3 Sheets—Sheet 1.

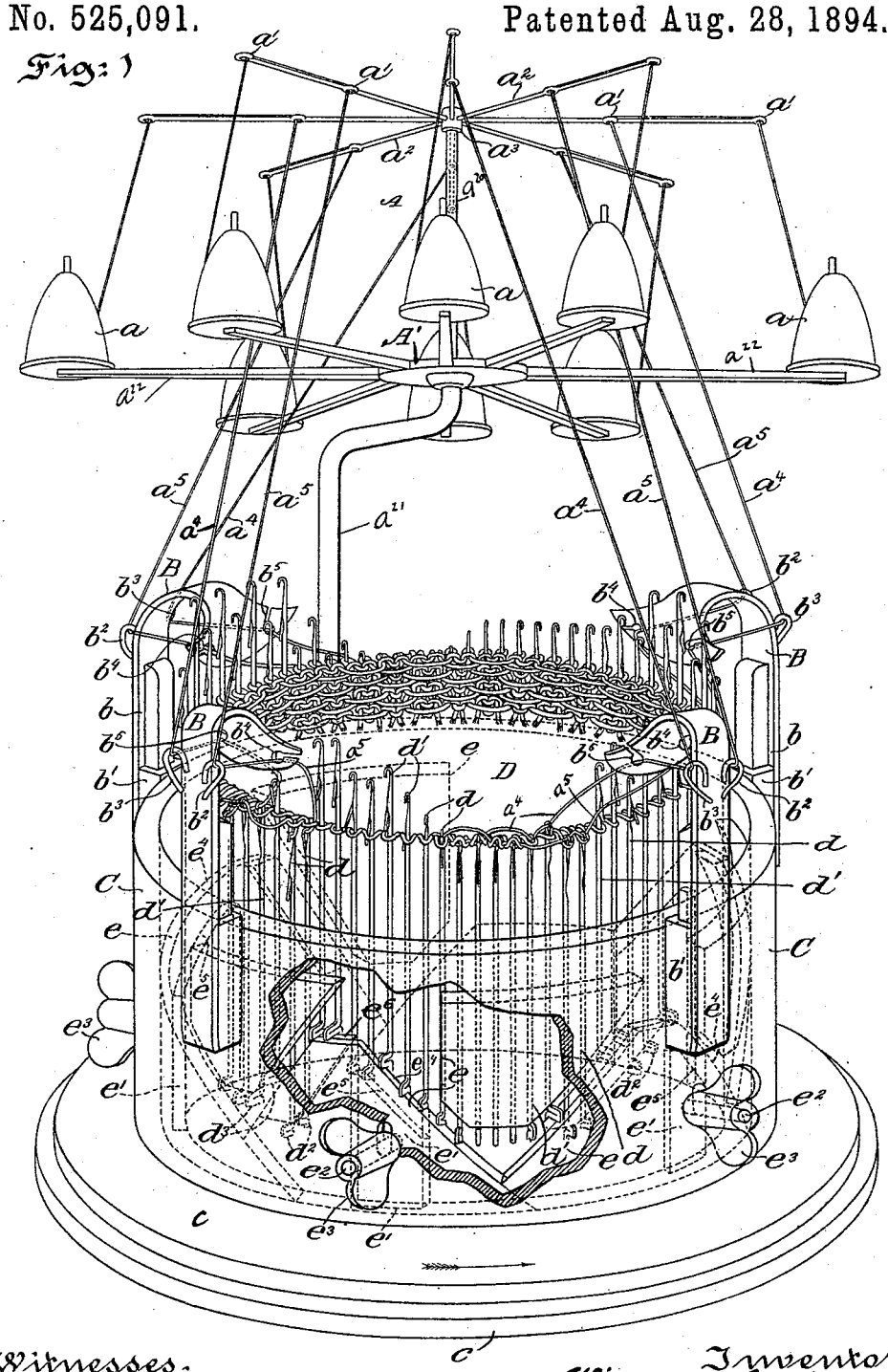
(Specimens.)

W. R. CARTLEDGE.

KNIT FABRIC AND METHOD OF AND APPARATUS FOR PRODUCING SAME.

No. 525,091. Patented Aug. 28, 1894.

Fig. 1



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3 Sheets—Sheet 2.

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KNIT FABRIC AND METHOD OF AND APPARATUS FOR PRODUCING SAME.

No. 525,091. Patented Aug. 28, 1894.

Fig: 2

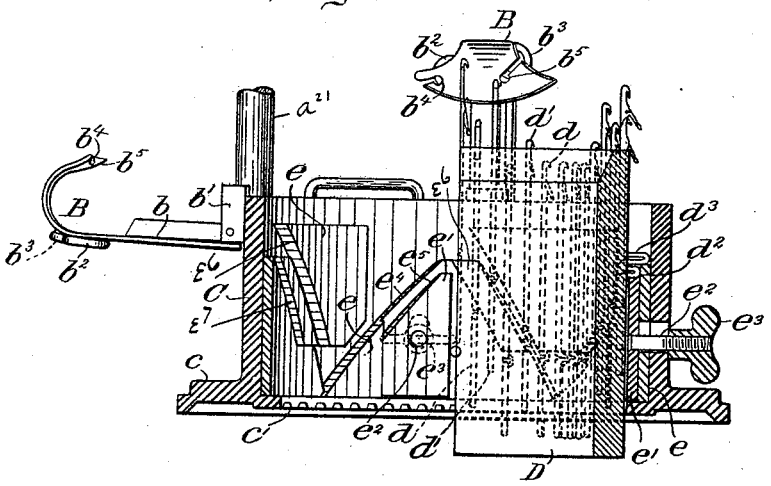
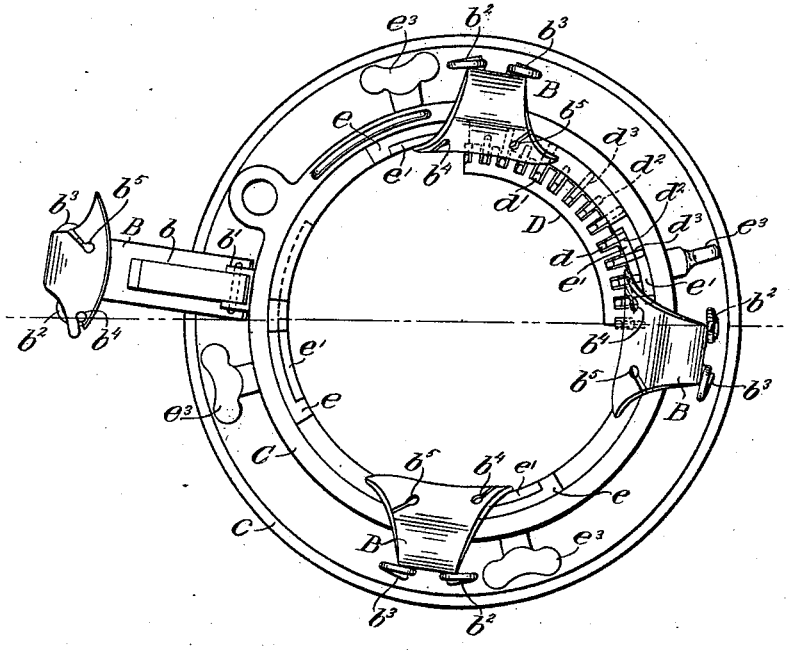


Fig: 3



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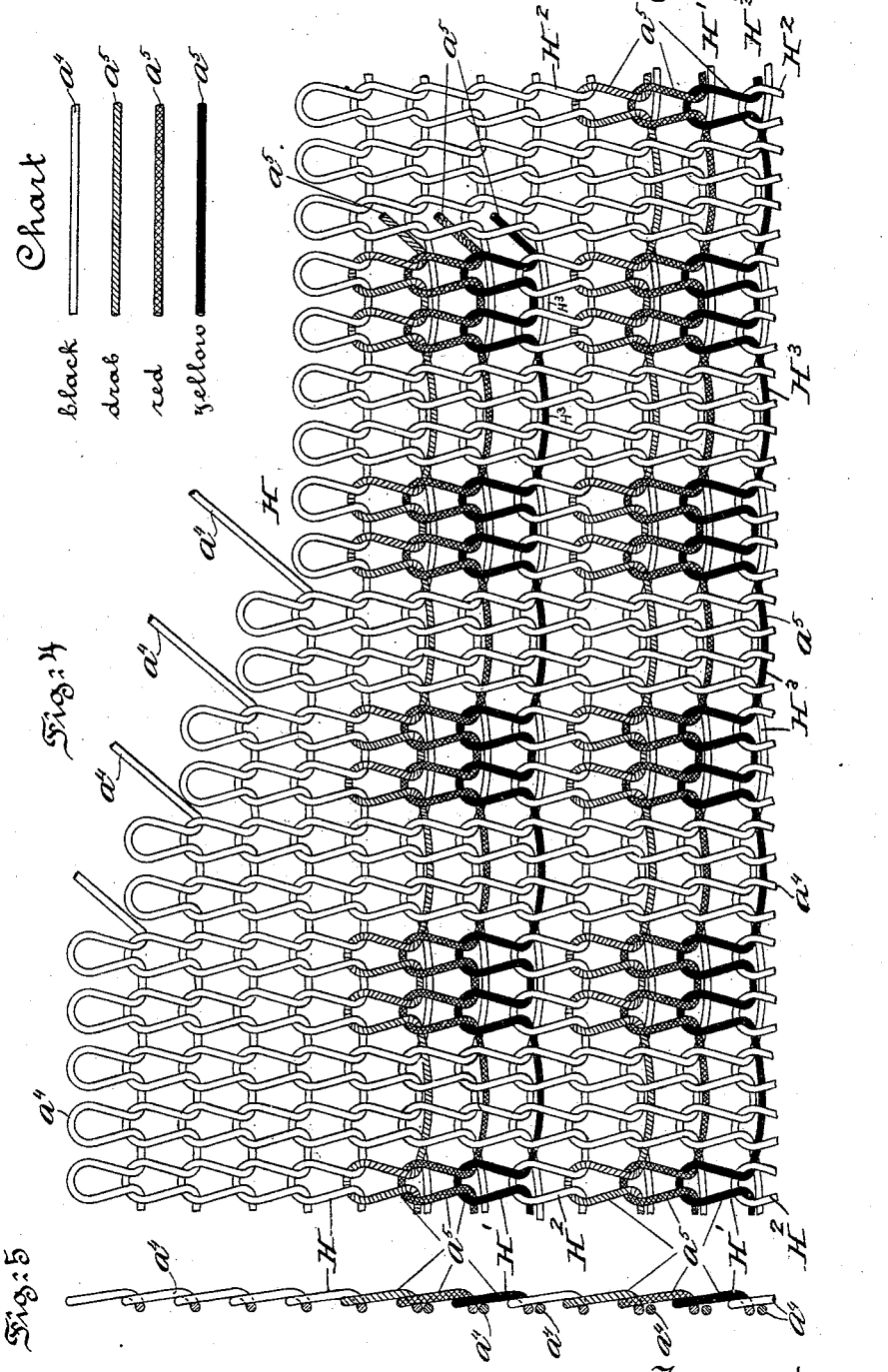

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UNITED STATES PATENT OFFICE.

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KNIT FABRIC AND METHOD OF AND APPARATUS FOR PRODUCING SAME.

SPECIFICATION forming part of Letters Patent No. 525,091, dated August 28, 1894.

Application filed January 23, 1894. Serial No. 497,742. (Specimens.)

To all whom it may concern:

Be it known that I, WILLIAM R. CARTLEDGE, a subject of the Queen of Great Britain, but now residing at Guelph, in the Province of Ontario and Dominion of Canada, have invented certain new and useful Improvements in Knit Fabrics and the Method of and Apparatus for Producing the Same, of which the following is a specification.

My invention relates to the production of a knit fabric; and also to the method of and apparatus for producing such a fabric.

The principal objects of my invention are first, to provide a knit fabric having one portion in which the yarn is formed into a loop in every wale as usual, and another portion containing an additional yarn in which the yarns are formed into loops in alternate groups of wales, the yarn which is formed into loops in one group of wales floating across the adjacent groups; second, to provide an efficient method for producing such a knit fabric; and third, to provide a machine for the conduct of said method.

My invention consists of the improvements hereinafter described and claimed.

The nature and general features of my invention will be more fully understood from the following description taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1, is a perspective view of a circular knitting machine embodying my invention, showing the supported spool or bobbin frame, the general character of an article fabricated in such a machine and also showing the fixed and movable cams for controlling the position of the respective sets of latch needles and the movable slotted thread holders or carriers for continuously feeding four or more threads to the sets of needles of the machine. Fig. 2, is a vertical central section through the machine of Fig. 1, showing the ribbed needle holder, the two sets of latch needles thereof and also the fixed and movable cams for changing from plain to pattern work by the shifting of the movable cams and means for controlling the positions of the same. Fig. 3, is a top or plan view of the circular machine of Figs. 1 and 2, showing the series of hinged thread carriers or holders, with one of them occupying an inoperative position. Fig. 4, is a plan view of the structure of the fabric illustrating the arrangement of the threads in the plain portion thereof and also in the pattern portion thereof; and Fig. 5 is a vertical transverse section through the fabric of Fig. 4.

Referring to the drawings with reference to Figs. 1 to 3, A is a spool or bobbin frame having disposed from radial arms a^{22} thereof, a series of spools, bobbins or cops a. The threads from the series of bobbins or spools a, are respectively lead in an upward direction through eyes a', formed in radial arms a^2, connected with a hub a^3, which is mounted on the stem a^{20}, of a curved bracket or arm a^{21}, supporting frame A. This curved bracket or arm a^{21}, is connected with the base plate c, of a rotatable shell or casing C, and the threads are then lead in a downward direction to a series of thread carriers or holders B, provided with inner feathers b, engaging sockets or recessed bearing posts b', which are secured to or formed integral with the surface of the shell or casing C. This casing or shell C, is provided with a circular flanged base c, adapted to engage in or with a bed, not shown, and so as to revolve therein. The circular flanged base c, is provided on the inner under side or edge thereof with a rack c', which is adapted to mesh with a driving gear not shown. The thread carriers or holders B, are each pivoted in the sockets in posts b', as fully illustrated in the drawings and each is provided with guides b^2 and b^3, and slotted eyes b^4 and b^5, through which the threads from the bobbin or spool frame A, are inserted and fed to the respective sets of latch needles. The eyes b^4 and b^5, of each yarn guide B, are arranged at different heights with respect to each other, in order that a thread presented through the eye b^5, may engage the latch of a long bitted needle, while a thread from the opposite eye b^4, is presented so as to engage the latch of a short bitted needle and thus to fabricate the required chains of stitches in rows to form wales of the fabric, for example, as illustrated in Fig. 1.

D, is a circular fixed ribbed needle cylinder provided with two sets of latch needles d' and d, having long and short base bits d^3 and d^2,

which are adapted to engage respectively with certain portions of the fixed and movable cams e and e', of the shape or form shown in Figs. 1 and 2, and arranged between the exterior surface of the needle cylinder or holder D, and the interior of the rotatable shell or casing C. The series of fixed cams e, are in the form of triangles uniting at or about their bases with each other throughout the circumference of the shell or casing C and the respective inclined edges or sides and flat top surfaces thereof form paths for the long bitted needles d', to travel along and in downward and upward directions in contact therewith in the rotation of the shell or casing C, in the direction of the arrow, as illustrated in Fig. 1. The fixed cams e, are provided with cams e^6, either secured or formed integral therewith. The slanting surfaces e^7, of which are adapted to engage the short bits d^2, of the needles d, and to depress the same as illustrated in Fig. 1, of the drawings. Each of the movable cams e', is adapted to actuate the short bitted needles d, and said cams are inclined on one side thereof. This inclination of said cams merges into a straight or horizontal plane at the top of the cams and on the opposite side each has a straight surface in a vertical direction, as clearly shown in Fig. 2. These cams e', are adapted to be shifted by the pins e^2, so that they assume in contact with the cams e, a position adjacent to the top and inclined edges or sides of the fixed cams e, as clearly shown in Figs. 1 and 2, so that the bits d^2 and d^3, of the sets of needles d and d', can ride along in contact with the said cams, to permit of the formation of the required looped stitches in the fabrication of a plain web. When the cams e', are shifted downward by means of the pins e^2, they assume the position illustrated in dotted lines in Fig. 1, and in full lines in Fig. 2, to cause the short bits d^2, of the latch needles d to ride over a lowered cam e', while the long bits d^3, of the needles d', ride over a fixed cam e, to permit of the formation of the pattern portion of the fabric. e^2, is a series of pins provided with threaded tightening nuts e^3. These pins engage the movable cams e', and operate to adjust and clamp the same to required positions with respect to the upper surface of the fixed cams e, and so as to permit of the engagement of the short bits d^2, of the latch needles d therewith, while the long bits d^3, of the latch needles d', engage with certain portions of the fixed cams e, as hereinafter more fully explained.

In the fabrication of the fabric of a single thickness, the machine operates as follows:— It must be assumed that all the movable cams e', have been raised by means of the pins e^2, and clamped to position by the tightening nuts e^3, so that the several movable cams preferably of the shape or form illustrated in Figs. 1 and 2, are brought thereby to substantially the same plane or height as the series of fixed cams e, of the machine. In the fabrication of such a fabric but four threads a^4, are employed, which are presented through the eyes b^5, of the holders or carriers B, located at suitable distances apart upon the movable shell or casing C, to both sets of needles d and d', in order to knit the same into chains of stitches constituting wales of the fabric. By rotating the shell or casing C, by means of suitable gear mechanism, not shown, but which is the same as found in the well known type of Branson knitting machine, both sets of needles d and d', produce chains of stitches to constitute the wales of the fabric, as illustrated in the upper part H, of Figs. 4 and 5. This operation of the machine and of both sets of needles d and d', is continued until it is required to begin the formation of the pattern portion composed of complemental chains of stitches of a series of different threads a^5 forming the wales of the fabric, when the machine is stopped, and the movable cams e', are shifted by means of pins e^2, into the position illustrated in dotted lines in Fig. 1, and in full lines in Fig. 2, and the cams e', are then clamped to such position by means of the nuts e^3, and at the same time the said series of different colored threads a^5, are introduced from the spool or bobbin frame A, to and through the eyes b^4, of the holders or carriers B, to the set of latch needles d, so as to form a continuation of the previously formed wales of the fabric. The shell or casing C, is then rotated and the two sets of needles d and d', respectively ride on the upper edges e^5 and e^4, of the movable and fixed cams e' and e, during continuous operations of the machine, to cause as illustrated in Figs. 1 and 4, one of the series of threads a^5, to be presented to the short bitted needles d, and then a thread a^4, to the long bitted needles d', as will be readily understood from Fig. 1, of the drawings, and so on in regular succession the respective sets of needles are brought into and out of action in the operation of the machine to receive and form into chains of stitches the series of threads of different colors from the frame A, in order to fabricate by such chains of stitches a web H', having a pattern appearing in stripes, courses or the like on the face in sections, and between which sections of the patterned face are courses H^2, like those of the previously formed fabric H, as clearly illustrated in Figs. 4 and 5, and on the back, the threads where not formed into loops float transversely as to the stripes of the face but with the sequence of threads displayed in the pattern of the face adhered to throughout the formation of the fabric having the double thickness in structure.

In Fig. 1, of the drawings, eight threads are shown as being employed to form the pattern fabric in the manner hereinbefore explained in connection with the fabrication of the portion H', of the fabric of Figs. 4 and 5. When eight threads are employed as shown in Fig. 1, the course H^2, illustrated in Fig. 4,

is not formed, but instead the corresponding course is like the courses marked H'. To fabricate the pattern portion with an interposed course of stitches H^2, in a single plane as illustrated in Figs. 4 and 5, but seven threads are required. One of the eyes b^4, will therefore not be supplied with a colored thread a^5, and one of the movable cams e', adjacent thereto in the direction indicated by the arrow in Fig. 1, will be raised until its upper inclined surface e^5, will come in alignment with the inclined surface e^4, of the corresponding fixed cam e. The two short bitted needles d, following the long bitted needles d', will be raised to the same level, as hereinbefore explained in connection with the fabrication of the single thickness fabric H, illustrated in Figs. 4 and 5, and will also catch a thread a^4, whereby a crosswise row H^2 of single stitches corresponding to those of the fabric H, of said figures, will be knit, while the other needles are knitting the pattern portion of the fabric of the type illustrated in Figs. 4 and 5.

Instead of using one thread for each of the eyes b^4 and b^5, of the yarn carrier B, several of the eyes may be supplied with two threads to be taken by the needles like one thread so as according to requirements to increase the fullness of the web being fabricated for particular purposes or to produce special effects in the article, as desired.

To describe the fabric shown in Figs. 4 and 5 somewhat more in detail it is noted that the part marked H, consists of yarn formed into a loop in every wale as usual, the resulting courses being unbroken, while the part marked H', consists of loops and of floats H^3. The part H', comprises the yarn a^4, of the part H, and additional yarn a^5; the yarn a^4, is formed into loops for two wales and then floats across two wales and so on, while the yarn a^5, is formed into loops in those wales across which yarn a^4, floats and floats across those wales in which yarn a^4, is formed into loops. The part H, may be knit by one feed and of one yarn instead of a plurality, as shown, and the part H', may be knit with two yarns or with as many yarns as the capacity of the machine will admit, the number being limited to two for each set of cams e and e'. By varying the colors or materials of the yarns used a pattern is produced, as shown.

It may be here remarked that the fabric of my invention may be knit in a long tube composed of alternating portions of plain and figured work H and H', and may then be cut into sections, each adapted to form the hand and wrist of a mitten or glove, the plain portion being at the wrist and the figured portion on the hand including the fingers thereof.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A knit fabric having one portion in which the yarn is formed into a loop in every wale as usual, and another portion containing an additional yarn in which the yarns are formed into loops in alternate groups of wales, the yarn which is formed into loops in one group of wales floating across the adjacent groups, substantially as and for the purposes set forth.

2. The method of knitting herein described, which consists in forming yarn into loops in every wale as usual, introducing an additional yarn, forming the yarns into loops in alternate groups of wales, and floating the yarn of one group in which it has been formed into loops across the adjacent group, substantially as and for the purposes set forth.

3. A knitting machine for producing a knit fabric, comprising a needle holder, two sets of needles, a yarn guide having eyes at different heights and two cams, one being movable and constructed with provisions in virtue of which it may be raised to the same height as the fixed cam and in virtue of which it may be depressed to the level at which it co-operates with the lower of the two eyes of the yarn guide, substantially as and for the purposes set forth.

4. A knitting machine, comprising a movable shell or casing provided with a series of thread holders or guides having eyes at different heights, fixed and movable cams, the latter constructed with provisions in virtue of which they may be raised to the same height as the fixed cams and of being depressed to the level at which they co-operate with the lower of the eyes of the said holders or guides, two sets of needles with long and short bits, and a ribbed needle-cylinder, substantially as and for the purposes set forth.

5. A knitting machine, comprising a fixed needle cylinder, needles provided with long and short bits, a yarn guide having eyes at different heights, a movable casing or shell provided with fixed and movable cams and the latter constructed with provisions in virtue of which they may be raised to the same height as the fixed cams and in virtue of which they may be depressed to the level at which they co-operate with the lower of the eyes of said guide, substantially as and for the purposes set forth.

6. A machine for producing a knit fabric, comprising a ribbed needle-cylinder, two sets of latch-needles provided with long and short bits, yarn guides having eyes at different heights, and two sets of cams, whereof one is movable and constructed with provisions in virtue of which such may be raised to the same height as the fixed cams and in virtue of which the same may be depressed to the level at which such co-operate with the lower of the two eyes of said yarn guides, substantially as and for the purposes set forth.

7. A knitting machine provided with a rotatable shell or casing, a bracket or arm supporting a frame for spools or bobbins, hinged thread holders or carriers engaging sockets or

bearing posts and provided with eyes having slots and of different heights with respect to each other, said slots merging into the eyes of said holders or carriers, cams connected with said shell or casing, other cams disposed adjacent thereto, means for adjusting the latter with respect to the former and a ribbed needle holder provided with long and short bitted latch needles adapted to engage and travel in contact with said cams, substantially as and for the purposes set forth.

8. A knitting machine provided with a rotatable shell or casing, a fixed needle cylinder, a double thread holder or carrier provided with slotted eyes of different heights with respect to each other, the slots merging into the eyes of said holder or carrier, cams connected with said shell, other cams disposed adjacent thereto, means for adjusting the latter with respect to the former and two sets of latch needles provided with long and short bits elevated to different heights by means of said cams, substantially as and for the purposes set forth.

9. A knitting machine, comprising a rotatable shell or casing, hinged thread holders or carriers having slotted eyes of different heights with respect to each other, the slots merging into the eyes of said holders or carriers, cams connected with said shell, other cams disposed adjacent thereto, means for adjusting the latter with respect to the former, a ribbed needle holder, and two sets of needles provided with long and short bits elevated to different heights by means of said cams, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

WILLIAM R. CARTLEDGE.

Witnesses:

J. H. DIXON,

JAMES HARVEY.