No. 647,880.

Patented Apr. 17, 1900.

M. SALDIN.

KNITTING MACHINE.

(Application filed July 17, 1899.)

(No Model.)

4 Sheets—Sheet 1.

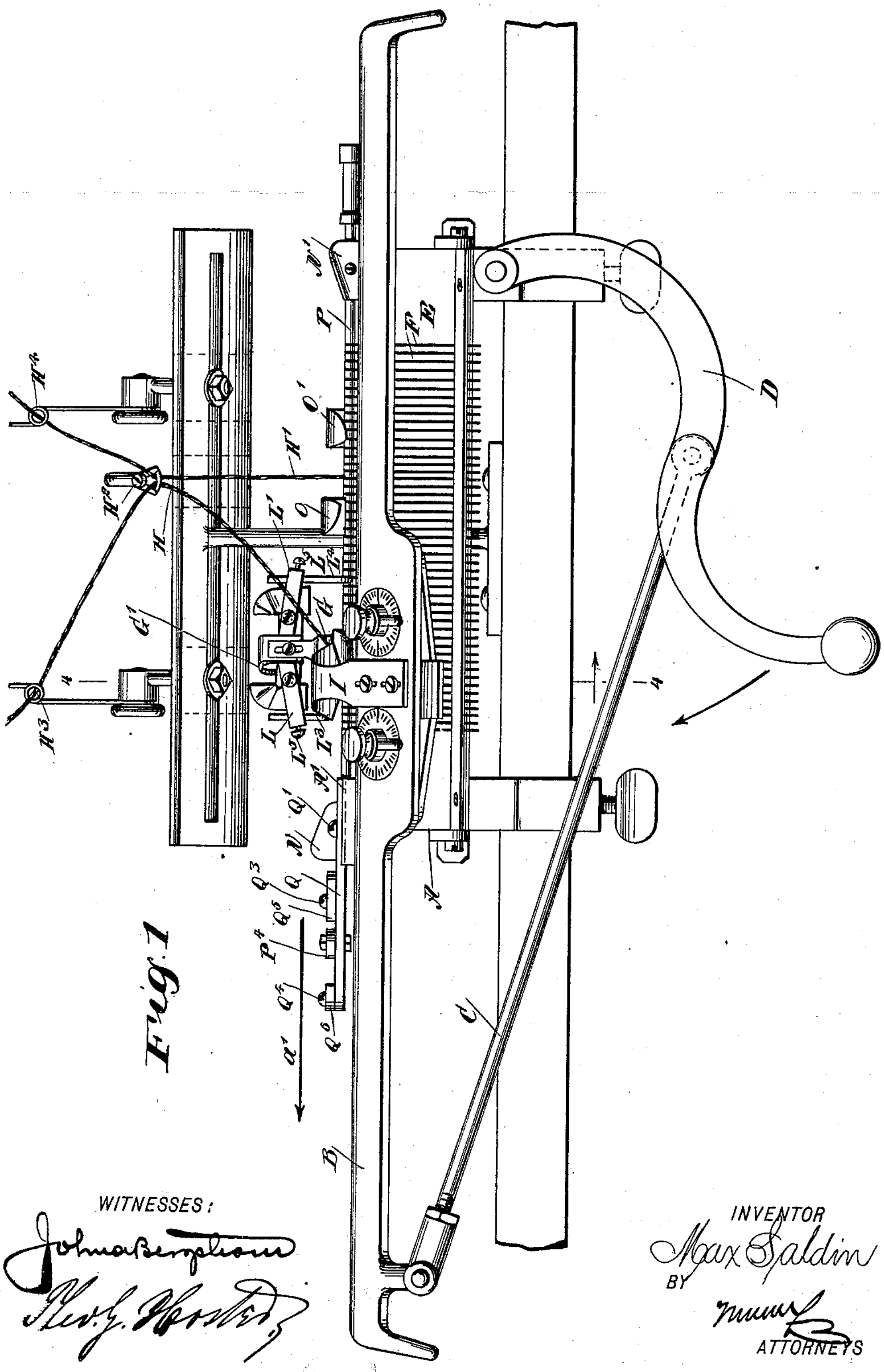

Fig. 1

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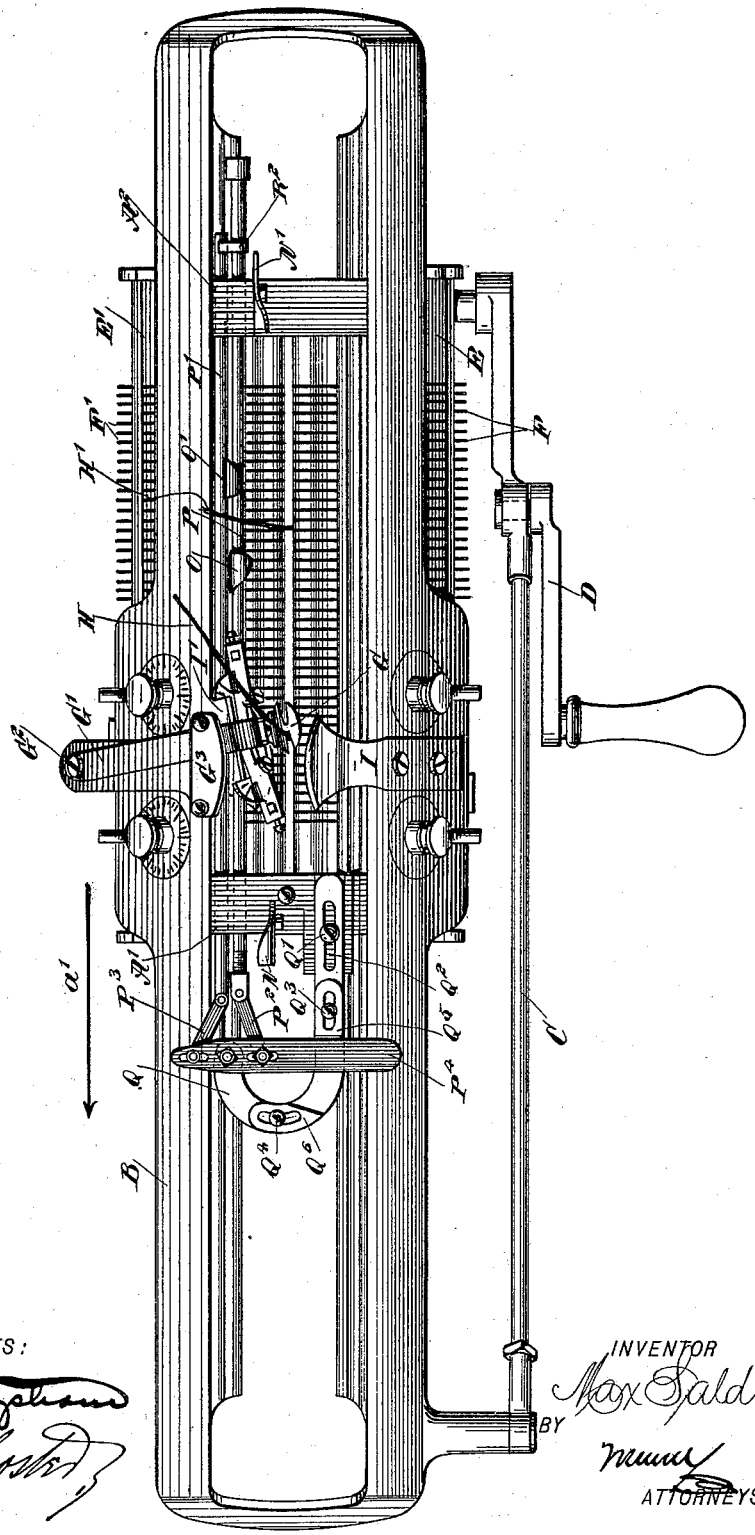
(No Model.) 4 Sheets—Sheet 2.

Fig. 2



WITNESSES:

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(No Model.) 4 Sheets—Sheet 3.

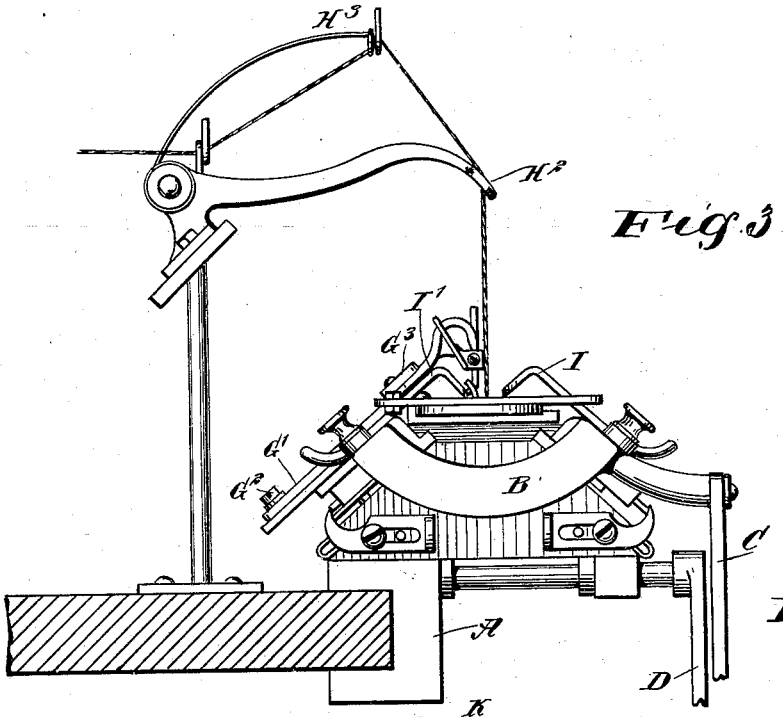
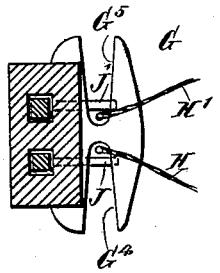


Fig. 3

Fig. 7



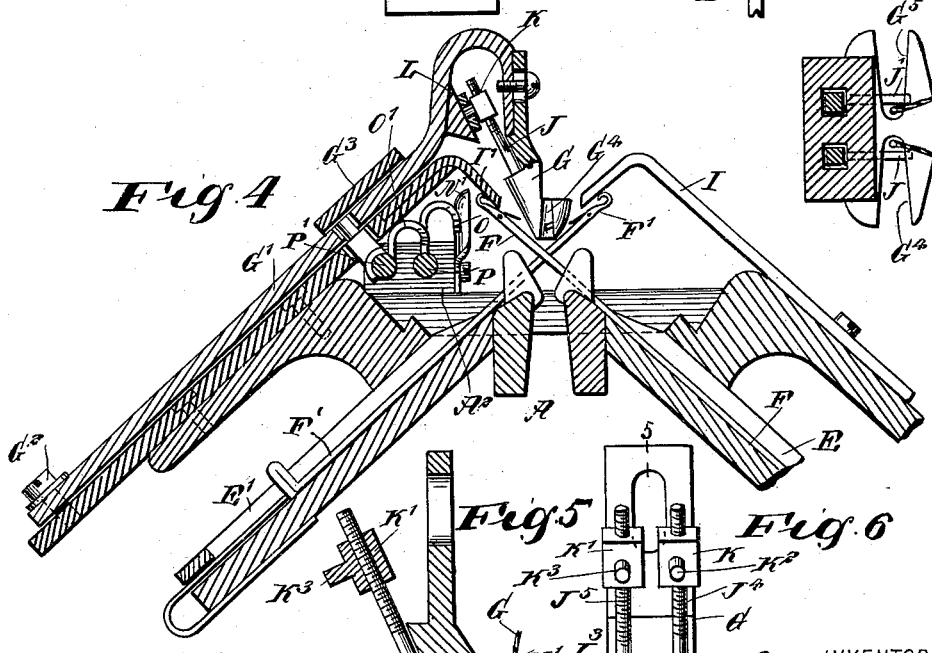


Fig. 4

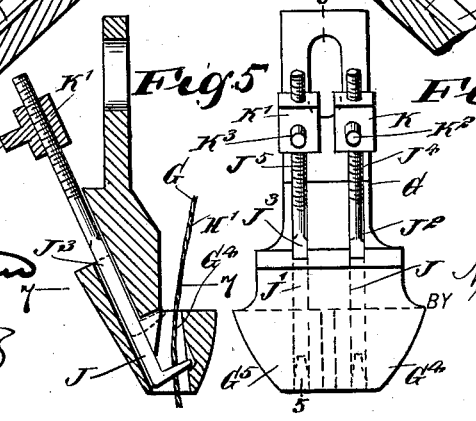


Fig. 5

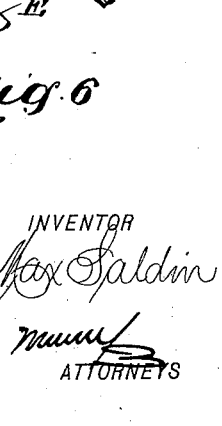


Fig. 6

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(No Model.) (Application filed July 17, 1899.) 4 Sheets—Sheet 4.

Fig. 8

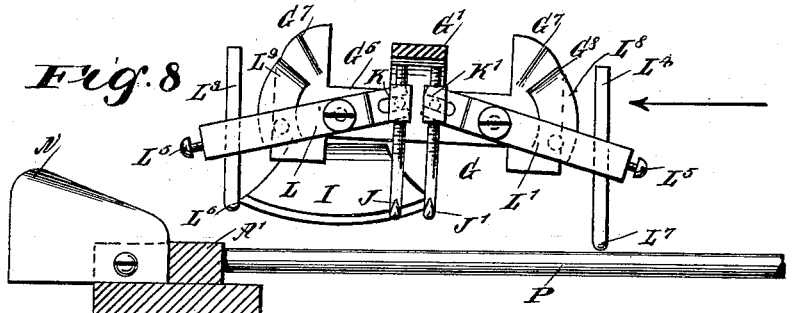


Fig. 9

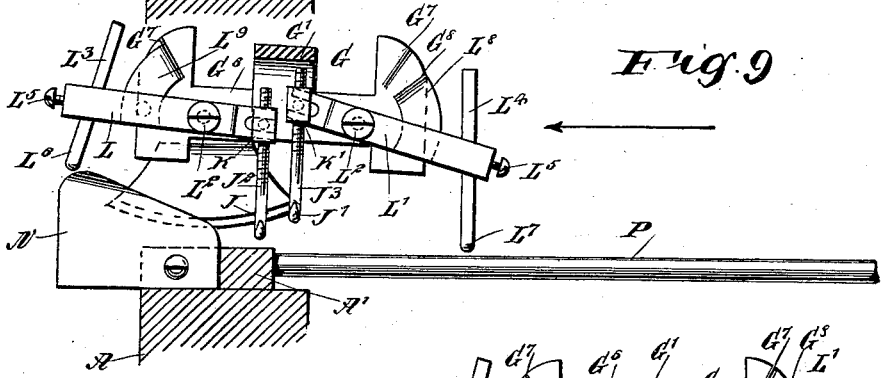


Fig. 10

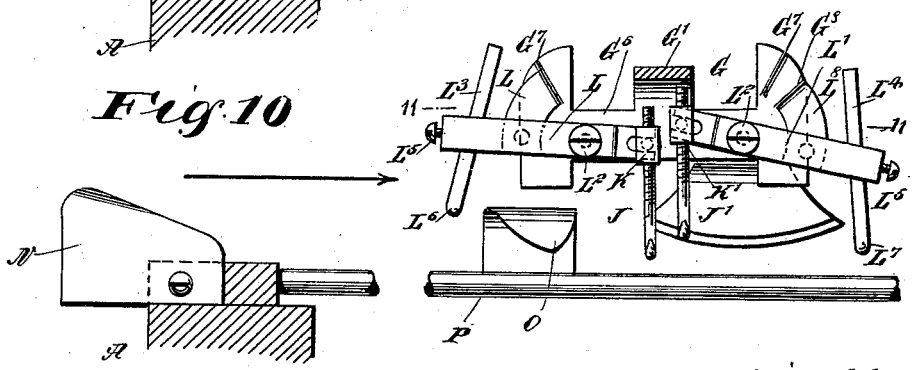


Fig. 11

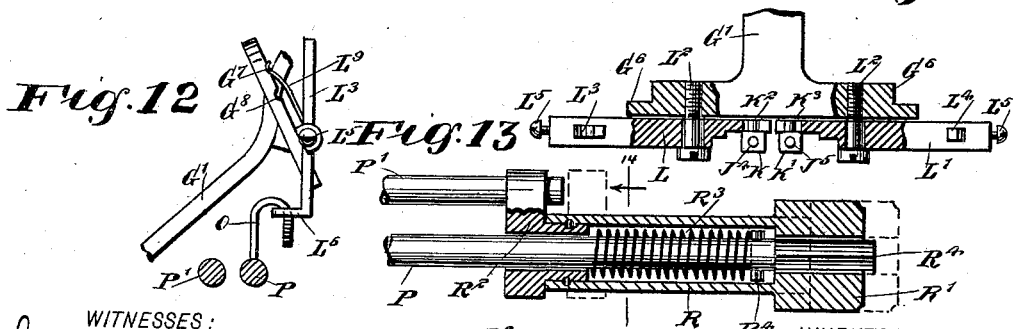
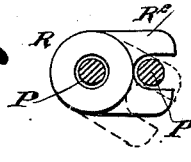


Fig. 12

Fig. 13

Fig. 14



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ATTORNEYS

UNITED STATES PATENT OFFICE.

MAX SALDIN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO HIMSELF AND HENRY REICHENBACH, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 647,880, dated April 17, 1900.

Application filed July 17, 1899. Serial No. 724,069. (No model.)

To all whom it may concern:

Be it known that I, MAX SALDIN, of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Knitting-Machine, of which the following is a full, clear, and exact description.

The invention relates to knitting-machines having two straight rows of needles arranged on opposite sides of the machine and between which passes the work—for instance, as shown and described in the application for Letters Patent of the United States, Serial No. 702,331, filed by me on January 16, 1899, and allowed April 17, 1899.

The object of the invention is to provide a new and improved knitting-machine, more especially designed for knitting mittens, sweaters, gloves, and other articles in such a manner that either a single tubular portion of the article can be knitted or separate tubular parts at the same time. For instance, in a mitten the wrist portion can be knitted, then the thumb and finger portions simultaneously and properly spaced, or in the case of a sweater the body portion can be knitted to the sleeves, then the two sleeves simultaneously, and finally the remaining body portion to complete the garment, with the crotch at the joint of the single tubular portion and the separate tubular portions knitted and closed automatically.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation of the same. Fig. 4 is an enlarged transverse section of the same on the line 4 4 in Fig. 1. Fig. 5 is an enlarged transverse section of the double yarn-carrier on the line 5 5 in Fig. 6. Fig. 6 is a rear elevation of the same. Fig. 7 is a sectional plan view of the same on the line 7 7 in Fig. 5. Fig. 8 is a sectional side elevation of the double yarn-carrier and the shifting mechanism therefor for retaining and releasing the yarns. Fig. 9 is a similar view of the same with the parts in a different position. Fig. 10 is a like view of the same with the parts in still another position. Fig. 11 is a sectional plan view of the same on the line 11 11 in Fig. 10. Fig. 12 is an end view of the same with the cam-rods in section. Fig. 13 is an enlarged sectional plan view of the outer ends of the cam-rods, and Fig. 14 is a transverse section of the same on the line 14 14 of Fig. 13.

The improved knitting-machine is mounted on a suitably-constructed frame A, on which is mounted to reciprocate a carriage B, connected by a pitman C with a crank-arm D, adapted to be turned by hand; but in the case of a power-machine the said pitman is connected with a crank-disk secured on a shaft driven by other machinery for imparting a reciprocating motion to the carriage B on the frame A. On the frame A are mounted the needle-plates E E′, inclined toward each other, as illustrated in Figs. 3 and 4, and provided with suitable guideways for the two rows of needles F F′, respectively, to which a single yarn or thread or a plurality of yarns or threads are passed from the double yarn-carrier G, mounted on an arm G′, fulcrumed at G^2 on the carriage B and mounted to swing in a stop-guide G^3 to limit the oscillating movement of said arm, and consequently that of the carrier. The yarns or threads H and H′ pass to the double carrier G from a suitable overhead eye H^2 and tension devices H^3 H^4, respectively, as is plainly indicated in Figs. 1 and 3.

The double yarn-carrier G oscillates between guide-arms I I′ of the carriage D, and this oscillating double yarn-carrier G is provided with shoes G^4 G^5 for receiving the yarns H H′, respectively, suitable means being employed for retaining and releasing said yarns at the proper time to form two tubular fabrics, as hereinafter more fully described. The means referred to for opening and closing the shoes G^4 G^5 to release or retain the yarns H H′ consist, essentially, of latches J J′, respectively, (see Figs. 5 and 6,) having their square shanks J^2 J^3 fitted to slide in

suitable bearings in the double yarn-carrier G and at an angle to the openings in the shoes, so that the hook ends of the latches move in and out of said shoe-openings upon sliding the shanks J^2 J^3 downward or upward in the bearings in the carrier G. The extreme outer ends J^4 J^5 of the latches J J′ are threaded and screw in nuts K K′, respectively, formed with pivot-pins K^2 K^3, respectively, journaled in the forked ends of levers L L′, respectively, fulcrumed at or near their middle at L^2 on extensions G^6 on the carrier-arm G′. (See Fig. 11.) The two levers L L′ extend in opposite directions, and in their outer ends are held cam-bars L^3 L^4, secured in place by set-screws L^5, which permit proper adjustment of the bars to insure proper working, as hereinafter more fully described. The lower or cam ends L^6 L^7 of the cam-bars L^3 L^4 are adapted to engage cams N N′, respectively, secured to the frame A of the machine, said cams N N′ serving to impart an upward movement to the said bars and a corresponding swinging movement to the levers L L′, so as to move the latches J J′ into a lowermost or closed position to retain the yarn within the corresponding shoe G^4 or G^5 of the yarn-carrier G at the time the carriage is on the return stroke from the corresponding end of the frame A, on which the cams N N′ are located. The cam ends L^6 L^7 of the cam-bars L^3 L^4 are also adapted to engage cams O O′, respectively, to impart a swinging motion to the levers L L′ in a reverse direction—that is, to move the latches J J′ outward and upward to open the shoes G^4 G^5 and release the corresponding yarns H H′ at the predetermined points between the ends of the rows of needles F F′. These cams O O′ are secured on rods P P′, respectively, mounted to slide in suitable bearings A′ A^2 on the frame A, and said rods are connected at one end by links P^2 P^3, respectively, with a lever P^4, fulcrumed on the curved end of an arm Q, held longitudinally adjustable on the bearing A′ by means of a set-screw Q′ passing through a slot Q^2 in the arm Q, and on the latter are adjustably held by set-screws Q^3 Q^4 the stops Q^5 Q^6 for the lever P^4 to abut against. By adjusting the arm Q longitudinally the rods P P′ and their cams O O′ are shifted in a like direction—that is, nearer to one end of the rows of needles F F′ or farther from said end, according to the points where the yarns H H′ are to be released between the ends of the rows of needles, the location of said points depending on the form of the garment to be knitted. By the operator moving the lever P^4 from one stop Q^5 to the other stop Q^6, or vice versa, the rods P P′ are shifted longitudinally but in opposite directions, so as to bring the cams O O′ closer to or farther from each other. When the lever P^4 abuts against the stop Q^5, then the cams O O′ are close together, and when the machine is in operation a shifting of the opening and closing means for the shoes G^4 G^5 of the yarn-carrier G takes place sooner than when the said cams O O′ are farther apart, with the lever P^4 standing against the stop Q^6. It is understood that the cams O O′ are out of longitudinal alinement relatively to each other, (see Figs. 2 and 4,) and the cam-bars L^3 and L^4 are similarly arranged, so that the bar L^3 is only actuated from the cam O and the bar L^4 only from the other cam O′.

In order to hold the levers L L′ against accidental movement when in either of their two positions, I provide said levers with spring-arms L^8 L^9, adapted to engage notches G^7 G^8 on the extension G^6 of the arm G′ of the carrier G. (See Figs. 8, 9, 1, and 12.) Thus when the latch J or J′ is in a lowermost closed position the corresponding spring-arm L^8 or L^9 engages the uppermost notch G^7, and when said latch is in an open or raised position then the spring-arm L^8 or L^9 is in engagement with the notch G^8.

When it is desired to knit one tubular fabric instead of two tubular fabrics, then the yarn H only is used and locked against release in the shoe G^4 by its latch J, and in order to hold this latch in a closed position during the full strokes of the carriage it is necessary to swing the cam O out of the path of the cam-arm L^3 and to lock it in this position during the time the single tubular fabric is being knitted. For this purpose I provide the device shown in detail in Figs. 13 and 14, the device consisting of a tube R, held to slide on the right end of the rod P, a knob R′ being on the outer end of said tube. The other end of said tube is provided with a fork R^2, adapted to straddle the other rod P′, so as to hold the tube R against movement. A spring R^3 presses against the tube R and holds the latter normally in an innermost position—that is, with the polygonal aperture in the handle R′ in engagement with the correspondingly-shaped rod end R^4, so that when it is desired to turn the rod P the operator first slides the tube R outward against the tension of the spring R^3 to move the fork R^2 out of engagement with the other rod P′, and by then turning the tube a turning motion is given to the rod P, so that the cam O is swung out of the path of the end L^6. Upon releasing the tube R the spring R^3 causes said tube to slide on the rod P until one of the fork members abuts against the outer end of the other rod P′, (see dotted lines in Fig. 14,) and in doing so the rod P remains in a locked position, with the cam O out of the path of the end L^6, so that the latch J is not shifted into an open position during the reciprocation of the carriage, and consequently the yarn H is fed to the rows of needles.

The operation is as follows: When it is desired to knit a single tubular fabric, then the cam O is locked in an inactive position by manipulating the tube R as previously explained, and only the yarn H is carried by the shoe G^4 along the rows of needles from one end to the other when the carriage B is recip-

rocated. The double yarn-carrier G then oscillates in the usual manner at the change of the end of the stroke to form the single tubular fabric in the usual manner. It is evident that when the cam O is moved into an inactive position, as described, then the latch J always remains in a closed position in the shoe G^4 to retain the yarn H and to carry the same forward and backward to the rows of needles, as above explained. Now when it is desired to continue the fabric but with two tubular portions it is necessary for the operator to bring the cam O into an active position by turning the rod P accordingly. The second yarn H′ is now passed to the shoe G^5 and the carriage is reciprocated, but with the lever P^4 in the position shown in Fig. 2—that is, with the cams O O′ close together for a few full reciprocations of the carriage to knit the crotch and the beginning of the tubular fabrics. When the carriage reciprocates to the left in the direction of the arrow *a′*, (shown in Figs. 1 and 2,) then the yarn H is in the open shoe G^4 and is fed to the needles; and when the carriage nears the end of its stroke the cam-bar L^3, with its cam end L^6, travels up the cam N and imparts motion to the lever L to move the latch J into a lowermost position to retain the yarn H in the shoe H^4 during part of the return stroke of the carriage. Now during the return stroke the open shoe G^5 receives the second yarn H′ at a predetermined point, and this yarn is thus fed to the needles and at the same time is interlocked with the other yarn H as the latter is still fed to the needles at the time the yarn H′ passes into the shoe G^5. After the interlocking has taken place the end L^6 moves in contact with the cam O, and a swinging motion is given to the lever L to move the latch J out of the opening in the shoe G^4, so that the yarn H now passes out of the shoe upon a further movement of the carriage in the inverse direction of the arrow *a′*. This yarn now remains at a standstill until the return of the shoe G^4. When the carriage nears the end of its stroke to the right, the cam end L^7 travels up the cam N′ and thereby imparts a swinging motion to the lever L′, so that the latch J′ now moves downward to retain the yarn H′ in the shoe G^5 during part of the next forward stroke of the carriage in the direction of the arrow *a′*. During this second forward movement of the carriage B in the direction of the arrow *a′* the shoe G^4 is open and finally again engages the previously-dropped yarn H; but as the other yarn H′ is still in the shoe G^5 it is evident that the two threads are now again interlocked, and immediately after this interlocking the cam end L^7 engages the cam O′, so that a swinging motion is given to the lever L′ to move the latch J′ upward and release the yarn H′, which now passes out of the shoe upon a further forward movement of the carriage B in the direction of the arrow *a′*. The yarn H′ thus dropped remains at a standstill until the return of its shoe G^5. The yarn H is now the only one active until the carriage comes back again to take up the other yarn H′ and to leave the yarn H, as above described. After the yarns have been interlocked in the manner described to form the crotch—say through two or three full reciprocations of the carriage B—then the operator takes hold of the lever P^4 and shifts the same to the left until the lever abuts against the stop Q^6. The two cams O O′ are now moved so far apart that one yarn is released from its shoe and passes out of the same before the other yarn is taken up to prevent further interlocking of the two yarns. Each yarn now knits a single tubular fabric with one or two needles in the rows of needles F F′ remaining out of action, as no yarn is fed to them, it being understood that the carrier G oscillates in the usual manner to knit with some of the needles in the row of needles F and the yarn H or H′ first one side of a tubular fabric and then the other side with the corresponding needles of the other row of needles F′. It is understood that the rows of needles operate in conjunction with the carrier G and the yarns H H′ so as to knit separate tubular fabrics in the manner described, and as the yarns are alternately released and come to a standstill between the rows of needles at predetermined points between the ends of the rows of needles it is evident that complete, separate, and independent tubular fabrics are produced, one of which may form the thumb of a mitten and the other a finger portion, or the two tubular fabrics may be the arms of a sweater.

The two tubular fabrics may be made in different lengths, and for this purpose the rods P P′ are adjustable to move the cams O O′ closer together or farther apart, so as to actuate the latches J J′ sooner or later to release the yarns at the desired points which correspond to the length of the tubular fabrics.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A knitting-machine provided with a double yarn or thread carrier for feeding separate yarns to the needles during part of the stroke of the carriage in either direction, and devices on said carrier one for each yarn for retaining and releasing said yarns, substantially as set forth.

2. A knitting-machine, provided with an oscillating double yarn-carrier for feeding separate yarns or threads to the needles during part of the stroke of the carriage in either direction, and means on said carrier, for retaining and releasing the yarns alternately between the rows of needles at points between the ends of said rows of needles, substantially as shown and described.

3. A knitting-machine, provided with a double yarn-carrier for feeding separate yarns or threads to the needles during part of the stroke of the carriage in either direction, and

independent retaining and releasing devices on said carrier, one device for each yarn, to alternately retain and release the same between the rows of needles at points between the ends of said rows of needles, substantially as shown and described.

4. A knitting-machine, provided with a double yarn-carrier for feeding separate yarns or threads to the needles during part of the stroke of the carriage in either direction, independent retaining and releasing devices on said carrier, one device for each yarn, to alternately retain and release the same between the rows of needles at points between the ends of said rows of needles, and means for actuating the said devices on the reciprocation of the carriage, as set forth.

5. A knitting-machine, provided with a double yarn-carrier, retaining and releasing means for the yarns in said carrier for alternately taking up and releasing the yarns between the rows of needles at points between the ends of said rows of needles, and devices for actuating said means, and arranged to cause the release of one yarn after it has been interlocked with the other taken-up yarn to form a knitted crotch between the two fabrics, substantially as shown and described.

6. A knitting-machine for knitting a plurality of tubular fabrics, provided with a double yarn-carrier, retaining and releasing means for alternately taking up and releasing the yarns between the rows of needles at points between the ends of said rows of needles, and devices for actuating said means and arranged to release one yarn previously to taking up the other yarn, as set forth.

7. A knitting-machine for knitting a plurality of tubular fabrics, provided with a double yarn-carrier, retaining and releasing means for alternately taking up and releasing the yarns between the rows of needles at points between the ends of said rows of needles, devices for actuating said means and arranged to release one yarn previously to taking up the other yarn, said devices being adjustable to allow of spacing the tubular fabrics a greater or lesser distance apart, as set forth.

8. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, a double yarn-carrier for feeding separate yarns or threads to the needles, and retaining and releasing means on said carrier for retaining and releasing the yarns during part of the stroke of the carriage, to release one yarn at a predetermined point between the ends of the rows of needles and to take up the other yarn at a predetermined point between the ends of the rows of needles, substantially as shown and described.

9. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, a double yarn-carrier for feeding separate yarns or threads to the needles, retaining and releasing means on said carrier for retaining and releasing the yarns during part of the stroke of the carriage, to release one yarn at a predetermined point between the ends of the rows of needles and to take up the other yarn at a predetermined point between the ends of the rows of needles, and devices for actuating said means to release one yarn previously to taking up the other yarn, as set forth.

10. A knitting-machine, provided with a double yarn-carrier formed with two oppositely-arranged shoes for taking up separate threads or yarns, and sliding latches in said carrier at the said shoes, for opening or closing the latter, as set forth.

11. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, an oscillating double thread or yarn carrier on the said carriage for feeding separate threads or yarns to the needles, said yarn-carrier being formed with shoes extending in opposite directions for taking up either of the yarns in its path upon reciprocating the carriage, sliding latches in said carrier, one for each shoe, to open or close the same and retain or release the thread or yarn, levers carrying said latches, and cam devices for actuating said levers, as set forth.

12. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, an oscillating double thread or yarn carrier on the said carriage for feeding separate threads or yarns to the needles, said yarn-carrier being formed with shoes extending in opposite directions for taking up either of the yarns in its path upon reciprocating the carriage, sliding latches in said carrier, one for each shoe, to open or close the same to retain or release the thread or yarn, levers carrying said latches, cam devices for actuating said levers, and means, substantially as described, for adjusting said cam devices to allow of spacing the tubular fabrics a greater or lesser distance apart, substantially as described.

13. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, an oscillating double thread or yarn carrier on the said carriage for feeding separate threads or yarns to the needles, said yarn-carrier being formed with shoes extending in opposite directions for taking up either of the yarns in its path upon reciprocating the carriage, sliding latches in said carrier, one for each shoe, to open or close the same and retain or release the thread or yarn, levers carrying said latches, a set of stationary cams for engaging said levers and moving the corresponding latch into a closed position, and a second set of cams for actuating said levers and moving the latches into an open position, substantially as described.

14. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, an oscillating

double thread or yarn carrier on the said carriage for feeding separate threads or yarns to the needles, said yarn-carrier being formed with shoes extending in opposite directions for taking up either of the yarns in its path upon reciprocating the carriage, sliding latches in said carrier, one for each shoe, to open or close the same and retain or release the thread or yarn, levers carrying said latches, a set of stationary cams for engaging said levers and moving the corresponding latch into a closed position, a second set of cams for actuating said levers and moving the latches into an open position, said second set of cams being held on slidable rods, and means under control of the operator, for shifting said rods to move the cams of the second set farther apart or nearer together, substantially as shown and described.

15. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, an oscillating double thread or yarn carrier on the said carriage for feeding separate threads or yarns to the needles, said yarn-carrier being formed with shoes extending in opposite directions for taking up either of the yarns in its path upon reciprocating the carriage, sliding latches in said carrier, one for each shoe, to open or close the same and retain or release the thread or yarn, levers carrying said latches, a set of stationary cams for engaging said levers and moving the corresponding latch into a closed position, and a second set of cams for actuating said levers and moving the latches into an open position, one of the cams of the second set being adjustable, to permit of throwing it in or out of the path of its lever, as set forth.

16. A knitting-machine, comprising rows of needles, needle-plates, a reciprocating carriage for actuating the needles, an oscillating double thread or yarn carrier on the said carriage for feeding separate threads or yarns to the needles, said yarn-carrier being formed with shoes extending in opposite directions for taking up either of the yarns in its path upon reciprocating the carriage, sliding latches in said carrier, one for each shoe, to open or close the same and retain or release the thread or yarn, levers carrying said latches, a set of stationary cams for engaging said levers and moving the corresponding latch into a closed position, a second set of cams for actuating said levers and moving the latches into an open position, one of the cams of the second set being adjustable, and means for locking its cam in either an active or inactive position, as set forth.

17. In a knitting-machine, a carrier having two oppositely-arranged shoes, and latches movable in the said shoes to open and close the latter, substantially as set forth.

18. In a knitting-machine, a carrier having two oppositely-arranged shoes, and latches movable in the said shoes to open and close the latter, the latches being movable independent one of the other, substantially as described.

19. A knitting-machine, provided with a carrier having two oppositely-arranged shoes, and latches slidable in said carrier for opening and closing said shoes, said latches being held against turning in the carrier, as set forth.

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Witnesses:
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EVERARD BOLTON MARSHALL.