

1,029,494.

E. DUBIED.
KNITTING MACHINE.
APPLICATION FILED JULY 1, 1910.

Patented June 11, 1912.

9 SHEETS—SHEET 1.

Fig. 1

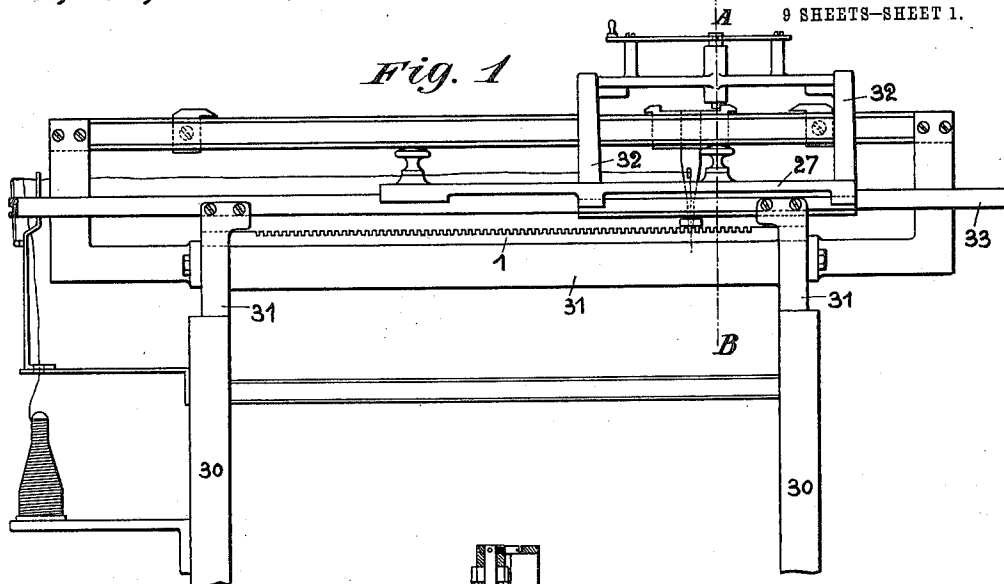
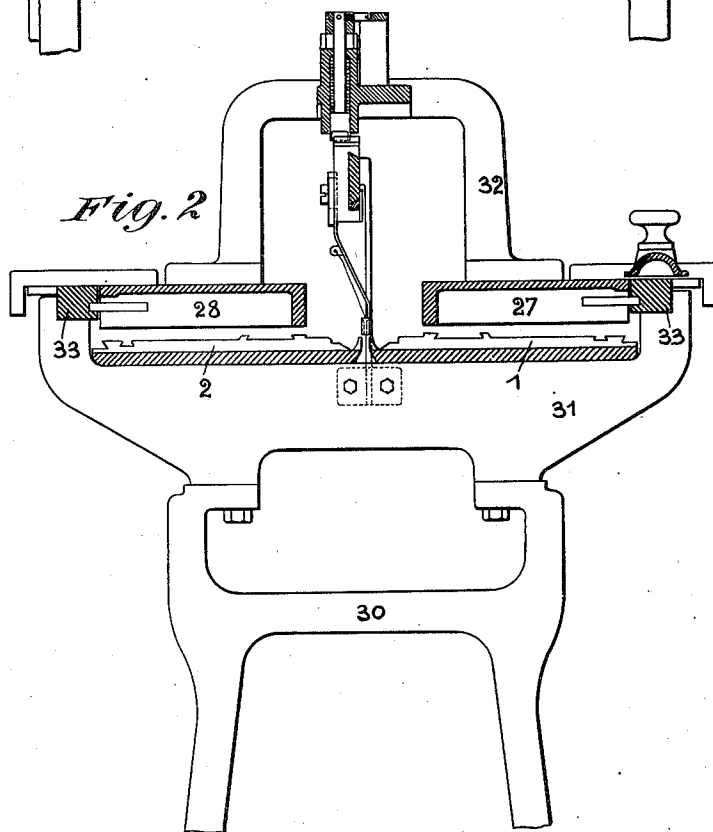


Fig. 2



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Fig. 3

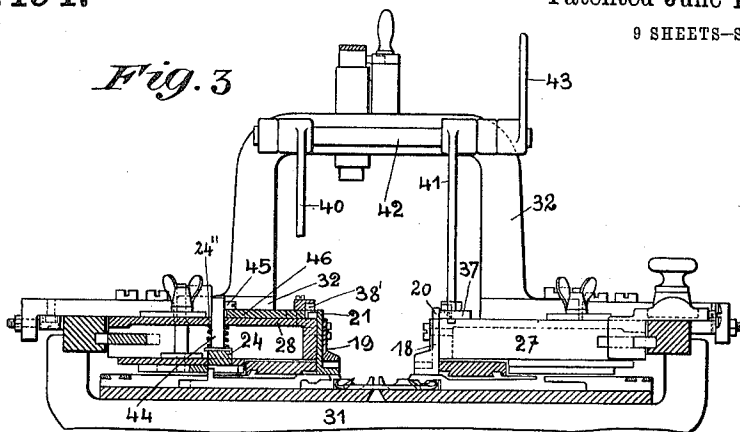
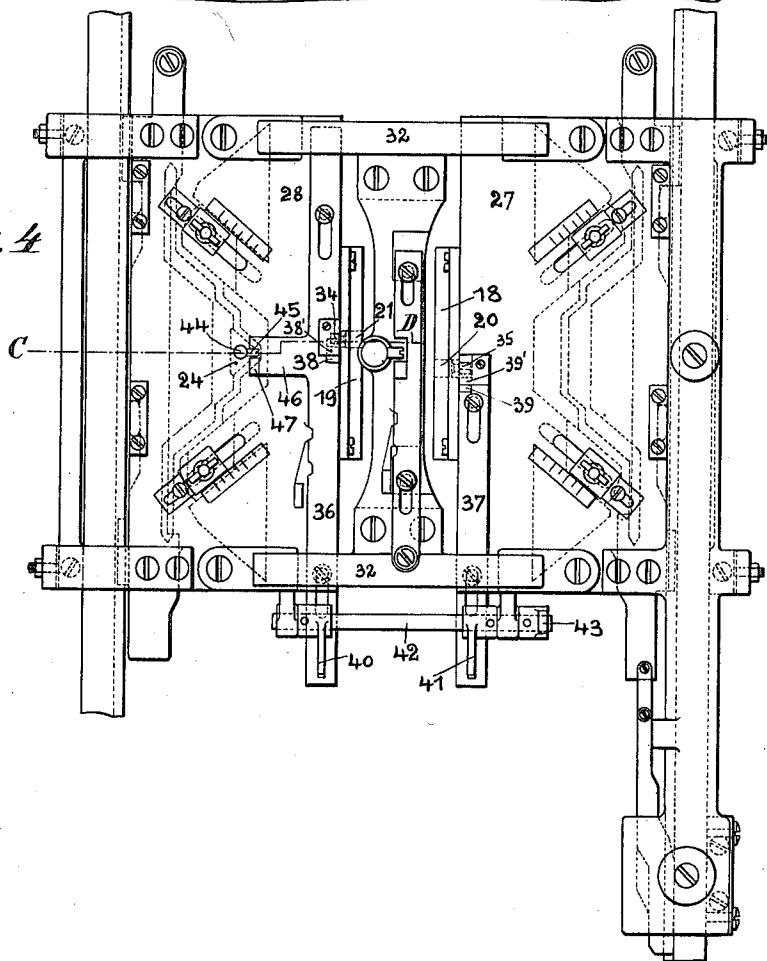


Fig. 4



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Fig. 5

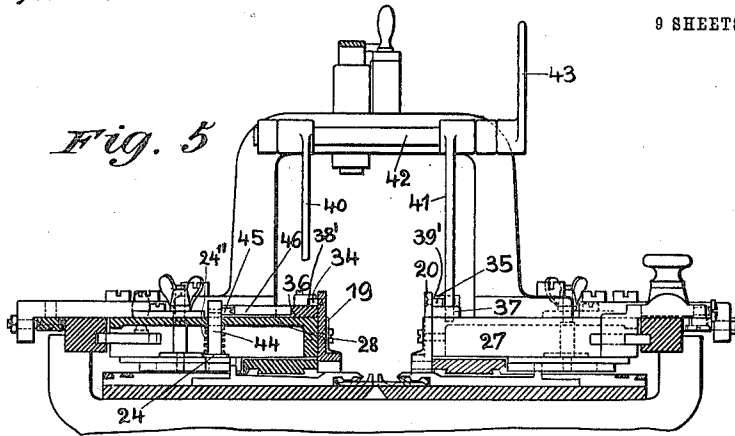
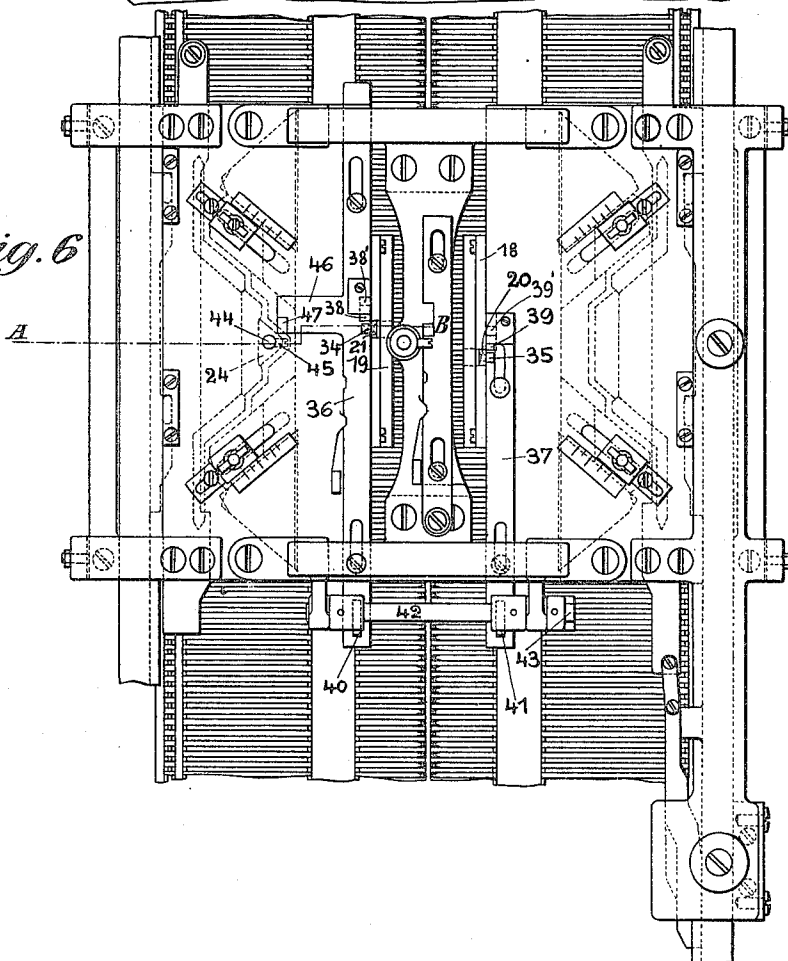


Fig. 6

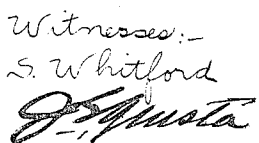


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Fig. 12

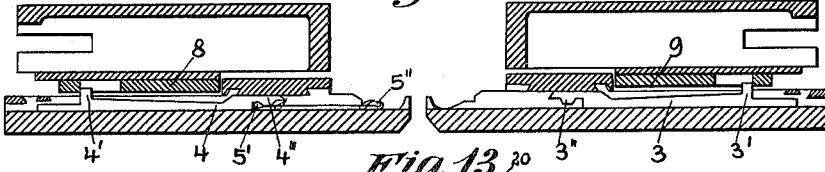


Fig. 13

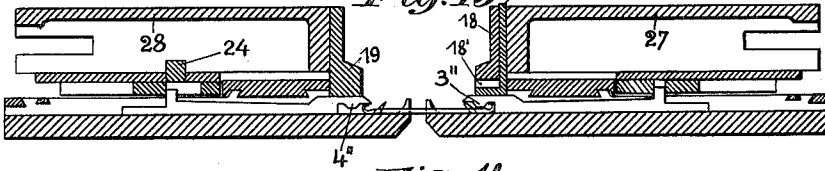


Fig. 14

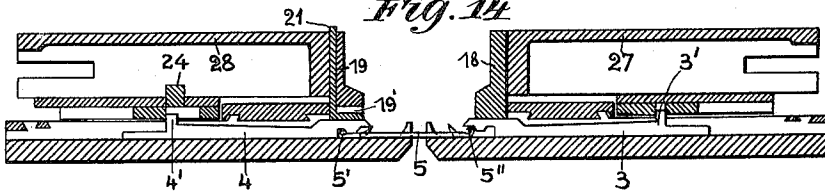
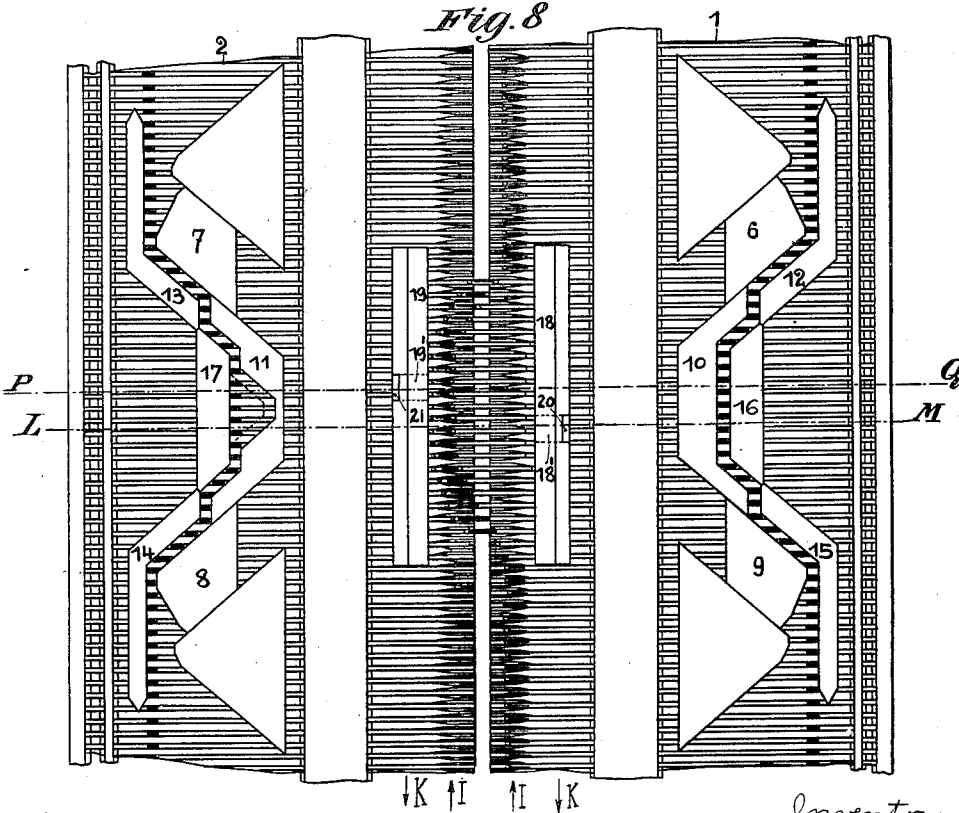


Fig. 8



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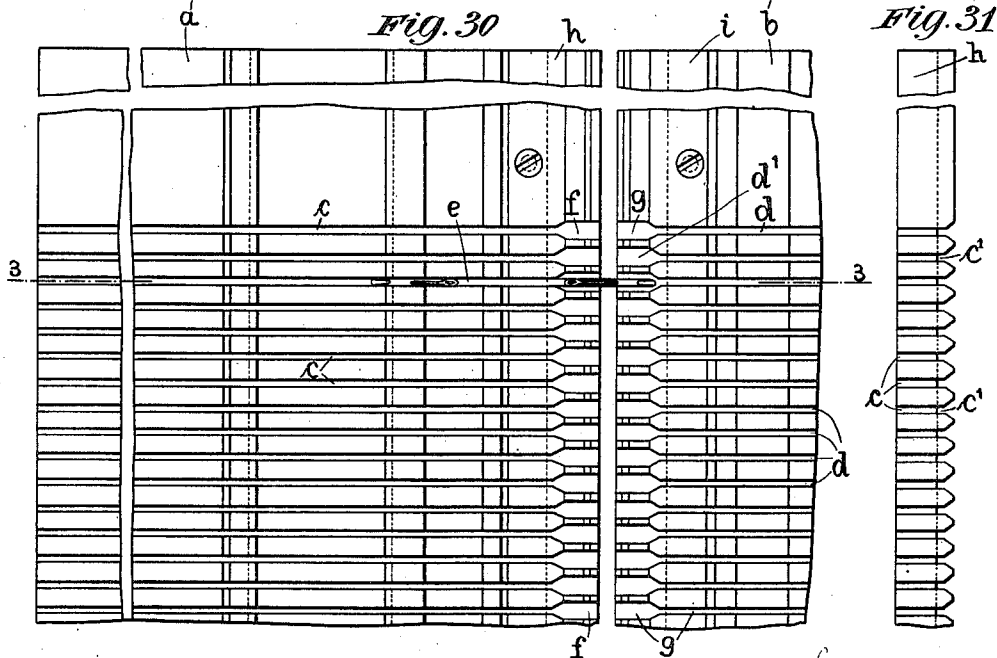
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9 SHEETS—SHEET 6.

A cross-sectional diagram of a two-layered structure. The top layer is hatched and contains a central rectangular cavity. The bottom layer is also hatched and contains a similar central rectangular cavity. The two cavities are aligned horizontally. The number '24' is written in the center of the top cavity.

Fig. 31



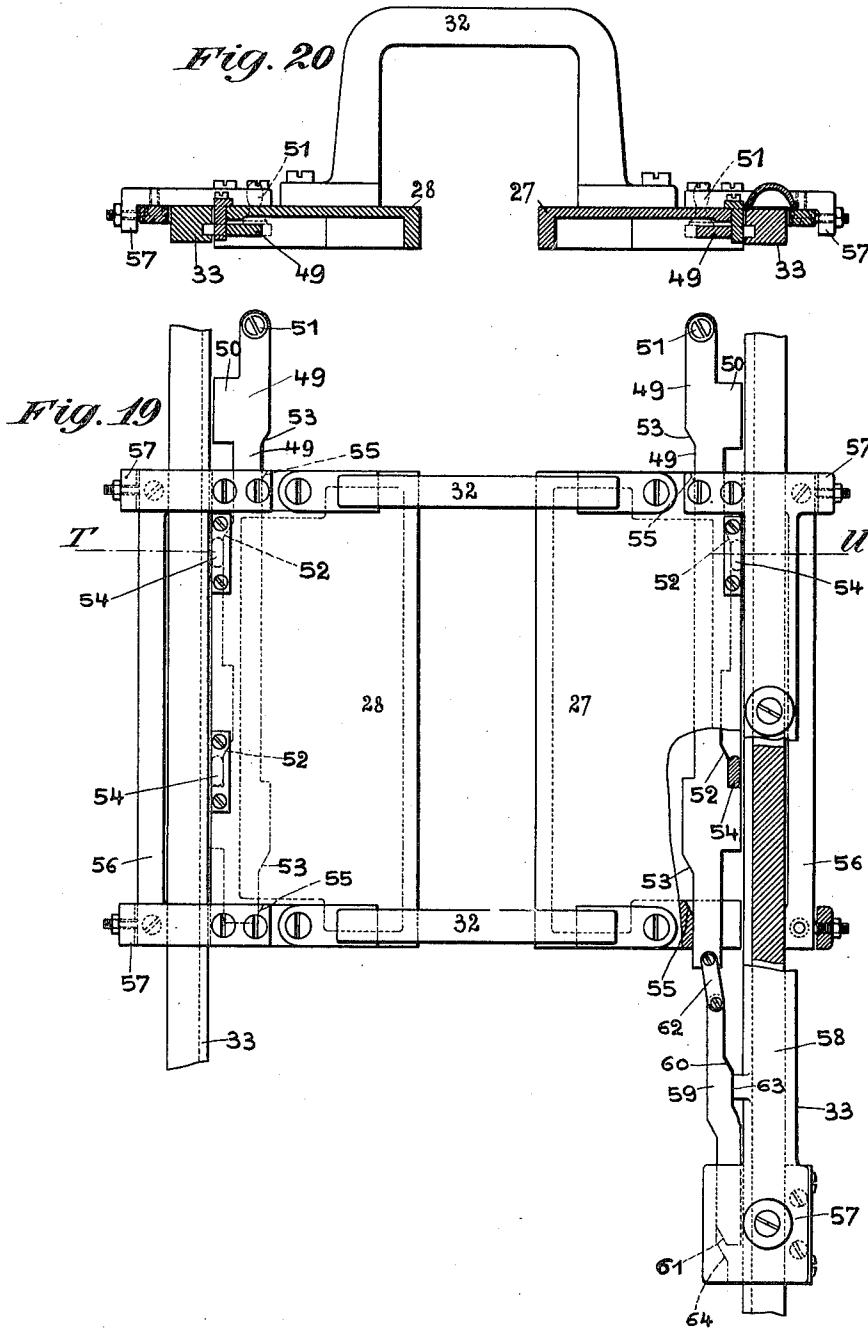
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9 SHEETS—SHEET 7.



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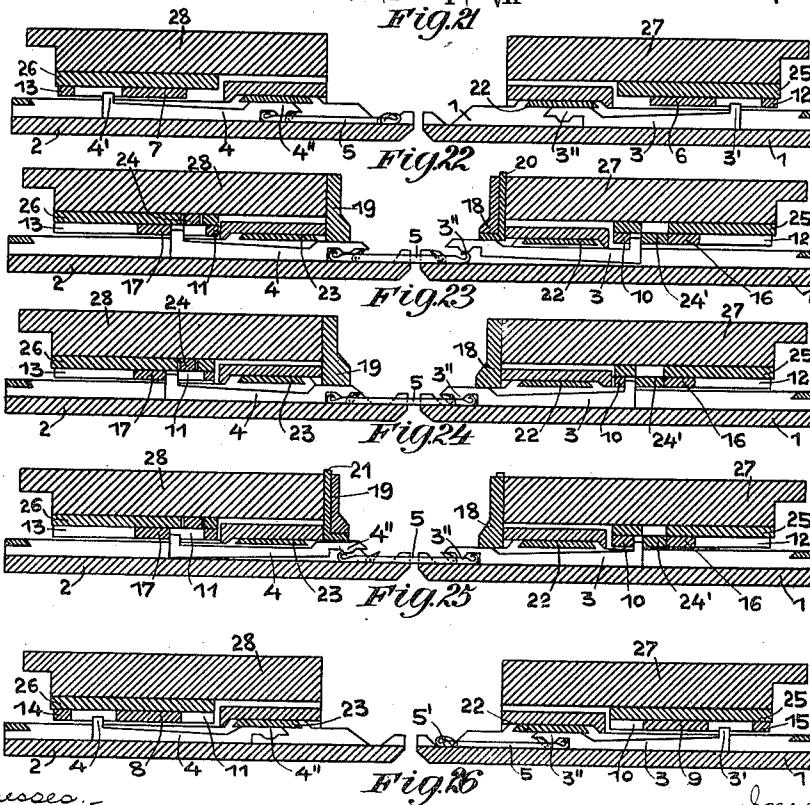
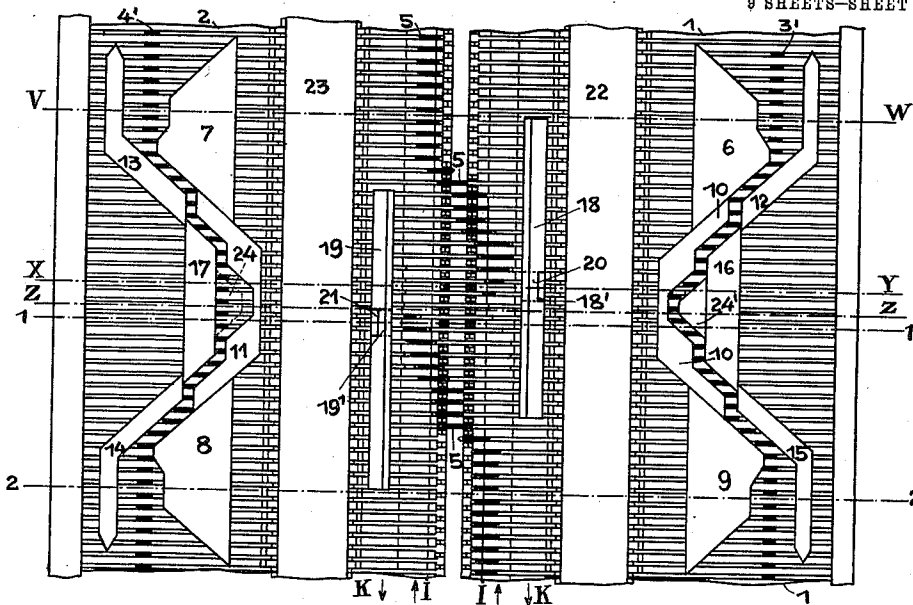
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9 SHEETS-SHEET 8.



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9 SHEETS-SHEET 9.

Fig. 27

Fig. 28

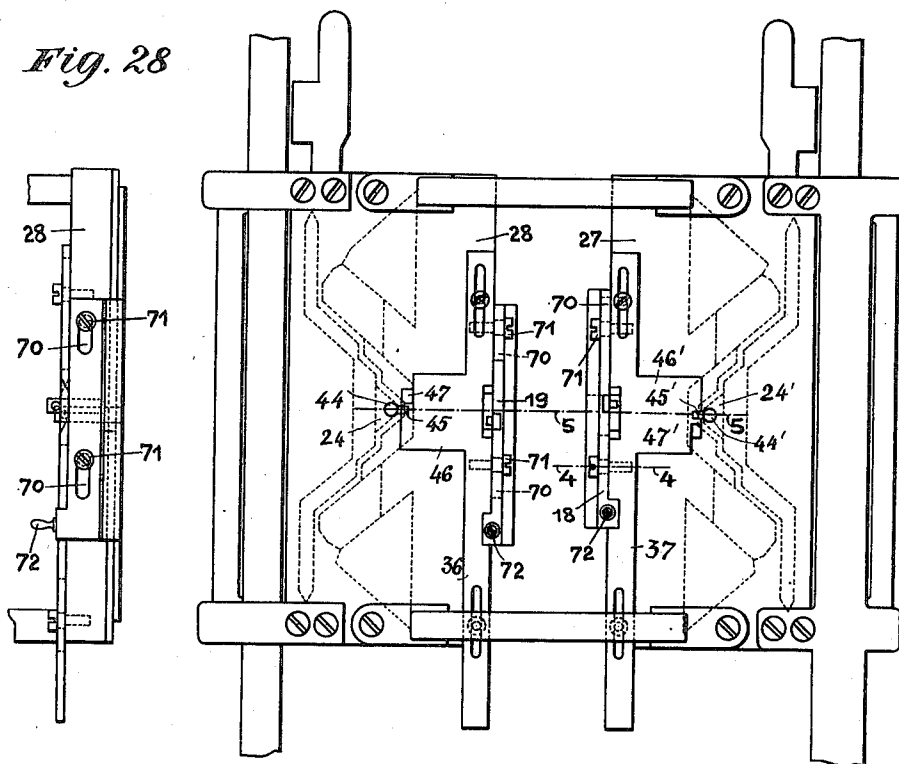


Fig. 27a

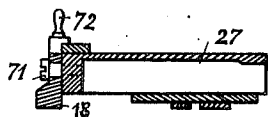
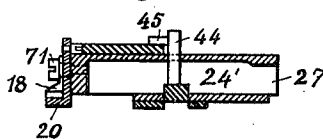


Fig. 27b



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UNITED STATES PATENT OFFICE.

EDOUARD DUBIED, OF COUVET, SWITZERLAND, ASSIGNOR TO EDOUARD DUBIED & CIE.,
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KNITTING-MACHINE.

1,029,494.

Specification of Letters Patent.

Patented June 11, 1912.

Application filed July 1, 1910. Serial No. 569,974.

To all whom it may concern:

Be it known that I, EDOUARD DUBIED, a citizen of the Republic of Switzerland, residing at Couvet, in the Canton of Neuchâtel, Republic of Switzerland, (whose post-office address is Couvet,) have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The present invention relates to improvements in knitting machines in which double ended needles are employed. In such machines the needles are moved from one needle-bed into the other by means of jacks. For this purpose the jacks are coupled with the needles by means of heads on the jacks which engage with the latches of the needles. In order to release the needles from the jacks it was hitherto necessary to move the jacks forward for a certain distance during which movement the needles were not positively guided and consequently the needles were sometimes thrown forward too far owing to their inertia, so that reengagement of the needles by the jacks was rendered impossible and consequently flaws were produced in the fabric while the needles were injured.

According to the invention, the carriage is provided at each side with a bar having a recess, which bars prevent the jacks from rising and thereby prevent release of the needles until the needles are completely engaged by the second set of jacks which by this time have passed through the recess in the opposite bar, whereupon after the engagement of the needles by the second set of jacks, the second bar prevents the rising of the second set of jacks.

The accompanying drawings show by way of example a construction of machine as far as is necessary to illustrate the invention.

Figure 1 is a front elevation of the machine, Fig. 2 is a section on the line A—B of Fig. 1, Fig. 3 is an elevation in which the left hand portion is shown in section on the

broken line C—D of Fig. 4 and the right hand side partly in side elevation, wherein some parts are shown in section. Fig. 4 is a part plan. Figs. 5 and 6 show the same parts as Figs. 3 and 4, but in different position. Figs. 7 and 8 are plans of the needle bed and the cams showing the working parts in different positions. Fig. 9 is a section on the line E—F in Fig. 7. Fig. 10 is a section on the line J—K of Fig. 7. Fig. 11 is a section on the line G—H of Fig. 7. Fig. 12 is a section on the line N—O of Fig. 7. Fig. 13 is a section on the line L—M of Fig. 8. Fig. 14 is a section on the line P—Q of Fig. 8. Fig. 15 is a section on the line R—S of Fig. 7. Fig. 16 shows the needles displaced. Figs. 17 and 18 are front elevations showing details in different positions. Fig. 19 is a plan of the carriage. Fig. 20 is a section of the line T—U of Fig. 19. Fig. 21 is a plan, showing a modification of the cams. Fig. 22 is a section on the line V—W of Fig. 21. Fig. 23 is a section on the line X—Y of Fig. 21. Fig. 24 is a section on the line Z—Z of Fig. 21. Fig. 25 is a section on the line 1—1 of Fig. 21. Fig. 26 is a section on the line 2—2 of Fig. 21. Fig. 27 shows a plan showing a modified form of carriage with the bars. Figs. 27^a and 27^b are sections on the lines 4—4 and 5—5 of Fig. 27. Fig. 28 is a part front elevation of the carriage. Fig. 29 shows the two needle beds in section on the line 3—3 of Fig. 30. Fig. 30 is a plan of the needle beds. Figs. 31 and 32 show a detail in plan and elevation respectively.

Referring to Figs. 1 and 2, 30 is the base of the machine upon which is mounted the frame 31 which carries the two rails 33 for the carriage 32. In the frame 31 are mounted the front needle bed 1 and the rear needle bed 2 in channels in which are disposed jacks 3 and 4 having lugs 3¹ and 4¹ and heads 3¹¹ and 4¹¹ (Fig. 9—14). 5 are the needles having latches 5¹ and 5¹¹. The carriage 32 has fitted to it, by means of the plates 27 and 28, cam members 6 to 17 and 24 for moving the jacks (Figs. 4, 7, and 8).

To the plates 27 and 28 are secured bars 18 and 19 respectively, each of which bars has a recess 18¹ or 19¹ on its under side (Figs. 3, 4, 7, 8, 9, 13, 14, 17, 18.) The recesses 18¹ and 19¹ are offset relatively to

each other. Each of these bars is provided with an L-shaped latch 20 or 21, the horizontal member of which projects into the recess 18¹ or 19¹. For the purposes of raising and lowering the latches 20, 21, each latch is provided with an outwardly projecting pin 34 or 35 (Figs. 3-6), while slides 36 and 37 are also arranged on the plates 27 and 28, each of these slides being provided with two opposite inclines 38, 38¹ or 39, 39¹. These slides may be moved simultaneously by hand through the intermediary of arms 40, 41, engaging slots in said slides, the arms being fixed on a common shaft 42 provided with a handle 43. In the position of the slides 36 and 37 shown in Figs. 5 and 6 the latches 20 and 21 are in their highest position, but, when the handle 43 is turned, the slides 36 and 37 are moved by means of the parts 40, 41, 42 whereby the inclines 38, 39, pass below the pins 34, 35, while the inclines 38¹ and 39¹ pass over the pins and depress the latches 20, 21 (Fig. 5).

The rear cam mechanism includes a triangular member 24 which is depressed by a spring 24¹¹ (Figs. 3, 4, 5). The member 24 also carries an upwardly extending pin 44 with a cross pin 45. For raising the member 24 an extension 46 with an incline 47 is provided on the slide 36, said incline 47 engaging the cross pin 45 so as to raise it together with the member 24 when the slide is moved. It will be seen from the above that when the member 24 is raised the latches 20 and 21 are lowered, and vice versa.

The operation of the devices is explained below.

It is assumed that the member 24 is in its operative position, that is, is lowered, and that the latches 20, 21, are raised, that the needles 5 are in the forward needle bed and are in engagement with the jacks 3 (Figs. 7 and 15). It is further assumed that the carriage is moved by hand in the direction of the arrow 1 in Fig. 7. The members 12 and 16 move the jacks 3 and the needles 5 which are in engagement therewith, toward the rear into the position shown in Fig. 9; simultaneously the cam members 13 and 17 move forward the jacks 4. The jacks are prevented from being thrown forward by the cam members 10 and 11; upward movement of the jacks 3 is prevented by the bar 18 (Figs. 7, 9) whereby release of the needles from the jacks 3 and therefore involuntary sudden advance of the needles owing to their kinetic energy is prevented. On further movement of the carriage the jacks 4 are brought into their forward position (Fig. 10) while the jacks 3 remain in the position shown in Fig. 9. On the forward movement of the jacks 4 effected by the cam member 24, the heads 4¹¹ of the jacks slide over the latches of the needles 5 (Fig. 9) and come in their forward position into en-

gagement with the needles so that each needle is now coupled with two jacks (Fig. 10). During this movement, the jacks 4 are permitted to rise in the recesses 19¹ of the bar 19 by the movement of the carriage relatively to the slide 36. On further movement of the carriage the jacks 4 together with needles 5 are again returned by the member 11 into the position shown in Fig. 9. During this movement the needles 5 are disengaged from the jacks 3, as the latter are permitted to rise by the recess 18¹ in the bar 18, and the jacks 4 pass through the recess 19¹, entering finally under the bar 19 which prevents them from rising again. On the further movement of the carriage the jacks 4 are moved by means of the cam members 11 and 8 and the jacks 3 are moved by means of the cam members 10 and 9 into the position shown in Fig. 12; the passage of the needles from the forward to the rear needle bed being thus completed. If the carriage is now moved in the direction of the arrow K of Fig. 7, the needles which are now in the rear needle bed are returned to the forward needle bed in the manner now to be described. The jacks 4 together with the needles 5, and simultaneously the jacks 3, are brought into the position shown in Fig. 14, by means of the cam members 14, 17 and the cam members 15, 16 respectively: the jacks being prevented from being thrown forward by the members 10, 11, and upward movement of the jacks 4 being prevented by the bar 19, so that release of the needles from the jacks 4 and consequently involuntary sudden advance of the needles are prevented. On further movement of the carriage the jacks 4 are brought to their forward position (Fig. 10) while the jacks 3 remain in the position shown in Fig. 14. On the forward movement of the jacks 4 effected by the cam member 24, the heads 3¹¹ assume a position above the hooks of the needles 5 (Fig. 11) and enter into engagement therewith, so that the needles are again coupled with both jacks (Fig. 10). Upward movement of the jacks 3 is permitted by the recess 18¹ in the bar 18. On further movement of the carriage the jacks 4 are returned by means of the cam member 11 into the position shown in Fig. 13; during this movement the needles 5 are disengaged from the jacks 4, the latter being permitted to rise in the recess 19¹ in the bar 19 (Fig. 9), and the jacks 3 pass through the recess 18¹ and enter under the bar 18, whereby they are prevented from rising. On further movement of the carriage the jacks 4 and simultaneously the jacks 3 are brought into the position shown in Fig. 15 by means of the cam members 11, 10 and 6 and 7 respectively, while the passing of the needles from the rear needle bed is completed. From the foregoing it will be clear that the

needles are positively guided by the jacks in every position.

There are fabrics in the production of which it is necessary that a number of needles from one needle bed should be passed over to the other needle bed, while another set of needles, after they have been advanced in one needle bed are to be returned to the same needle bed during one working stroke. When, for instance, a needle of the forward needle bed is moved into the position of Fig. 9, without the opposite jack of the other needle bed being moved simultaneously, sudden advance of the needle due to kinetic energy would be possible in the absence of the bar 18 (Fig. 16), as, on the one hand, the jack would not be prevented from rising and on the other hand the needle would not be stopped by the oppositely disposed jack. In such a case the bar 18 prevents the upward movement of the jack and so prevents release of the needle from the jack. There are also fabrics in the production of which it is not necessary that the needles should pass from one bed into the other, *e. g.*, one-faced or plain fabrics. In such case the two latches 20 and 21 are lowered by turning the handle 43 (Figs. 3, 4, 8, and 17) so that the recesses 18¹, 19¹ are closed at the bottom (Figs. 13, 14); by the rotation of the handle the member 24 is also thrown out of action. In this position the jacks advanced temporarily are entirely covered up in their extreme position by the bars 18 and 19 and are prevented from rising, so that the needles cannot be released.

It may at times be necessary to remove the carriage from the machine for repair or other purposes. Figs. 19 and 20 illustrate a modification, in which the carriage is removable from the rails 33 without the necessity for loosening screws and the like.

27 and 28 denote the two carriage plates which are connected with each other by means of strap-like handles 32. A slide 49 is guided in each of the plates, which slide is provided on its outside with a projection 50 engaging a slot in the rail 33 and also carries a handle 51. Each slide has two outwardly extending inclines 52 and two inwardly extending inclines 53. Projections 54 on the plates cooperate with the inclines 52, while inclined surfaces 55 are provided on the plates to cooperate with the inward inclines 53. If the slides 49 be pushed downward from the position shown in Fig. 19, the inclines 53 engage the surfaces 55 and thus effect outward movement of the slides, whereby the lugs 50 engage with the slots provided in the rails 33 and support the carriage in such manner that it cannot be taken off the rails but may be moved along them. If the slides be again pushed back, the inclines 52 come into engagement with the projections 54 which effect inward

movement of the slides, whereby the lugs 50 leave the slots in the rails so that the carriage can be bodily removed from the rails without the necessity for loosening a single screw. The carriage is guided externally by bars 56 which are adjustably arranged in lugs 57.

In order to guide the carriage, the latter is provided with an extended guide arm 58 carrying a slide 59 with inclined faces 60 and 61; the slide 59 being connected by means of a link 62 with the adjacent slide 49. The guide arm 58 is provided with a projection 63 and has also an inclined face 64 which acts upon the slide 59. If for instance the slide 49 be moved outward, this movement is transmitted through the intermediary of the link 62 to the slide 59 which latter is forced by the inclined face 64 into the lateral slot of the rail 33. If, however, the slide 49 be again moved outward, the inclined face 60 slides over the projection 63, whereby the slide 59 is brought out of the slot of the rail. It will be seen that the movement of the slide 59 synchronizes with the movement of the slide 49, permitting the removal and replacing of the carriage at each point of its stroke without manipulation of screws. It will further be seen that on movement of the cam members from left to right, *i. e.* on movement in the direction of the arrow I in Fig. 7, the needles pass over from the forward into the rear needle bed; on movement of the cam members from right to left (arrow K—the needles move from the rear into the forward needle bed).

The movement of the needles is not reversed in any case; for instance, on movement of the cams in the direction of the arrow K the needles do not move from the forward needle bed into the rear needle bed or vice versa. Consequently certain fabrics, for instance, such which have left and right patterns on both sides cannot be produced on the machine described. Figs. 27 and 28 illustrate a modified construction for accomplishing this result, in which the bars 18 and 19 are provided with slots 70 and are so arranged on the plates 27 and 28 by means of screws 71 that they may be easily moved. Handles 72, 72 permit of easy manipulation of the said bars. Each cam mechanism includes a part 24, 24¹ adapted to be raised and lowered. Each of the two slides 35, 36 is provided with an extension 46, 46¹, each having an oblique surface 47 or 47¹, said surfaces being inclined in opposite directions. Each member 24 or 24¹ is provided with an upwardly projecting pin 44 or 44¹ with cross pin 45 or 45¹ engaged by the corresponding slide 36 or 37. On simultaneous movement of both slides 36 and 37 in the same direction the member 24 is raised and the member 24¹ lowered. The operation of

the machine for the case where the needles are to be moved from the forward into the rear needle bed, the cams being moved in the direction of the arrow I, has already been described. In order to obtain this result by means of the arrangement shown in Figs. 21, 27 and 28, it is only necessary to set the two bars 18 and 19 in such position that the recesses assume the position relative to each other shown in Figs. 6 and 7, while the member 24 is to be lowered and the member 24¹ is to be raised.

In order to permit the needles to pass over from the rear into the forward needle bed when the cams are moved in the direction of the arrow I, the member 24 is thrown out of action, while the member 24¹ is brought into operative position and the bars 18 and 19 are set so that the recesses assume the relative positions shown in Fig. 21. In Fig. 21 it is assumed that the needles 5 are in the rear needle bed (Fig. 22).

When the cams are moved in the direction of the arrow 1, the cam members 13 and 17 move the jackets 4 and the needles 5 engaged by the latter forward into the position of Fig. 23; simultaneously the cam members 12 and 16 move the jacks 3 to the rear. The jacks 3 are prevented from being thrown forward by the cam members 10 and 11 and are prevented from rising by the bars 19, whereby release of the needles from the jacks 3 and consequently involuntary sudden advance of the needles due to impetus are obviated. On further movement of the carriage the jacks 4 of the rear needle bed 2 remain in their position (as shown in Fig. 23) while the jacks 3 of the front needle bed are moved into extreme forward position by means of the cam member 24¹ (Fig. 24). During the return movement of the jacks 3 the heads 3¹¹ slide over the latches of the needles 5 (Fig. 23) and enter in their extreme rear position into engagement with the latter, so that the needles are coupled with both sets of jacks (Fig. 24). The recess 18¹ in the bar 18 permits the jacks 3 to rise. On further movement of the carriage and cams the jacks 3 together with the needles 5 are brought forward again into the position shown in Fig. 25 by means of the cam member 10; during this movement the needles 5 are released from the jacks 4, the recess 19¹ on the bar 19 permitting the jacks 4 to rise. The jacks 4 then pass during the movement of the cam through the opening 19¹ and finally enter beneath the solid part of the bar 19 being thereby prevented from rising again. On further movement of the carriage and cams the jacks 4 and simultaneously the jacks 3 are brought into the position shown in Fig. 26 by means of the cam members 11, 8, and 10, 9, respectively, the passage of the needles from the rear into the forward needle bed being thereby com-

pleted. If the carriage be thereupon moved in the direction of the arrow K, the needles are moved from the forward into the rear needle bed in the manner now to be described.

The jacks 3 together with the needles 5 engaged thereby and simultaneously the jacks 4 are brought into the position of Fig. 25 from the position of Fig. 26 by means of the cam members 15, 16, and the cam members 14, 17, respectively; the cam members 10 prevent the jacks 3 from being thrown forward; the bar 18 prevents the jacks from rising so that release of the needles from the jacks 3 and sudden advance of the latter are obviated. On further movement of the cams the jacks 3 of the forward needle bed are brought into their extreme forward position (Fig. 24) while the jacks 4 of the rear needle bed remain in their position as shown in Fig. 25. On the return movement of the jacks 3 effected by the cam member 24¹ the heads 4¹¹ assume a position above the hooks of the needles 5; when the jacks 3 have reached their extreme forward position, the needles are again coupled with both jacks (Fig. 24). The jacks 4 entering the recess 19¹ in the bar 19 are free to rise. On further movement of the cams the jacks 3 are again brought forward into the position shown in Fig. 23, while the jacks 4 still remain in their position; the jacks 3 now release the needles 5, the said jacks being free to rise within the recess 18¹ in the bar 18. On further movement of the cams the jacks 3 pass through the recess 18¹ and enter beneath the bar 18, being therefore prevented from rising again. On further movement of the cams the jacks 4 and simultaneously the jacks 3 are brought in the position shown in Fig. 22 by means of the cam members 7, 11, and 10, 16, respectively.

From the preceding it will be seen that also in the last operation the needles are positively guided by the jacks in every position so that an involuntary advance of the needles cannot occur. During the passage of the needles from one bed into the other it may occur that the needles, after they have partly left the needle channels of one of the beds, are deflected by the tension of the fabric or otherwise from the direction of movement, and consequently come into contact with the sides of the opposite channels, instead of entering the latter. To overcome this disadvantage the entrances to the channels in the needle beds are usually flared. Hitherto the said flared entrances were formed integral with the needle beds, which involved difficult and expensive shaping work, as it was necessary to employ small faced cutters and as the final completion had to be effected by hand. These disadvantages were accentuated in the production of needle beds of small needle pitch. To overcome

these disadvantages, the entrances to the needle channels are formed in a separate bar for each needle bed, as shown in Figs. 29 and 31.

5 *a* denotes the left hand, *b* the right hand needle bed, *c* the needle channels in the needle bed *a*, *d* the needle channels in the bed *b*, *e* a needle, *f* and *g* the grooved oppositely disposed knocking over combs of the needle
10 beds, the width of the grooves thereof being greater than that of the needle channels *e* and *d*. Each of the needle beds is provided with a bar *h* or *i* of angular cross section in which latter bars the flared portions *e'* and
15 *d'* of the entrances to the needle channels and also part of the corresponding needle channels *c* and *d* are formed. When for instance on reciprocation of the carriage the needles *e* are moved forward into the
20 position shown in Fig. 1, for instance from left to right, the needles are only partly guided in the needle channels *c* and easily yield under the tension of the threads carried by them and may be deflected from the
25 straight direction. On further movement of the needles their forward hook ends pass into the flared entrances in the bar *i*, being thus guided into the channels *d* of the needle bed *b*. When the needles advance in the
30 opposite direction, the same operation is repeated but in reverse order. The bars *h* and *i* are separately provided during their manufacture with the said flared entrance in the projecting portion *k* and are fitted into
35 the corresponding needle bed only after they are entirely finished. It will be clear that in this manner the flared entrances may be produced in a mechanically simple and exact way for any small needle pitch, as it is
40 possible to employ strong cutters for their manufacture, no hand work being necessary. This arrangement has the further advantage that when the groove entrances become worn the bars may be replaced without necessitat-
45 ing the replacing of the needle bed.

Having described my invention I declare that what I claim and desire to secure by Letters Patent of the United States is:—

1. In a knitting machine, the combina-
50 tion of two sets of jacks, each jack being provided with a trapeziform part at its head, two sets of cam devices, bars arranged on the inner side of said cam devices for holding down said jacks, recesses in said
55 bars permitting rising of the jacks only when engaging or disengaging the needles, such recesses being offset relatively to each other in the direction of travel of said cam devices, means for moving said bars, latches
60 for closing said recesses, and means for actuating said latches.

2. In a knitting machine the combina-
tion of two sets of jacks, each jack being provided with two downwardly inclined
65 surfaces at its ends, two sets of cam devices,

bars arranged on said cams for holding down the jacks recesses in the bars permitting the rising of the heads of the jacks only when engaging or disengaging the needles, means for moving said bars, latches
70 for closing said recesses and means for raising and lowering said latches.

3. In a knitting machine the combination of a removable carriage, cam devices on said carriage, each cam device including
75 a triangular member, bars slidably arranged on said cams, recesses in said bars, latches for closing said recesses, means for raising and lowering the latches, means for simultaneously moving the triangular member of
80 each cam device with the latch on the same cam device, and means for lowering the triangular member of a cam device when the triangular member of the other cam device is raised.

4. In a knitting machine the combination of a carriage, cam device on said carriage, bars for holding down the jacks, said
85 bars being slidably arranged on said cams and having recesses, latches for closing said recesses, said latches having pins, and slides arranged on the carriage, the slides having
90 inclines engaging the pins.

5. In a knitting machine the combination of a carriage, cams on said carriage, bars for holding down the jacks, said bars
95 being slidably arranged on said cams and having recesses, latches for closing said recesses, said latches having pins, slides arranged on the carriage and having inclines engaging the pins a shaft disposed trans-
100 versely of the carriage, two levers mounted on said shaft and engaging slots in the slides and a handle mounted on said shaft.

6. In a knitting machine the combina-
105 tion of a removable carriage, two guide rails provided with inwardly directed slots, said carriage being adapted to slide on said rails, two sliding catches having inclines and arranged at both sides of the carriage, said
110 sliding catches being provided with projections engaging the slots in said rails, contact devices on the carriages for engagement with said inclines and pressing the projections of the sliding catches in the slots
115 of the guide rails.

7. In a knitting machine the combination of a removable carriage, two guide rails provided with inwardly directed slots, said carriage being adapted to slide on said rails,
120 two sliding catches having inclines and arranged at both sides of the carriage said sliding catches being provided with projections engaging the slots in said rails, contact devices on the carriages for engagement
125 with said inclines, an extended guide arm on the carriage, an auxiliary sliding catch, a link connecting the auxiliary catch with one of the first mentioned catches, a projection on the guide arm, an inclined face on the
130

guide arm cooperating with two inclined faces on the auxiliary catch, the contact devices on the carriage and the inclined faces on the guide arm pressing the sliding catch
5 and the auxiliary catch in the slots of the guide rails.

In testimony whereof, I have signed my

name to this specification in the presence of two subscribing witnesses.

EDOUARD DUBIED.

Witnesses:

HERMANN HUBER,
AUGUST RIVEGG.