

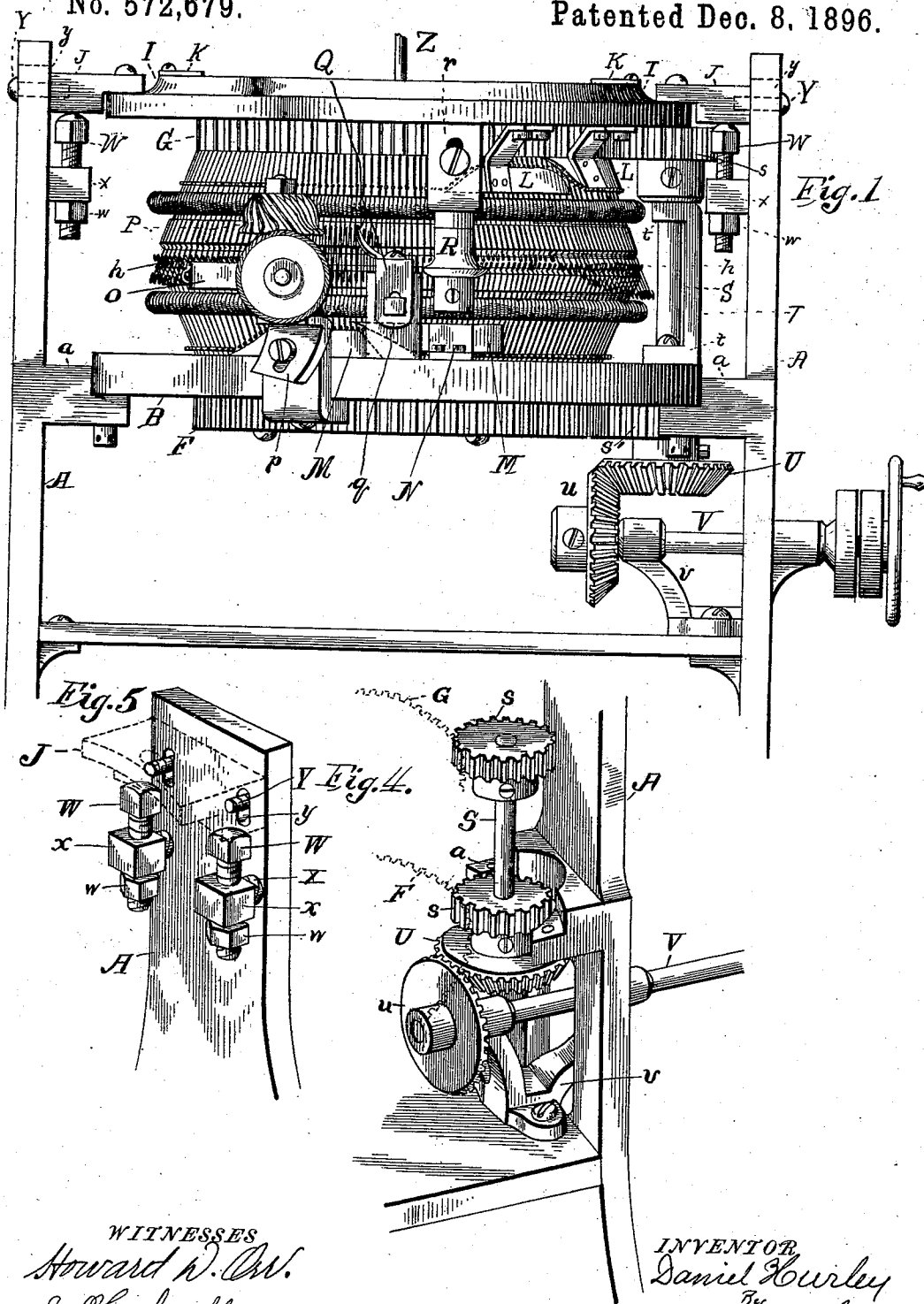
(No Model.)

3 Sheets—Sheet 1.

D. HURLEY.
CIRCULAR KNITTING MACHINE.

No. 572,679.

Patented Dec. 8, 1896.



WITNESSES
Howard W. W.
J. H. Griffin.

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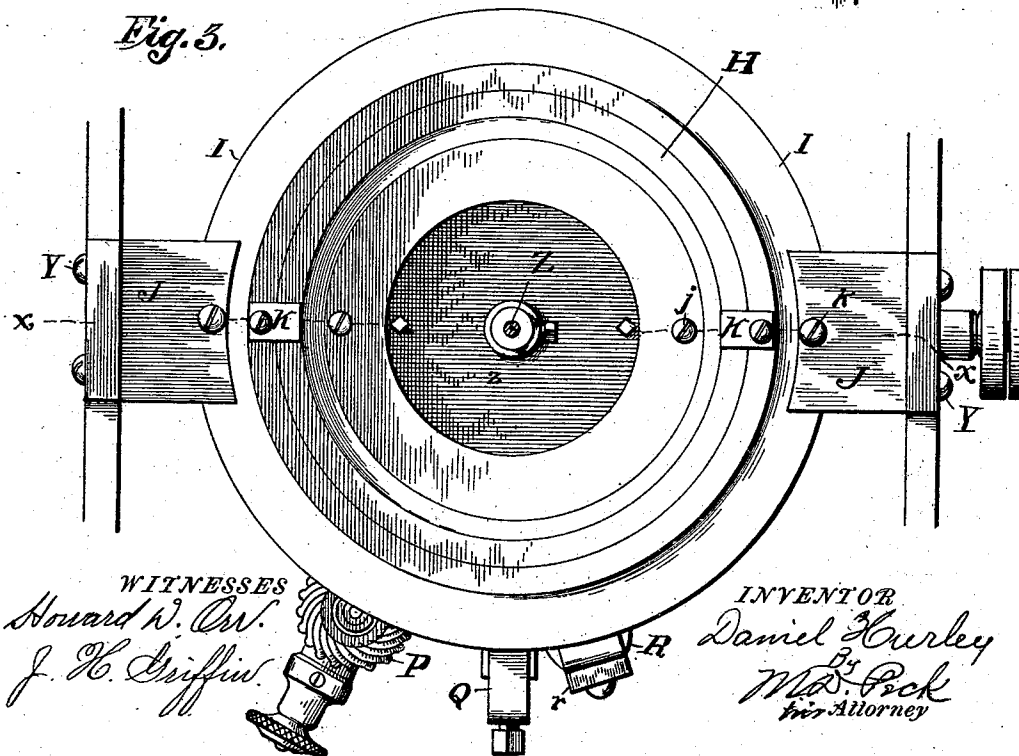
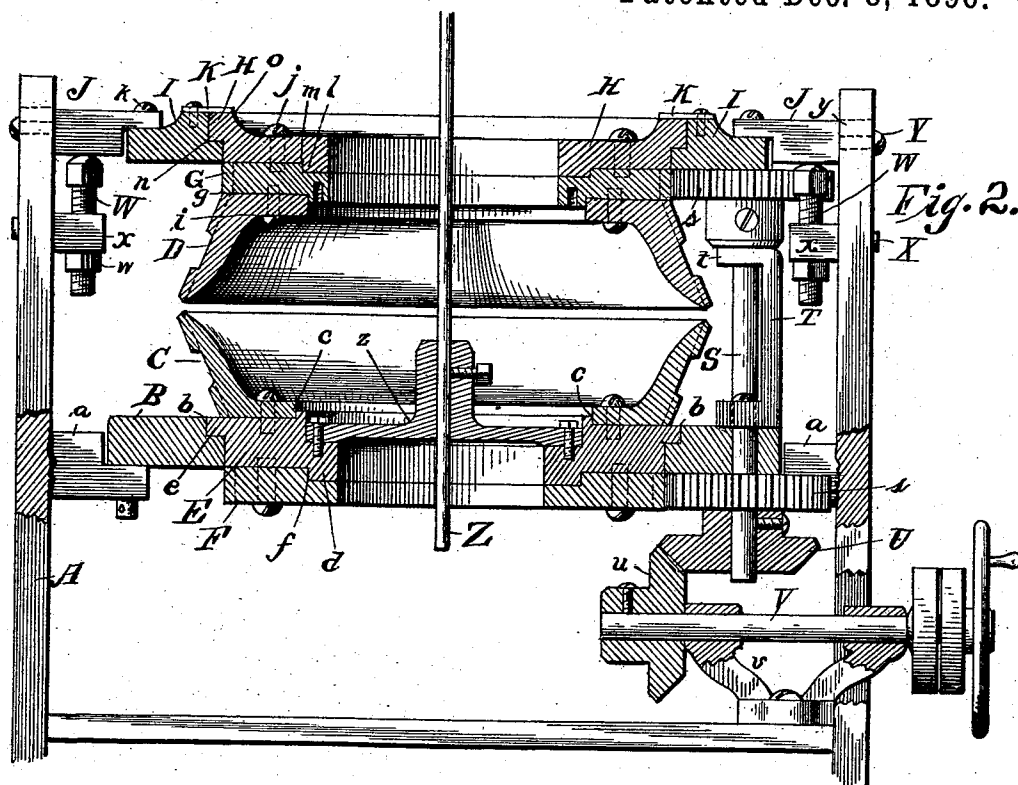
(No Model.)

3 Sheets—Sheet 2.

D. HURLEY.
CIRCULAR KNITTING MACHINE.

No. 572,679.

Patented Dec. 8, 1896.



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(No Model.)

3 Sheets—Sheet 3.

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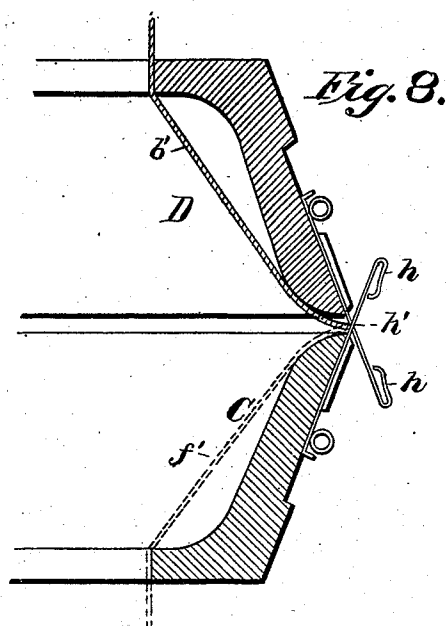
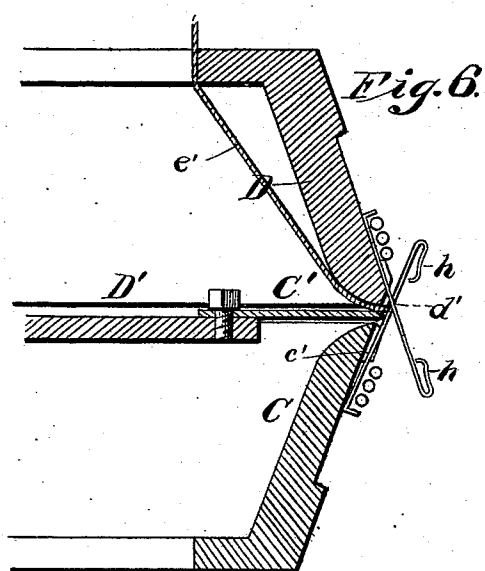
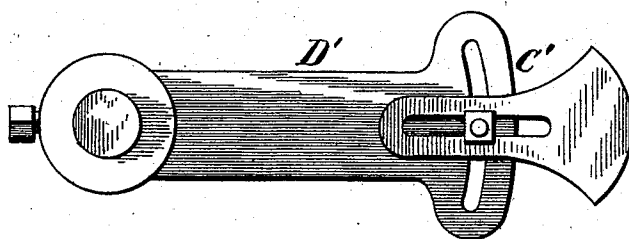


Fig. 7.



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UNITED STATES PATENT OFFICE.

DANIEL HURLEY, OF BENNINGTON, VERMONT, ASSIGNOR TO CHARLES COOPER, OF SAME PLACE.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 572,679, dated December 8, 1896.

Application filed January 24, 1895. Serial No. 536,099. (No model.)

To all whom it may concern:

Be it known that I, DANIEL HURLEY, a citizen of the United States, residing at Bennington, in the county of Bennington and State of Vermont, have invented certain new and useful Improvements in Circular-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, which form part of this specification.

My invention relates to certain improvements in circular-knitting machines wherein two revolving needle-cylinders, one above the other, are employed, and has for its object to simplify the driving or revolving mechanism of the cylinders to produce a more even and steady movement, to effect the ready and compact assembling of the parts, to provide a vertical adjustment of the upper cylinder with relation to the lower one, to enable the varying of the length of the loop as may be required in the operation of producing the fabric, and to so construct the machine as to enable the finished work to be taken up either above or below the cylinders; and it consists in the construction and combination of parts hereinafter fully described, and more particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a side elevation of a circular-knitting machine embodying my improvements. Fig. 2 is a vertical section of Fig. 1 on the line *xx*, shown in the plan view of Fig. 3, with certain portions of the supporting frame and brackets and other parts broken away. Fig. 3 is a plan view of the same with detached portions of the supporting-frame shown. Fig. 4 is a detached perspective view showing the principal gearing which drives the needle-cylinders and a partial dotted outline of the annular gear-rings which form a part of the cylinders. Fig. 5 is a detached perspective view showing more especially the adjusting mechanism for the upper needle-cylinder. Fig. 6 represents a vertical section of the old way of arranging the needle-cylinders and the line on which the needles cross each other. Fig. 7 is a plan

view of the cam shown in Fig. 6, and Fig. 8 shows a vertical section of my new arrangement of the needle-cylinders and the line on which the needles cross each other.

Like letters of reference refer to corresponding parts in each figure of the drawings.

A represents the supporting-frame, which has brackets *a* at some distance below its upper end. These brackets may be formed separately and be secured to the frame or be cast with the frame, and are preferably recessed on their upper side to about one-half their thickness to receive and support an annular bed-plate B, which is bolted or otherwise secured thereto, as shown. This bed-plate is also recessed in its upper surface at *b*, for the purpose hereinafter described.

C represents the lower and D the upper needle-cylinders, which have outwardly-flaring bodies as they approach each other. The lower cylinder C is seated in a recess *c* of a carrying-ring E, and is secured thereto at its lower edge by means of screws. This ring E has a flange *e* on its outer and upper edge, which enters the recess or seat *b* of the bed-plate B, and on the under side of the ring there is an annular gear F, which has in its upper inner side a recess or seat *f*, which receives a pendent flange *d*, located on the inner edge of the ring E, and this gear is secured to the ring by means of screws from beneath, and thus the cylinder C, the annular ring E, and the gear F are rigidly united together.

Near the upper end of the frame A there are attached adjustable brackets J, which are recessed on their under side to receive a cap-plate I, which is rigidly connected to the brackets by means of screws *k*. The inner upper portion of the cap-plate is recessed at *n* to receive a flange *o* on the outer and upper edge of the ring H, and this ring is held in its seat as against upward displacement by means of a button K, secured to the top of the cap-plate I and extending over the ring. On the under side of the ring, at its inner edge, there is a downwardly-projecting flange *l*, which enters a recess *m* in the upper inner edge of an annular gear G, which is secured to the ring by means of screws *j*,

and in a recess *g* on the under side of the annular gear the upper needle-cylinder D is rigidly secured by means of screws *i*, and thus the upper needle-cylinder D, the annular gear G, and the ring H are, like the lower cylinder, firmly secured together and greatly simplified in their construction.

The upper and lower cylinders are provided with the ordinary needles *h*, arranged, as usual, in grooves in the cylinders, as shown, and L represents cams for actuating the needles on the upper cylinder, which are secured to hanging brackets attached to the under side of the cap-plate I, and M refers to the cams for actuating the needles on the lower cylinder, and these cams are secured to brackets N, which are attached to the bed-plate B.

In connection with the needles *h* there is used also the ordinary thread or yarn guide O and sinker-wheel P, jointly supported by an adjustable bracket *p*, attached to the bed-plate B, and stationary and revolving pressers Q and R, the former presser being supported upon the bed-plate by a vertically-adjustable standard *q* and the latter being suspended from the cap-plate I by a vertically adjustable bracket *r*, the functions of all of which parts are well understood by those familiar with the art, and as they are common to machines of this class further explanation of them herein is deemed unnecessary.

S represents an upright shaft extending from below to above the needle-cylinders and is journaled in a bracket T, supported upon and rigidly secured to the bed-plate B by screws or other well-known means. This bracket is provided with an upper and lower bearing *t* for the purpose of holding the shaft in an even and true position relative to the other parts of the operative mechanism. On the upper end of the shaft there is a spur-gear *s*, having a hub on its lower side resting upon the upper bearing of the bracket T, and this gear is rigidly secured to the journal by a screw or by other well-known means and meshes with the annular gear G and revolves the upper needle-cylinder, while a like spur-gear *s'* is attached to the shaft S below the bed-plate B and meshes with the annular gear F and revolves the lower needle-cylinder C. The lower spur-gear *s'* rests upon the upwardly-projecting hub of a beveled gear U, secured to the lower end of the shaft S, and this beveled gear meshes with another like gear *u*, secured to a shaft V, which is held in a bracket *v*, supported upon the frame A. This shaft V is provided with an ordinary belt-wheel outside the frame, or other means for communicating power, whereby both the upper and lower cylinders C and D are revolved simultaneously with power applied directly to each from the same vertical shaft, and thus subject less strain upon the gearing and produce more evenly-revolving cylinders than when all the power is applied to one cylinder for a like purpose.

Brackets J are secured to the frame A near

its upper end by means of screws or bolts Y, attached to the bracket and adjusted up or down, as desired, in the slots *y* in the supporting-frame A, and have beneath them adjusting jack-screws W, arranged in pairs and seated in screw heads or nuts *x* of bolts X, which are screwed into or otherwise rigidly attached to the frame A and are provided on their lower ends, beneath the screw-heads, with jam-nuts *w*. These jack-screws are adapted to be screwed up to support the under side of the bracket J after it has been adjusted and to be secured in a fixed position by means of the jam-nuts, which are screwed up to the screw-heads of bolts X. By this means of adjustment it will be seen that the needle-cylinders can be separated or brought nearer together and evenly adjusted, as may be required, in varying the length of the loops in the operation of producing the fabrics, the supporting-brackets of the sinker-wheel and the stationary and revolving pressers being, as previously described, adjustable to accommodate them to the adjustment of the needle-cylinders.

In Fig. 6 I have represented the old way in which conical needle-cylinders are arranged, with a space between them, the lower cylinder C being slightly smaller than the upper one D and in this case having its needle-grooves *c'* at the same angle with grooves *d'* in the lower outer edge of the upper cylinder, so that the lower needles traverse both sets of grooves. By this arrangement of the cylinders the needles working in the grooves above and below will cross each other on a line with the upper edge of the space between the cylinders, so that when the loops are being formed on the needles of the upper cylinder it becomes necessary that the needles of the lower cylinder be pushed outward that the loops previously formed can be cast off, and this is done by means of an adjustable cam C' on a stationary arm D' on the inside of the cylinder, or by some other equivalent device, in most cases where conical cylinders adjacent to each other and spring-needles have been used.

In all cases where the cylinders are constructed so that the needles will cross each other at the upper or lower edge of the space between them the cam C' is required to be adjusted near the edge of the cylinder on the opposite side of the space from where the needles cross, so that the finished work, as it is cast off from the needles, can pass within the cylinders between the end of the cam and the point where the needles cross and be taken up. As illustrated in Fig. 6, it is clearly shown that by such a construction the finished work *e'* will pass into the cylinder above the cam C' and be taken up above the cylinders, though the cylinders may be reversed in another machine, so that the finished work may pass under the end of the cam C' and down through the lower cylinder to the take-up below.

It is clearly evident, then, that machines constructed prior to my invention have not been so arranged that in any one machine the finished work can pass to the take-up either above or below the cylinders after passing in between them, as the circumstances of the case may demand, as when the ceiling is very low in the room in which the machine is operated and there not being room above the machine the finished work can be lowered to a take-up below, or when the ceiling is high in the room the finished work can pass to a take-up above the cylinders, which is preferable, as then the work is preserved without soiling and is always in view of the operator.

The object of my particular construction and arrangement of conical needle-cylinders is to remedy the difficulty heretofore experienced in not being able in the same machine to adjust the parts so that the finished work can pass to the take-up from the interior of the cylinders to either above or below the cylinders, and to this end Fig. 8 represents my improved conical cylinders, each of which is of the same form and size, and the upper one adjusted above the lower one by means of the brackets J, leaving the ordinary space between their adjacent ends. In this arrangement of parts the needles of each cylinder are confined to their own separate grooves and must necessarily cross each other at h' in the center of the space between the cylinders, as is clearly indicated in the drawings, and the loops formed on the needles are cast off by means of the cams and pressers, as hereinbefore described, and shown in Fig. 1, and the stationary arm D' and adjustable cam C' thereon for pushing the needles outward, as shown in Fig. 6, are dispensed with, leaving the interior space of the cylinders unobstructed to enable the finished work to extend up through the center of the cylinder to the take-up above, as indicated in the section-line b' , or to be let down through the lower cylinder to the take-up below, as indicated by dotted lines f' . In order that the finished work in passing from the needles to the take-up may not be injured, the opposing edges of the needle-cylinders are rounded on their inner faces, as indicated in Fig. 8, thereby presenting a smooth surface over which the work may pass as it leaves the needles in being taken up above or below the cylinders.

As shown in Fig. 2, a bracket z is seated within a recess in the carrying-ring E in the lower revolving cylinder and is secured by screws. This bracket is provided with a rod Z, adjustably secured therein, for operating the well-known take-up mechanism above the cylinders. When it is desired to pass the finished work to the take-up below the cylinders, the bracket z is detached from the ring E, connected with the lower cylinder, and is secured to the gear G in the recess of the upper cylinder D by means of the screws and the rod Z adjusted to the desired distance below the cylinders and connected to the take-up

mechanism, as will be clearly understood from the drawings.

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

1. In a circular-knitting machine, the combination of upper and lower brackets on the main frame, upper cap-plate and lower annular bed-plate supported by and secured to said brackets, each of said plates having an annular recess at its inner periphery, upper and lower supporting-rings each provided with a flange fitting in the recess of its cap or bed plate whereby the supporting-rings are carried by and revolved within the cap and bed plates, upper and lower needle-cylinders connected to the supporting-ring to revolve therewith, gear-rings also connected to said supporting-ring, and suitable gearing to impart uniform movement to both cylinders, as and for the purpose set forth.

2. In a circular-knitting machine, the combination with stationary brackets on which the lower needle-cylinder is supported, of vertically-adjustable brackets to which the upper needle-cylinder is connected, screw heads or nuts secured to a fixed portion of the frame of the machine, and jack-screws working in said nuts and engaging the under side of the adjustable brackets, as and for the purpose set forth.

3. In a circular-knitting machine, the combination of vertical standards provided with slots near their upper ends, stationary brackets on said standards below said slots, a lower needle-cylinder supported by said stationary brackets, adjustable brackets connected to said standards by suitable devices passing through said slots and upper needle-cylinder supported by said adjustable brackets, screw heads or nuts secured to the standards below said slots, and jack-screws working in said screw heads or nuts and engaging the under sides of the adjustable brackets whereby the upper needle-cylinders are vertically adjusted, as and for the purpose set forth.

4. In a circular-knitting machine, the combination with two oppositely-arranged conical needle-cylinders of the same size and form supported on the main frame, said cylinders having a space between their opposing edges and said edges being rounded on their inner surfaces, each of said cylinders having formed in its periphery a series of grooves for the reception of needles, a series of needles supported in said grooves and crossing each other on a line midway of the space between the cylinders whereby the finished work may be taken upwardly or downwardly from the needles, as and for the purpose set forth.

5. In a circular-knitting machine, the combination with two oppositely-arranged conical needle-cylinders of the same size and form supported on the main frame having a space between their opposing edges which are rounded on their inner faces, a series of needles in grooves in the periphery of said cylinders,

the needles of the respective cylinders cross-
ing each other on a line midway of the space
between the cylinders whereby the finished
work may be taken upwardly or downwardly
5 within the cylinders, of an interchangeable
bracket within the cylinders adapted to be se-
cured to the upper or lower cylinder for hold-
ing a rod for operating the take-up above or

below the cylinders, as and for the purpose
set forth. 10

In testimony whereof I affix my signature
in presence of two witnesses.

DANIEL HURLEY.

Witnesses:

JAMES HAYES,
FRANK HERVEY.