and in which the slide *b'* is partly represented by dotted lines as forced forward by a spring *w'*), situated in rear of the rear edge of the wiper or plane *i*, and projecting slightly by the same toward the left, and pushes said slide aside, while the wiper *h* passes by it. As soon as this operation is completed the slide (by the action of the spring) comes into its former position and projects so far toward the left or by the wiper *h*, as to prevent the bar *d* from being pressed directly forward or causes it to be pressed laterally by the contact of the wipers.

Each of the pitmen or clicks R S passes through a sliding plate *m*, Fig. 1, which is suitably fitted to the rear side of the partition X, and is moved laterally to the right or left at pleasure, by a small spring lever *n*, (represented by dotted lines in Fig. 1), Fig. 3, which has for its fulcrum a pin screwed into the lower side of the top plate *o* of the box containing the machinery.

On applying the fingers to the outer end of the lever and pressing this end slightly downward, so as to cause it to pass by a small pin or stud *p*, Fig. 3, and then sideways, the plate *m* is moved laterally so as to bring either of the pitmen R or S at pleasure to act on its ratchet wheel U or V, and thus turn the shaft W in one direction, or in the opposite. A small helical spring *q*, Fig. 1, connects the two pitmen, and causes the outer or front end of either of the same, which may be in contact with the teeth of the ratchet wheel, to press against said ratchet wheel.

The stitch hook L, Figs. 5, 19, 3, is arranged as before mentioned on the end of the slide bar K. It is composed of a piece of metal extending downward from the end of the bar and terminating in a small hook at its lower end. This hook acts directly over the projecting wires or needles of the chain belt, its office being to pass under the stitch which is upon the needle under it, and carry said stitch forward toward the hooked end of the needle.

The bobbin *v* on which the yarn is wound is placed horizontally over the machinery, as seen in the drawings, with its pointed end toward the front of the apparatus. The yarn is led from the bottom over the top of a little guide stud *w*, Fig. 3, which is suitably grooved out for the purpose, and thence downward between the directing nippers *y, y'*, to the needles of the chain belt. The directing nippers consist of two spring blades *y y'*, Figs. 2, 3, and 11, 12, (Fig. 11 being a front view of the nippers and Fig. 12 a side view exhibiting the manner in which they are attached to the slide bar K),

arranged at a sufficient distance apart to permit the yarn to be introduced and to pass freely between them, and meeting together at their points, (which are bent rearward as seen in Fig. 12) so as to nip or pinch the yarn or hold it with a slight force between them. The movement of the chain belt draws the yarn as it is wanted during the process of knitting, through the nipper ends or jaws. The nippers so formed extend downward at right angles to a bar or lever  $z$ , which is placed on the top of the bar K, and attached thereto by a pin or screw  $a'$ , on which the lever turns laterally either to the right or left, carrying the nippers with it. The rear end of the lever extends back through an opening in the partition X, and through the slide plate  $m$ , so that when said slide plate is moved laterally it also carries the end of the lever  $z$  with it, and consequently moves the directing nippers in the opposite direction into the requisite position for the machinery to knit in the opposite direction.

The next portion of the apparatus is the chain belt, an enlarged side elevation of one of the links of which is represented in Fig. 14, and a top view of the same in Fig. 15, and a rear view of it in Fig. 16, while Fig. 17 exhibits an elevation of the rear side of a portion of the chain belt.

All of the links of this belt are constructed precisely similar to each other and are hinged together. Each consists of an upright piece of round wire  $c'$ , Figs. 14, 3, bent over at right angles at its top and turned upward at its outer extremity into the form of a small hook  $d'$ . The horizontal portion of the wire  $c'$  is grooved out, as seen at  $e'$ , Fig. 15, and into this groove the stitch hook moves back and forth. The middle  $f'$  and the upper and lower tubes  $g'$ ,  $g'$ , of a hinge are connected to the rear side of the wire or rod  $c'$ , the central tube being of double the length of the others and situated its whole diameter aside from them, each tube being situated on one side of the vertical central line of the rear side of the wire  $c'$ , or as exhibited in Figs. 14, 15, 16. The middle tube  $f'$  of one link is passed into the space between the upper and lower tubes  $g'$ ,  $g'$ , of the succeeding link, the rear side of the wire  $c'$  between the upper and lower tubes, as well as the rear side of the succeeding wire above and below the middle tube of it, being suitably hollowed out, to permit the axis of the three tubes to come into the same straight line with each other.

A pin  $h'$ , Fig. 17, is then passed through the tubes, and the hinge is completed. The wires are thus hinged together, and this arrangement permits any one of them, with its hook, to be removed from the chain belt at any time in order that the operation of "narrowing" may be performed, or of one

or more being inserted in the chain belt for the purpose of widening, which operation will be readily understood by stocking knitters who use machines of this kind.

The wire pin  $h'$  should project a short distance above the upper tube of the hinge, in order that it may be easily removed at any time by a pair of nippers or pliers, and the lower tube  $g'$  should be closed up at its lower end, so as to cause the wire pin  $h'$ , to retain its place or prevent it from falling through the tubes.

As the chain belt is moved a certain distance at regular intervals of time, the yarn at every movement is laid over one of the hooks or needles  $i$ , Fig. 14, of the chain belt, and when the stitch hook advances that portion of the yarn over the needle is pushed by the stitch hook under the hook of the extremity of the needle, so as to permit the stitch to be passed over it by the finger.

In order to prevent the bar  $d$ , carrying the finger  $e$ , from being drawn too far back by the springs when the finger is over the needles, and in rear of the stitch hook, a small stud  $k'$ , (see Fig. 20, which represents a side view of the bar  $d$ ) projects above the top of the bar, as seen in the drawings, and its rear side is drawn in contact with the front face of a small bar  $l'$ , screwed to the rear face of the partition X.

The projecting portions or tops of the turning wires  $h'$ , of the chain belt, pass under a lip  $m'$ , Figs. 3, 18, (which latter figure is a vertical cross section of the chain belt, the pinion it moves upon, and other parts adjacent thereto), which lip extends around the pins for some distance, and keeps the chain in place. The chain is still further supported in position by a small collar  $n'$ , arranged on the lower part of the shaft of the ratchet wheel, which collar is forced upward against the chain by a small helical spring  $o'$ .

A small raised stud  $p'$ , Figs. 3 and 19, (the latter of which figures, is a view of the end of the slide bar K and parts adjacent taken on the left side of the bar), projects above the bottom plate of the box which contains the apparatus, near its front edge, as seen in the drawings. When the bar K is slid forward, a cam or wiper  $q'$ , projecting from the lower side of the bar K, meets the stud  $q'$ , and rises upon it so as to lift the bar and stitch hook, when the latter reaches the hooked end  $d'$  of the wire or needle of the chain belt. This enables the finger of the bar  $d'$ , to throw the stitch over the hook  $d$ . When the bar K is drawn back another projecting wiper  $r'$ , Fig. 19, rises upon the stud and lifts the bar K, so that the lower ends of the directing nippers  $y$ ,  $y'$ , may be elevated a sufficient distance to permit the free operation of the chain belt.

Fig. 21 is a top view of the wiper I. Fig. 130

22 is a top view of the pinion on the shaft W and Fig. 23 is a bottom view of the directing nippers.

Having thus described my invention I shall claim—

1. The method above described, and represented in Figs. 14, 15, and 16, of forming the hinges or joints by which the bars of the needles or hooks of the endless belt are united so that any one wire, with its hooked needle may be removed or another wire may be added to the collection for the purposes herein set forth.

2. Forming the directing nippers, by which the yarn is conveyed from the bobbin to the endless belt, of two lips or spring blades *y, y*, Figs. 11, 12 and 23, which receive the yarn between them and permit it to be delivered through their ends in contact, the same being constructed and operating in all respects substantially as set forth.

3. The combination of the sliding plate

*m* (moved by a spring lever *n* or other similar contrivance) with the clicks or pawls *R, S*, and the lever *z* of the directing nippers, the same being arranged substantially in the manner set forth, and for the purpose of causing, by one operation or lateral movement of the lever *n*, the machinery to knit in an opposite direction.

4. The method of sustaining the endless belt of knitting wires upon its moving pinion by means of the combined arrangement of machinery retaining it in said position, said arrangement consisting of the lip *m'*, spring *n'*, and roller *o'*.

In testimony that the foregoing is a true description of my said invention and improvements I have hereto set my signature this twenty-third day of February, in the year eighteen hundred and forty-two.

ARASMUS FRENCH.

Witnesses:

A. W. STOCKWELL,  
LEVI TYLER.