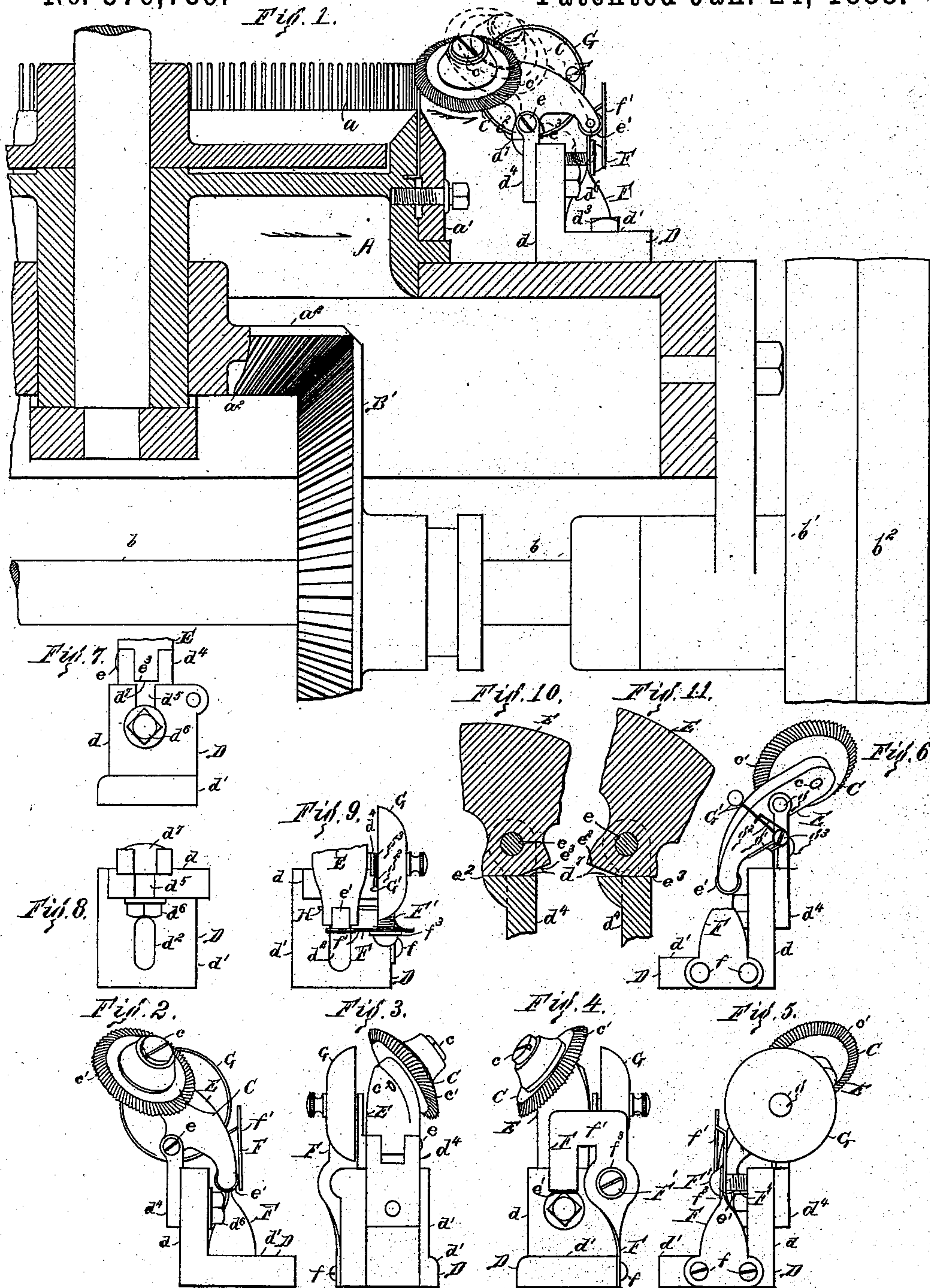


(No Model.)

C. T. SULLIVAN.  
CIRCULAR KNITTING MACHINE.

No. 376,789.

Patented Jan. 24, 1888.



Witnesses—

Wiskley Hyde,  
Arthur M. Day.

Inventor—  
Charles T. Sullivan,  
By Albert M. Moore,  
His Attorney.



# UNITED STATES PATENT OFFICE.

CHARLES T. SULLIVAN, OF LOWELL, MASSACHUSETTS.

## CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 376,789, dated January 24, 1888.

Application filed May 18, 1887. Serial No. 238,575. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES T. SULLIVAN, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Circular-Knitting Machines, of which the following is a specification.

My invention relates to knitting-machines; and it consists in means, hereinafter described, of throwing the clearing-wheel out of engagement with the needles of a spring-needle circular-knitting machine to prevent said needles being bent or broken by more than one needle at a time getting into the space between two adjacent blades of said clearing-wheel; also, in means, hereinafter described, of indicating by a suitable signal the disengagement of the clearing-wheel.

In the accompanying drawings, Figure 1 is a central vertical section of a part of a circular spring-needle knitting-machine provided with my improvement, the plane of section being just in front of the clearing-wheel and its bracket, the clearing-wheel being shown by full lines in engagement with the needles, the dotted lines showing the position of the clearing-wheel when out of engagement; Fig. 2, a front elevation of the clearing-wheel and its supporting-bracket and the alarm-bell, the clearing-wheel being in the position occupied when out of engagement with the needles—that is, in the position shown by dotted lines in Fig. 1. Figs. 3, 4, and 5 are respectively a left-side elevation, a right-side elevation, and a rear elevation of the parts shown in Fig. 2, in the position shown in said figure; Fig. 6, a rear elevation of the parts shown in Fig. 2, in the position there shown, and the bell-hammer, omitting the bell and the upper part of the bracket-lever spring; Fig. 7, a right-side elevation of the base of the bracket which supports the clearing-wheel and lower part of the sliding upper portion of said bracket; Fig. 8, a plan of the parts shown in Fig. 7; Fig. 9, a plan of the parts shown in Fig. 8, and also of the alarm-bell, the spring, the tension-screw, and the lower outer end of the bracket-lever. Figs. 10 and 11 are vertical sections of the bracket-lever and part of the slide of the bracket, showing, respectively, the position

of said lever when the clearing-wheel is in engagement with the needles and its position out of engagement with the needles.

The knitting-machine shown in the drawings is or may be of any ordinary construction, the circular head or cylinder A, carrying needles *a*, secured to said head by clamp-plates *a'* and being revolved by the beveled head-gear *a''*, secured to the head, which takes into another beveled gear, *B'*, secured on a horizontal driving-shaft, *b*, in the usual manner, said shaft being provided with a fast pulley, *b'*, and a loose pulley, *b''*, the parts above enumerated being used with the usual loop-wheel or stitch-wheel (not shown) and other parts of a circular spring-needle knitting-machine.

The clearing-wheel C is of ordinary construction and operation, its function being to clear the needles of kinks in the yarn and bunches of lint made in the operation of knitting. The clearing-wheel C turns upon a stud, *c*, which is inclined substantially as shown in the drawings, and is provided with blades *c'*, each space between the blades being intended to receive a single needle as the cylinder and clearing-wheel are revolved in the directions shown by the arrows, the stud *c* being usually supported upon a bracket adjustable radially toward or away from the cylinder A, and also adjustable vertically to vary the height of the clearing-wheel, the bracket, of course, being rigidly held when adjusted.

It not infrequently happens that the clearing-wheel is partly stopped by lint and waste getting wound around the stud *c*, so that two adjacent needles enter the same space between blades of the clearing-wheel, and are thereby bent or broken. If the motion of the clearing-wheel is wholly stopped, instead of being checked, all the needles are liable to be bent or broken unless the machine is stopped before the complete revolution of the head is made. Again, the needles are liable to be bent by an unusually large bunch of waste getting between the clearing-wheel and the needles.

To obviate the difficulties above described, I provide means by which the clearing-wheel is automatically thrown out of engagement with the needles whenever the pressure of the needles upon the clearing-wheel or the pressure



of a bunch between the needles and the clearing-wheel exceeds a definite amount. To this end I use an adjustable bracket, D, the lower part,  $d$ , of which is an angle-piece, the foot  $d'$  of which is provided with a slot,  $d^2$ , through which a screw,  $d^3$ , passes vertically down into the frame of the knitting-machine, and this screw being loosened, the distance of the foot  $d'$  from the needles  $a$  may be varied.

Adjustably secured to the vertical portion of the angle-piece  $d$  is another part,  $d^4$ , of the bracket D, said angle-piece being provided in its upper portion with a vertical slot,  $d^5$ , through which the bolt  $d^6$  is driven into the part  $d^4$ , to enable said part  $d^4$  to be held at any desired height on the angle-piece  $d$ .

The adjustment of the parts  $d$   $d^4$  of the bracket D, above described, is not new, and is substantially shown in the clearing-wheel brackets commonly used; but the stud  $c$ , instead of being secured (as is usually the case) to the vertically-sliding part  $d^4$  of said bracket, is by me secured to the upper inner end of a bracket-lever, E, pivoted or hinged at  $e$  to the upper end of said part  $d^4$ .

To the lower outer end of the lever E is journaled an anti-friction roll,  $e'$ . To the side of the foot of the bracket D is secured by screws  $f$  a sheet-metal spring, F, the upper portion,  $f'$ , of which is vertical and parallel with the pivot  $e$  of the lever E, and presses against the anti-friction roll  $e'$ . The lever E is pivoted between the tines of the forked upper end,  $d^5$ , of the piece  $d^4$ , and the surface  $d^7$  between the tines of said fork is flat and horizontal, as shown in Figs. 10 and 11. The under side of the lever E, near its pivot  $e$ , is provided with two flat surfaces,  $e^2$   $e^3$ , either of which may be brought into contact with the flat surface  $d^7$ , to stop the lever in either of the positions shown in Fig. 1. When the lever is in either of these positions, it is prevented from being jarred or accidentally moved to the other position by the spring F pressing against the outer end of said lever, or rather against the anti-friction roll  $e'$ , the center of said roll, when the clearing-wheel is in engagement with the needles, being a trifle above the center of the pivot  $e$ , so that when the clearing-wheel is slightly raised it will be suddenly thrown upward by the turning of the bracket-lever on its pivot.

It is desirable that the person in charge of the machine (one person usually having charge of from eight to twenty heads or machines) should be notified immediately when the clearing-wheel is thrown out of engagement. Accordingly, I provide a bell or gong, G, which is supported upon a horizontal stud,  $g$ , driven into the upper part,  $d^4$ , of the bracket D. On another stud,  $g^3$ , is supported a bell-hammer, G', the stem  $g'$  of the hammer being bent around said stud  $g^3$ , so as to turn freely thereon, the lower end of said stem  $g'$  being bent laterally under the outer arm of the bracket-lever E and held against the same by the wire

spring  $g^2$ , which is hooked around the upper arm of the stem of the bell-hammer, then bent around the stud  $g^3$ , and at its lower end resting against the outer face of the part  $d^4$  of the bracket D. Hence when the clearing-wheel is thrown out of engagement the outer arm of the lever E moves the bell-hammer stem, and causes the hammer to strike the gong and give an alarm, the hammer being arranged in a suitable position for that purpose. When the lever E is restored to position by the hand of the person in charge of the machine, the hammer G' is drawn away from the gong by the expansion of the spring  $g^2$ .

The pressure of the spring F may be increased by turning up the tension-screw F', which passes through a hole in said tension-spring and turns in a screw-threaded hole in the lower part,  $d$ , of the bracket D, the head of the tension-screw resting against the outer surface of the spring or against a washer,  $f^3$ , interposed between said spring and the head of said screw. By loosening the tension-screw the pressure of the spring F is lessened. The pressure of the spring F should be so adjusted as to allow a small bunch to be carried down below the loop-wheel by the clearing-wheel without disengaging the clearing-wheel from the needles, and on the other hand to allow the clearing-wheel to be thrown out of engagement by a bunch large enough to stop the clearing-wheel or bend the needles if the clearing-wheel were supported, in the usual manner, rigidly and directly upon the bracket D.

The invention above described not only prevents the breaking and bending of the needles and the loss of time required to replace and repair the broken and bent needles, but also prevents blades of the clearing-wheel being bent or broken by the needles.

I claim as my invention—

1. The combination of the clearing-wheel and a suitable stand or bracket adapted to be secured upon the frame of a circular spring-needle knitting-machine, with means, substantially as described, for supporting said clearing-wheel upon said stand or bracket in a position to be engaged and rotated by the needles of said knitting-machine and of allowing said clearing-wheel to be thrown out of engagement with said needles automatically by the pressure of bent needles or bunches of lint too large to be removed from the needles by said clearing-wheel, as and for the purpose specified.

2. The combination of the clearing-wheel bracket, a bracket-lever pivoted to the upper end of said bracket and provided on its under side with two flat surfaces, either of which may be brought into contact with a flat surface with which said bracket is provided, an inclined stud secured upon one end of said bracket-lever, a clearing-wheel supported on said stud, and a spring secured to said bracket and pressing against the other end of said bracket-lever to hold either of said flat sur-



faces of said lever in contact with said flat surface of said bracket and thereby to hold said clearing-wheel in a position to be engaged or out of engagement with the needles of a knitting-machine, as and for the purpose specified.

5 3. The combination of the clearing-wheel bracket, a lever pivoted upon said bracket, an inclined stud secured upon one end of said lever, a clearing-wheel supported upon said stud, a gong supported upon said bracket, a hammer pivoted upon said bracket in proximity to said gong and having a stem bent under said lever and adapted, when said lever is turned upon its pivot to lift said clearing-wheel, to be brought into contact with said gong, and a spring secured to said bracket and pressing against the lower end of said lever, substantially as described, to throw said clearing-wheel suddenly upward when the same is slightly raised, as and for the purpose specified.

20 4. The combination of the clearing-wheel bracket, a lever pivoted upon said bracket, an

inclined stud secured upon one end of said lever, a clearing-wheel supported upon said stud, a gong supported upon said bracket, a hammer pivoted upon said bracket and having a stem bent under said lever and adapted, when said lever is turned upon its pivot to lift said clearing-wheel, to strike said gong, a spring secured to said bracket and connected to said stem to restore said hammer to position when said bracket-lever is restored to position, and another spring secured to said bracket and pressing against the lower end of said lever to throw said clearing-wheel suddenly upward when the same is slightly raised, as and for the purpose specified.

In witness whereof I have signed this specification, this 14th day of May, A. D. 1887, in the presence of two attesting witnesses.

CHARLES T. SULLIVAN.

Witnesses:

ALBERT M. MOORE,  
GERTRUDE M. DAY.