

(No Model.)

3 Sheets—Sheet 1.

G. F. STURGESS.
KNITTING MACHINE.

No. 562,436.

Patented June 23, 1896.

Fig. 1.

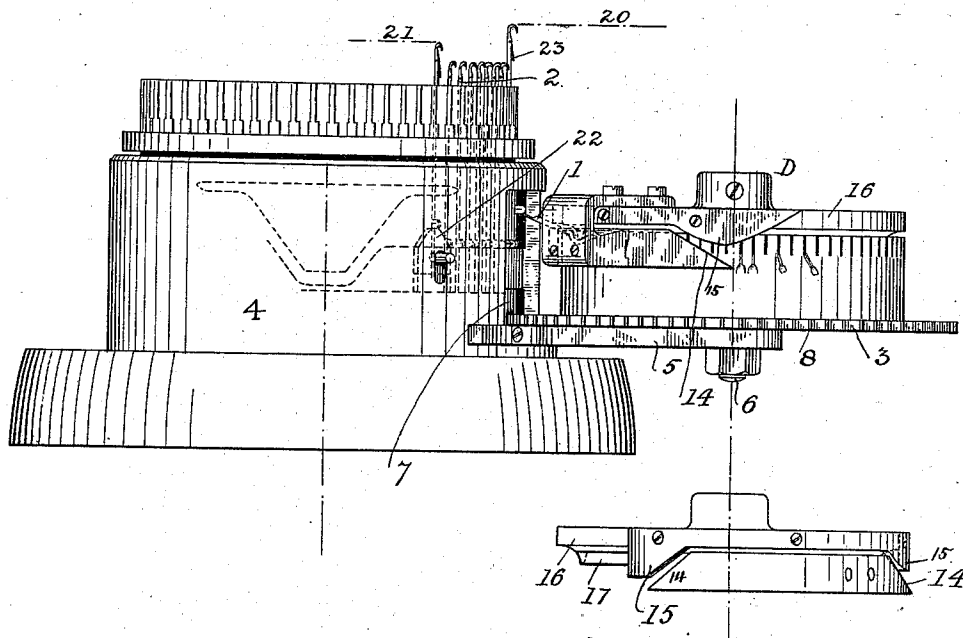


Fig. 3.

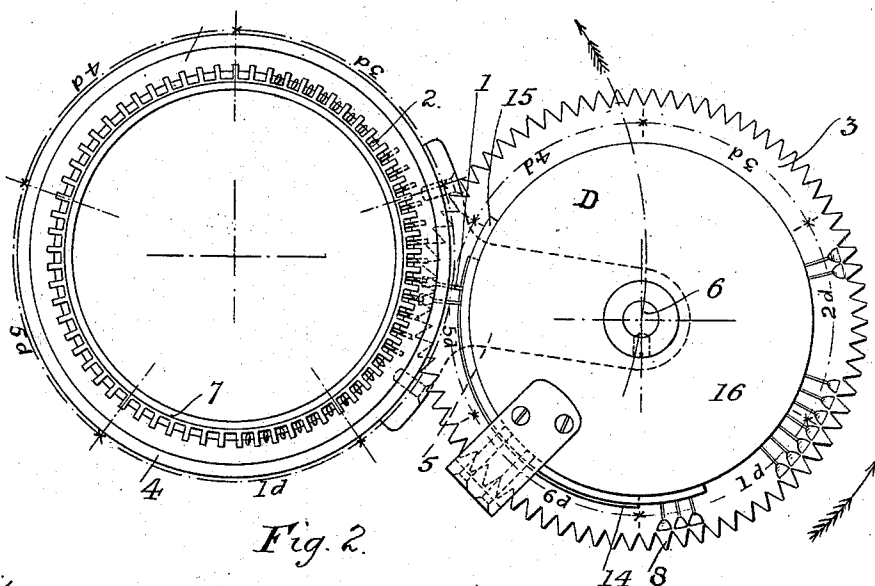


Fig. 2.

Witnesses.

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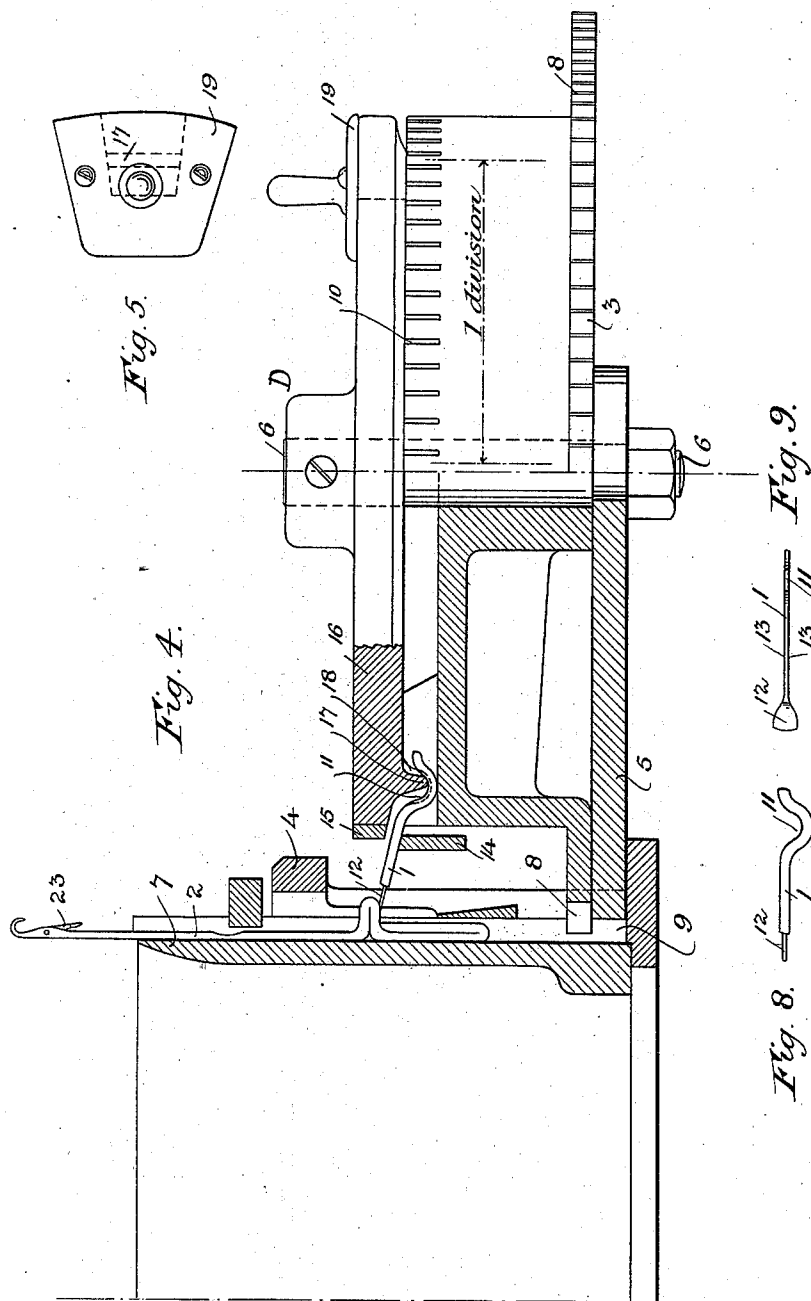
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3 Sheets—Sheet 2

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Fig. 6.

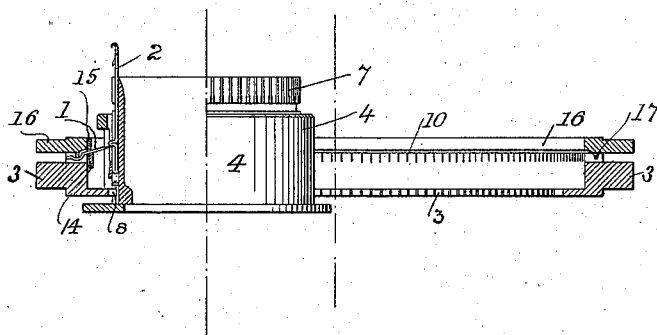
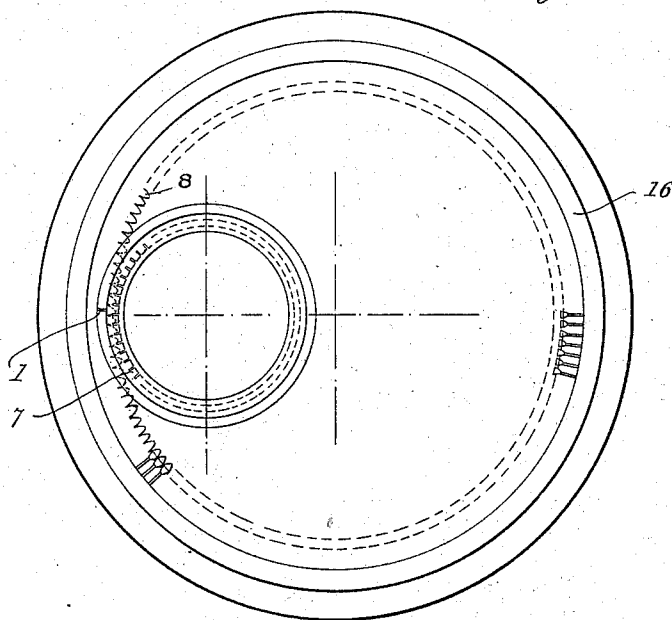


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE FREDERICK STURGESS, OF LEICESTER, ENGLAND.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 562,436, dated June 23, 1896.

Application filed July 28, 1894. Serial No. 518,865. (No model.) Patented in England December 6, 1892, No. 22,294.

To all whom it may concern:

Be it known that I, GEORGE FREDERICK STURGESS, hosiers' engineer, a subject of the Queen of England, residing at Overdale, Mere Road, Leicester, in the county of Leicester, England, have invented a new and useful Improvement in Knitting-Machines, (for which I have obtained a patent in Great Britain, No. 22,294, bearing date of December 6, 1892,) of which the following is a specification.

The principal object of my invention is to give the ordinary "sliding-needle" knitting-machine a wider range of usefulness, without having to change the principal or structural parts of the machine.

The nature, features, and scope of my invention will be fully understood by the specification and drawings herewith, the term "size," as used below, referring to the original drawings.

Figure 1 is a front view in elevation of my invention, half original size; Fig. 2, a plan view of the same, half original size; Fig. 3, an elevation view of the picker-cams detached, half original size; Fig. 4, an elevation view, partly in section, original size; Fig. 5, the gate in plan, original size; Fig. 6, elevation, partly in section, of the designer internally geared, quarter original size; Fig. 7, plan of the same, quarter original size. Fig. 8 shows picker instrument in elevation, original size. Fig. 9 shows picker instrument in plan, original size.

This invention consists of a mechanical appliance D, having a circle of picker instruments 1, and called a "designer," which has a direct action on the circle of needles 2, yet capable of a cycle of changes in relation to the said circle of needles, during which the needles are manipulated in such a manner by the pickers 1 as to form a complete pattern before the original connection or starting-point, between the circle of needles and the circle of pickers, is again reached.

In detail it consists of, first, a gear-wheel 3, carried by the cam-box 4, on the bracket 5, revolving on the spindle 6, meshed to the cylinder 7 and having teeth 8, same gage as the cylinder-tricks 9. This wheel has a differential motion in relation to the needle-cylinder 7—viz., the tricks 9 of the cylinder 7 and the tricks 10 of the gear-wheel 3 are in numbers

such as to be divisible into sections or divisions each of a common number, the divisions of the designer being marked off and numbered consecutively from one upward in every case to indicate their position. Whatever the number of divisions or the number of tricks to the division, the wheel has a different number of divisions from the cylinder 7. This causes the divisional change mentioned and enables the needles 2 to be acted upon by the pickers 1 in such a manner as to allow of a series of patterning changes to take place and to repeat themselves, as hereinafter described.

Second: A needle-picker 1. This picker is formed out of a strip of round steel wire, in order to keep the fibers of the metal unbroken throughout, and hardened for additional strength. It has a semicircle cramp 11 and a fan-surface 12, all made in one piece, the whole stem being battered on the sides 13. This fan-surface is formed by battering the wire crosswise, forming an extended surface on either side of the wire of much greater width than the wire itself. This fan-surface is to catch the needle-foot with. The semicircle cramp 11 is made to allow of a rocking movement of the fan end 12, for lifting the needles 2; also a slight sliding or endwise movement in order that the fan end 12 of the pickers 1 shall, while lifting the needles 2, keep to the vertically-sliding needle-foot long enough to slide the needle the required distance before leaving it when the picker descends and rests on the bottom outer edge of the tricks 10. A number of these pickers, as seen at Figs. 8 and 9, are mounted around the spindle 6 in a circle by putting the pickers 1 in the radial picker-tricks 10 of the gear-wheel 3. The pickers 1 are supported laterally by the walls of the tricks 10, and the tail end prevents their falling out of the tricks when they are brought down by the cam 15, or lifted by the cam 14. This circle of pickers, having one independent axis, is meshed to and has a differential-gearing contact with the circle of needles 2, having another independent axis. Each picker engages with a needle in its turn, as they are carried around their own axis, the whole being carried bodily around the needle-cylinder 7, upon the cam-

box 4. As the pickers come into contact with the needles 2, the fan ends 12 ride up the end (not shown in Fig. 1) of the elevating-cam 14, with the combined rocking and sliding or end-wise motion, moving the needle 2 to another position, and descend again down the depressing-cam 15. (Seen in Fig. 1.) The points of the cam 14 on both sides of the designer are below the bottom of the tricks 10. (See Fig. 4.)

Third. A disk-cap 16, fastened to the spindle 6, on the under side of which is a flange 17, which descends into the circumferential groove 18 of the picker-tricks 10, and into the semicircular cramp 11 of the pickers 1, and holds the pickers loosely in position. A gate 19, Fig. 5, consisting of a plate fastened by screws, as shown, upon the top of cap 16, and carrying on its lower face a block corresponding in shape to the cap 16, is provided for the withdrawal and insertion of the pickers. By unscrewing and lifting the gate the pickers can be threaded onto the flange 17 or withdrawn therefrom. The elevating-cam 14 is carried from the cap 16 by the angle-bracket shown in Figs. 1 and 2, and the depressing-cam 15 is connected directly to the cap by screws, as shown.

The needles which are picked to the high-level lift 20, by the pickers take the upper thread only. The low-level-lift needles 21, which are missed by the pickers, ride up the ordinary needle-cam 22, and take the lower thread only. First round, No. 1, division of pickers will strike on No. 1, division of needles, then, second round, No. 2, division of the pickers will strike on No. 1, division of the needles, and so on, each of the other divisions of needles being subject to the same changes.

A color design is formed by having the threads of yarn of different color, and arranging the pickers in each division according to the pattern desired. For instance, the circle of needles shown represents five divisions of thirteen—sixty-five needles. The broken circle of pickers represents six divisions of thirteen—seventy-eight pickers. Consequently where No. 1, division of the pickers, starts opposite No. 1, division of needles, first revolution, the said No. 1, division of needles, will be overlapped by No. 2 division on the commencement of the second revolution, necessitating six revolutions of the designer around the circle of needles to make 1, 2, 3, 4, 5, and 6, divisions of pickers, to have consecutive connection with No. 1, division of the needles, the pattern being finished when the process would repeat, the same changes being concurrently brought about on Nos. 2, 3, 4, and 5, divisions of needles.

By lowering cam 22 out of action and working only one thread of yarn fancy looped fabrics can be made, by reason of certain of the needles not clearing the old loops from the latch 23, as will be readily observed, and if the circle of pickers were made complete

every needle would knit continuously with the rotation of the machine.

To get a larger number of divisions and a bigger pattern, say twelve divisions of thirteen pickers—one hundred and fifty-six pickers—the designer would have to be as large again as the designer shown at Fig. 1. This large-size designer would be forty-two inches around and much too bulky if applied in the manner as seen at Fig. 1. Therefore in constructing a large designer I make it as applied in the more compact manner shown at Figs. 6 and 7.

It will be observed that the center portion of the gear-wheel 3 is cut away, turning it into the form of an annular ring, which compasses the needle-cylinder, and meshes or engages the circle of pickers and needles internally instead of externally. This annular-ring designer is exactly as large again as the wheel-designer shown in Fig. 1, and has double the number of picker tricks and divisions.

I have shown one way and form of making my invention without attempting to show the many forms of making, applying, and using the same.

Having now particularly described and ascertained the nature and objects of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A mechanical appliance for knitting-machines comprising a circle of picker instruments held in the radial tricks of a circular bed by a disk cap and mounted to revolve, substantially and for the purposes set forth.

2. In knitting-machines, the combination of a circle of sliding knitting-needles, and a circle of pickers, the pickers meshing with the circle of needles and means of actuating the said pickers and needles, substantially and for the purposes set forth.

3. In knitting-machines, a circle of needles, of a given number and a circle of pickers of a different given number each divisible into sections of a common number the number of sections of pickers being different from the number of sections of needles, the circle of pickers being mounted to mesh with the circle of needles and actuate the said needles, and the means of actuating the pickers, substantially and for the purposes set forth.

4. In combination, a circle of needles 2, and circle of pickers 1, cylinder 7, gear-wheel 3, having picker-tricks 10, and gear-teeth 8, divided into divisions from one upward mounted to gear with the cylinder 7, on spindle 6, on bracket 5, and the means of actuating the said pickers, substantially and for the purposes set forth.

5. In combination, a circle of needles 2, cylinder 7, bracket 5, spindle 6, wheel 3, pickers 1, cap 16, flange 17, elevating-cam 14, and the depressing-cam 15, substantially and for the purposes set forth.

6. In combination, bracket 5, spindle 6, a

wheel 3, pickers 1, cap 16, flange 17, gate 19, elevating-cam 14, depressing-cam 15, all geared to the cylinder 7, in such a manner that the pickers 1, mesh with the needles 2, substantially and for the purposes set forth.

7. In knitting-machines, the combination of the tricked and toothed wheel 3, spindle 6, bracket 5, pickers 1, flange 17, cap 16, elevating-cam 14, depressing-cam 15, substantially and for the purposes set forth.

8. A hardened-steel-wire picker 1, having flattened sides 13, and battered out crosswise

to a fan end 12, all in one piece substantially and for the purposes set forth.

9. A hardened-steel-wire picker 1, having flattened sides 13, semicircle cramp 11, battered out crosswise to a fan end 12, all in one piece substantially and for the purposes set forth.

GEORGE FREDERICK STURGESS.

Witnesses:

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WILLIAM HENRY SMITH.