2 Sheets—Sheet 1.

A. REICHENBACH.
Knitting Machine.

No. 201,447. **Patented March 19, 1878.**

Fig. 3.

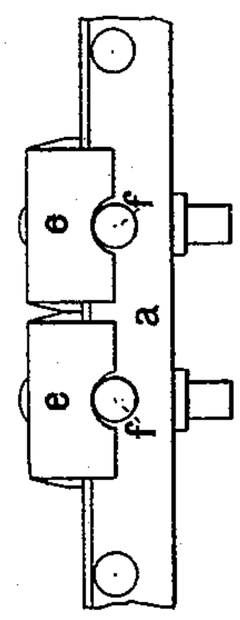
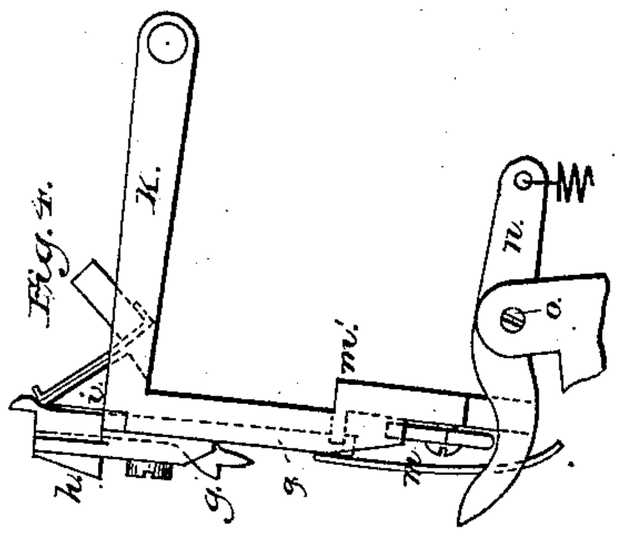


Fig. 1.

Fig. 2.



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2 Sheets—Sheet 2.

A. REICHENBACH.
Knitting Machine.

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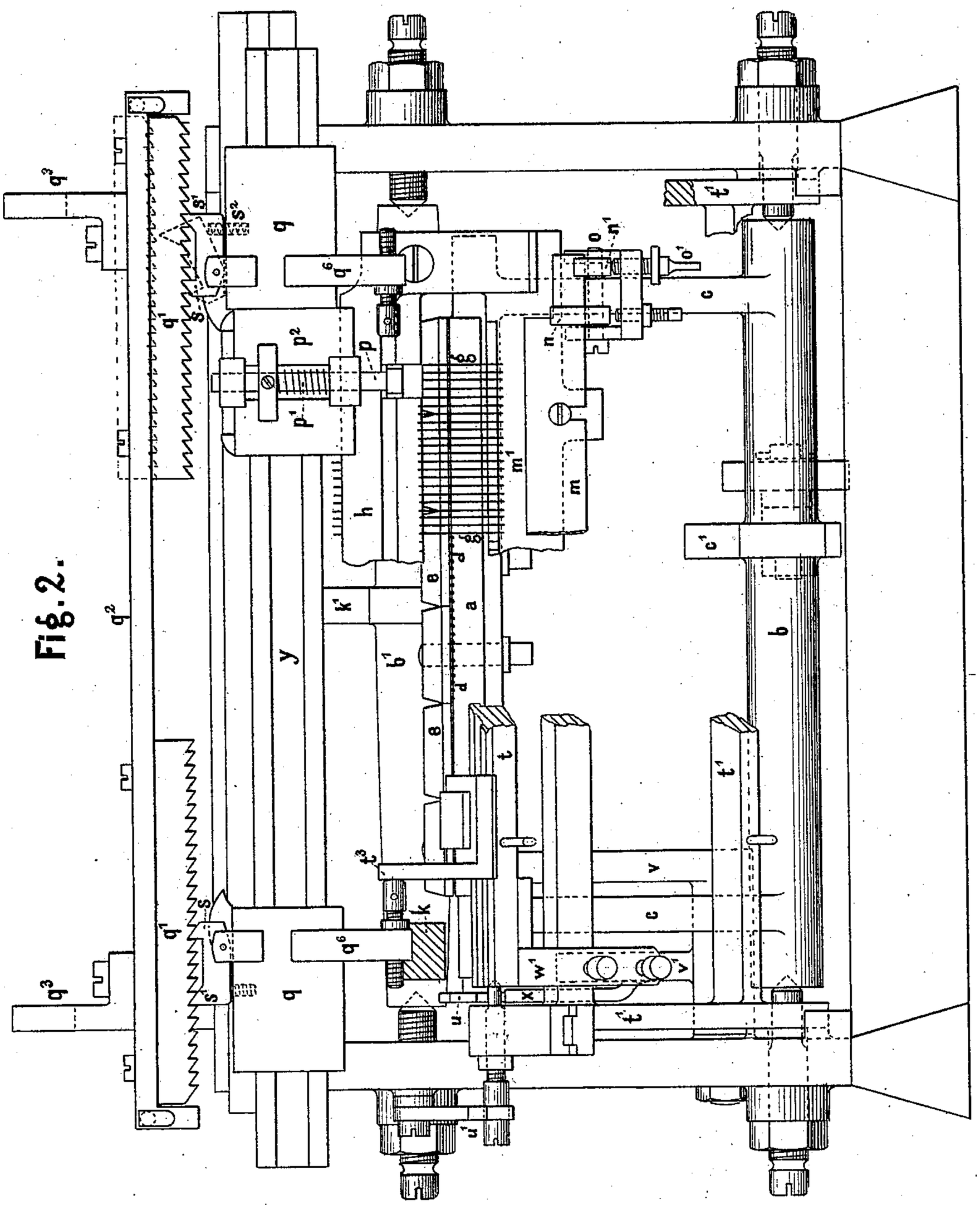
Fig. 2.



Attest:
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UNITED STATES PATENT OFFICE.

ADOLF REICHENBACH, OF LIMBACH, NEAR CHEMNITZ, ASSIGNOR TO GUSTAV HEINRICH NEUMANN, OF OEDERAN, NEAR CHEMNITZ, SAXONY.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **201,447**, dated March 19, 1878; application filed December 13, 1877; patented in Saxony, June 1, 1877, for five years.

To all whom it may concern:

Be it known that I, ADOLF REICHENBACH, of Limbach, near Chemnitz, Saxony, have invented an Improved Knitting-Machine, of which the following is a specification:

This invention relates to certain improvements in straight-knitting machines, by which important advantages are attained over other machines of the kind.

Figure 1 of the accompanying two sheets of drawings represents my improved machine in a transverse section, while Fig. 2 is a front view of the same, and Fig. 3 a back view of the needle-bar.

Several parts, which are not to be considered as new, have been omitted, and in Fig. 2 a number of parts have been represented broken off, so as to show others lying in their rear.

The bar *a*, carrying the frame-needles *d*, is fixed on two arms of a rocking shaft, *b*, which is actuated by the cam *z* and the lever *c'*. The needle-bar consequently oscillates horizontally in a short arc of a circle, instead of moving backward and forward in a straight line, as is frequently the practice.

The frame-needles *d* are fastened to the needle-bar in series of (by preference) from five to ten by the covering-plates *e*, each of which rests at the back on a stud or projection, *f*, of the needle-bar, Figs. 1 and 3, so that upon being screwed down its front edge will bear equally on all the needles of its series, and secure them firmly to the needle-bar.

The sinkers *g* are guided between two bars, *h* and *i*, constituting the sinker-frame, which is fastened to the arms *k* of the shaft *b'*. This shaft is oscillated by the cam z^1, acting on the arm *k'*. The sinker-frame, instead of reciprocating up and down in a straight line, as usual, is by consequence moved in a short arc of a circle.

The guide-bar *h* presses near the end of its descent on the beards of the frame-needles, so as to close them, whereby a special presser-bar is dispensed with.

By preference the bars *h* and *i* are lined on the inside with brass plates, and in this case the lining-plate *h'* may be arranged to act on the needles, as shown in the drawing.

The bar *m*, which corresponds to the falling-bar of other knitting-machines, is used here also as a sinker-lifting bar. The same is guided on the bar *m'*, forming part of or attached to the sinker-frame, as more clearly shown in Fig. 4 of the drawing, and it is lifted during the back stroke of the needle-bar by the incline n^2 on the front end of the two levers *n*. These levers are pivoted at *o* to the arms *c*, and the springs n^3 serve to keep them in their acting position, while they allow them to yield to an accidental undue strain.

The descent of the bar *m* is limited by the two stops n^1, also pivoted at *o*, which can be adjusted by the screws *o'*, for the purpose of regulating the machine with regard to the desired closeness of the fabric.

The lifting-bar *m* raises the sinkers *g* after they have sunk down the loops between the the needles. As soon, however, as the levers *n* move forward again the inclines n^2 allow the lifting-bar *m* to redescend until it rests on the stops n^1. The sinkers are, however, kept in their upper position by the springs *i'* catching into the notches of the sinkers.

The thread-guide holder *p* is free to slide vertically in the saddle p^2, within which a spring, p^1, presses it upward, so that it bears with its foot against an edge of the bar *h*. The saddle p^2 slides horizontally on the bar *y*, fixed to the frame of the machine. As the sinker-frame approaches the end of its downward stroke the thread-guide is pressed down between the selvage-needles, while it rises with its holder *p* by the action of the spring p^1 as soon as the sinker-frame reascends.

The saddle p^2 is actuated in the usual manner, and its course is limited by the adjustable stops *q*, Fig. 2, as in former machines; but the position of the stops is regulated by a new device, which will be described hereinafter.

The narrowing apparatus consists of the tickler-bar *t*, pivoted to the frame *t'*, which oscillates on the pivots of the shaft *b*; moreover, of the lever *v v'*, actuated by the cam z^2 of a hook, *u*; and, finally, of a mechanism for shifting the shaft *l* longitudinally.

Whenever narrowing is required, the main shaft *l* is shifted lengthwise, together with the

cams keyed on the same, as is usual in this class of machines. The cam z^2 now acts on the lever v, so as to cause the finger x of this lever to descend. In consequence, the hook u, being no more supported, catches with its notch on the pivot of the tickler-bar t. The narrowing apparatus thereby becomes connected with the needle-bar, so that both swing to and fro together. At its first forward oscillation the tickler-bar is drawn toward the sinker-frame. At the same time the end of the lever v', acting on the arm w' of the tickler-bar, causes this bar to turn on its pivots, and to press the narrowing-needles on the frame-needles d, so as to make them enter into the corresponding loops on the latter. By the backward oscillation of the tickler-bar these loops are drawn off from the frame-needles, the narrowing-needles are shifted by the stops q when the tickler-bar is near the end of its back stroke, and at its following oscillation the loops are taken off from the narrowing-needles by the sinkers and retained on the frame-needles.

The shifting of the shaft l lengthwise, as before specified, causes the cam z^3, attached to the cam-disk z^2, to be brought into operation on the lever q^4, so as to oscillate the shaft q^5, and to make its two arms, q^3, rise together with the bar q^2, having a rack, q^1, at either end. Each of these racks acts on a pawl, s s^1, pivoted to the adjustable stop q. One end of the said pawl is pressed upward by a spring, s^2, while an inclined tooth at either end catches into the nicks of the rack. The latter being lifted, the springs s^2 raise the ends s^1 of the pawls s s^1 and cause them to swing in a circle, in consequence whereof their teeth s^1 catch into the next nicks of the racks, as shown by dotted lines in Fig. 2. The racks being now depressed by the action of the two springs r, Fig. 1, both stops q are shifted toward the middle of the frame. After the shifting they are held securely in their place, as both teeth of the pawl s s^1 catch into the racks, thus preventing the pawls from turning.

The described movement of the stops q is transmitted by the arms q^6 to the slides t^3, carrying the narrowing-needles, after these needles have receded from the frame-needles by the oscillation of the tickler-bar t. In consequence the loops on the narrowing-needles are brought opposite to frame-needles contiguous to those on which they were originally formed. The tickler-bar thereupon making the second forward oscillation, the loops are transferred, as has been stated above.

While the work is going on without narrowing, the cam z^2 is out of the way of the lever v, so that the latter is at rest. Consequently the finger x keeps the hook u raised and the narrowing apparatus disconnected from the needle-bar. The said apparatus is retained in its non-acting position by a hook, u', Fig. 2, fixed to the framing, so as to cause the needles to stand above the frame-needles d, and not to interfere with other working parts.

I am aware that in straight-knitting machines it is old to use a needle-bar having the needles clamped therein by bars in sections, which bar is moved in the arc of a circle; to use a vibrating sinker-frame in which the sinkers are carried, one part of which acting as a presser-bar to close the beard of the frame-needles; to use adjustable stops actuated by racks and pawls, and actuating, through bars, slides carrying narrowing-needles on a tickler-bar; and to move lengthwise the shaft carrying the actuating-cams; and I therefore make no claim, broadly, to any of said devices; but

What I do claim as of my invention, and desire to secure by Letters Patent, is—

1. In combination with the needle-bar a, provided with projections or studs f, needles, and covers e, each cover resting at the back on one of said studs or projections, as and for the purpose described.

2. The sinker-frame h i and sinkers guided therein, in combination with the shaft b', a cam, z^1, and arms k k', as and for the purpose specified.

3. The sinker-lifting bar m, in combination with the levers n, provided with the inclines n^2, and the stops n^1, adjustable by screws o', substantially as described, and for the purpose stated.

4. The sinker-guide bar h, in combination with the thread-guide holder p, the saddle p^2, and spring p^1, as and for the purpose described.

5. The adjustable stops q and the saddle p^2, in combination with the racks q^1 and mechanism for operating the latter, the pawls s s^1, having two teeth each, and the springs s^2, substantially as specified, and for the purpose stated.

6. The racks q^1, mechanism, substantially as described, for operating the same, the pawls s s^1, and the adjustable stops q, having the arm q^6, in combination with the slides t^3 on the tickler-bar t, as and for the purpose specified.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ADOLF REICHENBACH.

Witnesses:

PAUL KASTEN,

PAUL DRUCKSMILLSE.