(No Model.) 4 Sheets—Sheet 1.

J. SCHMITT.

KNITTING MACHINE WITH TRANSPLACEABLE THREAD GUIDES.

No. 583,129. Patented May 25, 1897.

Fig. 1a

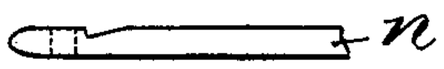


Fig. 1.

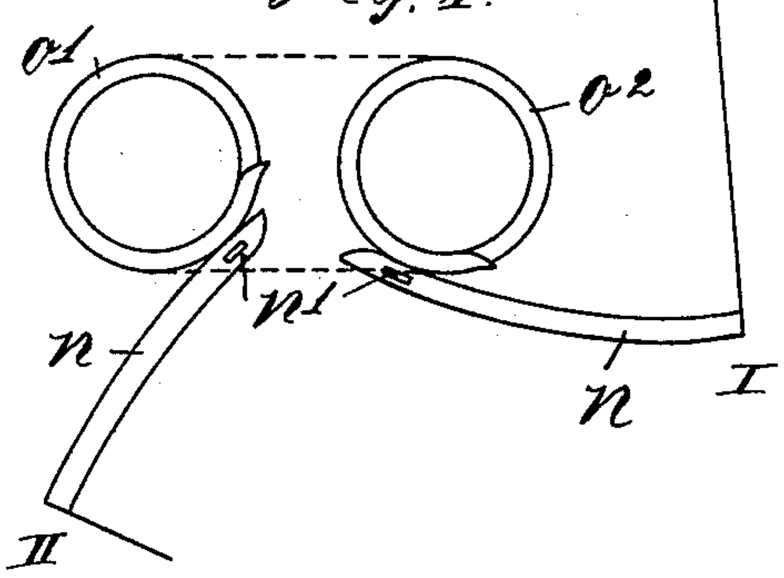


Fig. 2a.

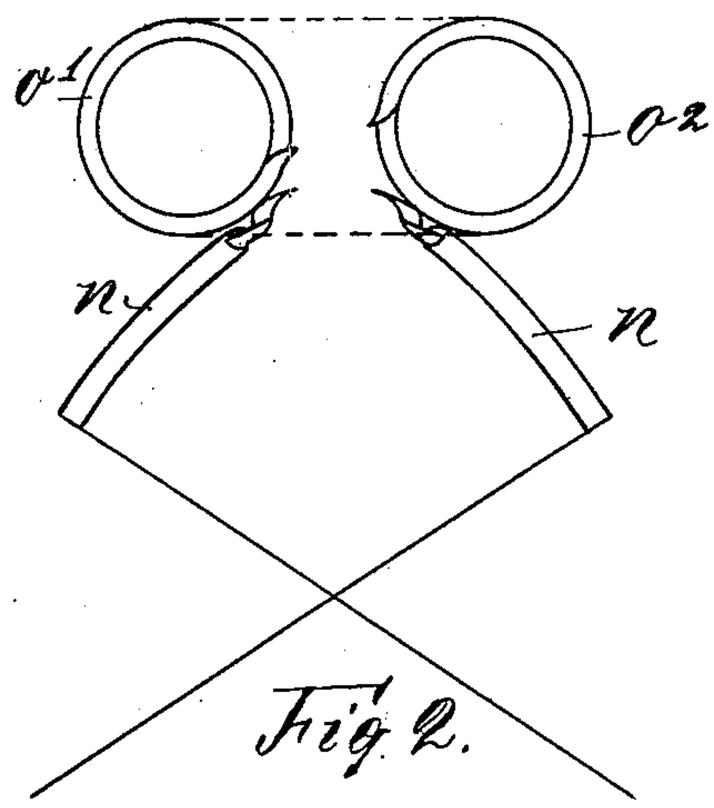


Fig. 2.

Fig. 3.

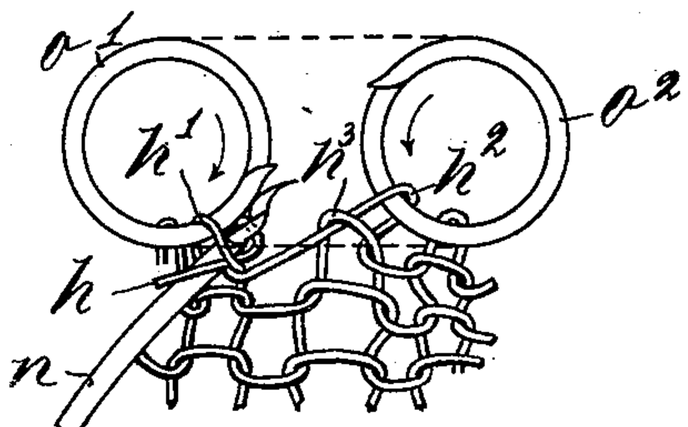
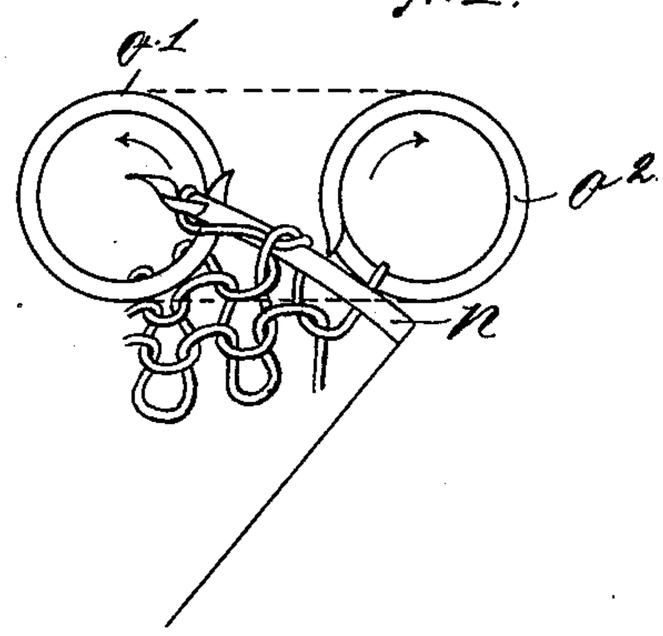


Fig. 4.



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(No Model.) 4 Sheets—Sheet 2.

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KNITTING MACHINE WITH TRANSPLACEABLE THREAD GUIDES.

No. 583,129. Patented May 25, 1897.

Fig. 5.

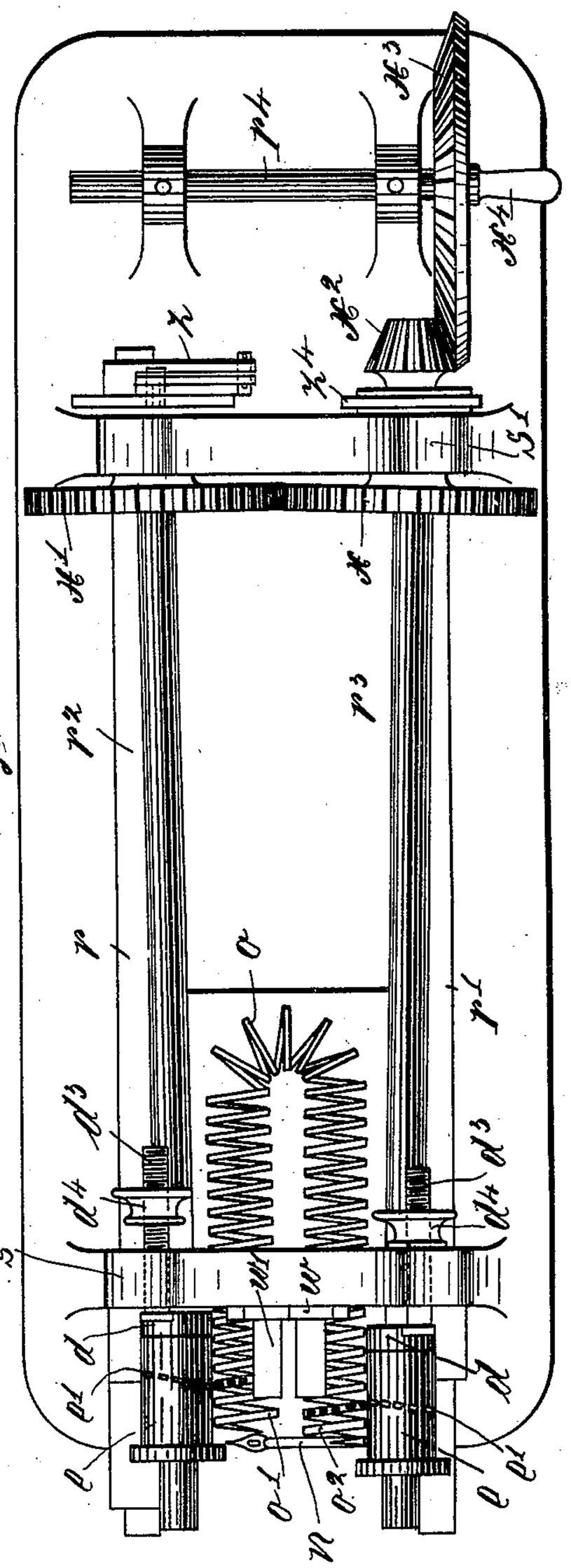
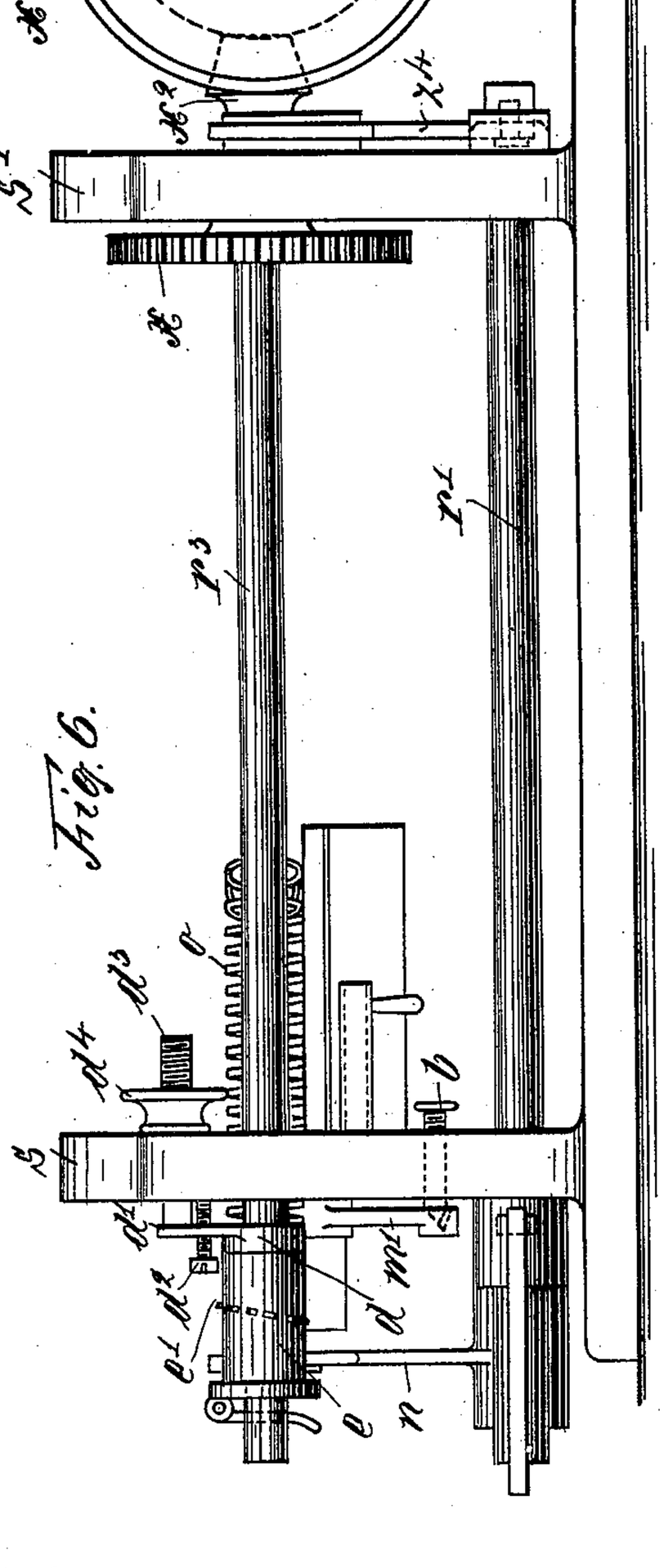


Fig. 6.



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KNITTING MACHINE WITH TRANSPLACEABLE THREAD GUIDES.

No. 583,129. Patented May 25, 1897.

Fig. 7.

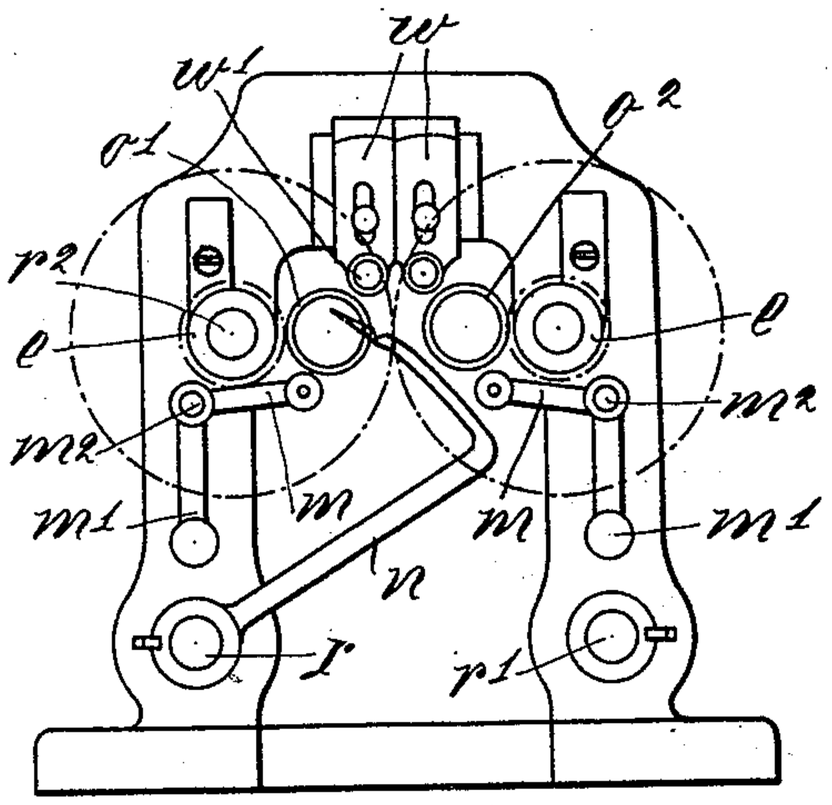


Fig. 8.

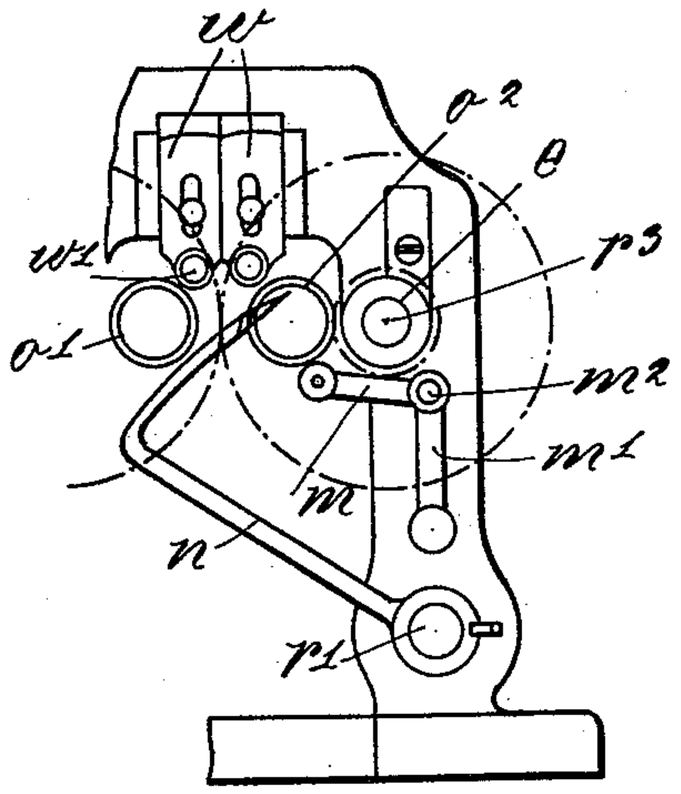
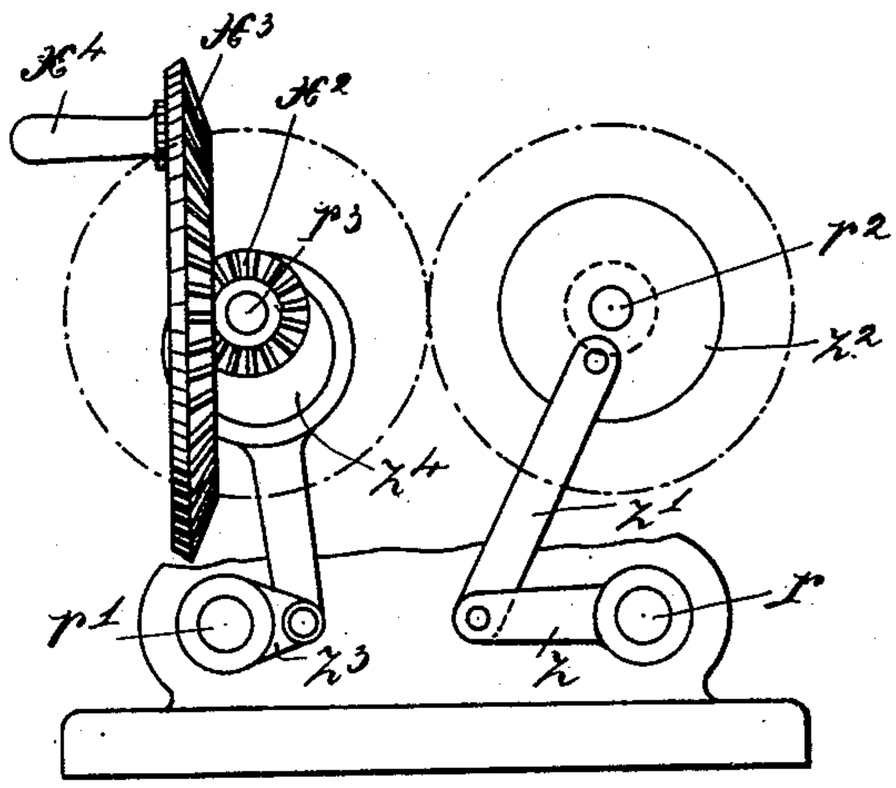


Fig. 9.



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J. SCHMITT.

KNITTING MACHINE WITH TRANSPLACEABLE THREAD GUIDES.

No. 583,129. Patented May 25, 1897.

Fig. 10.

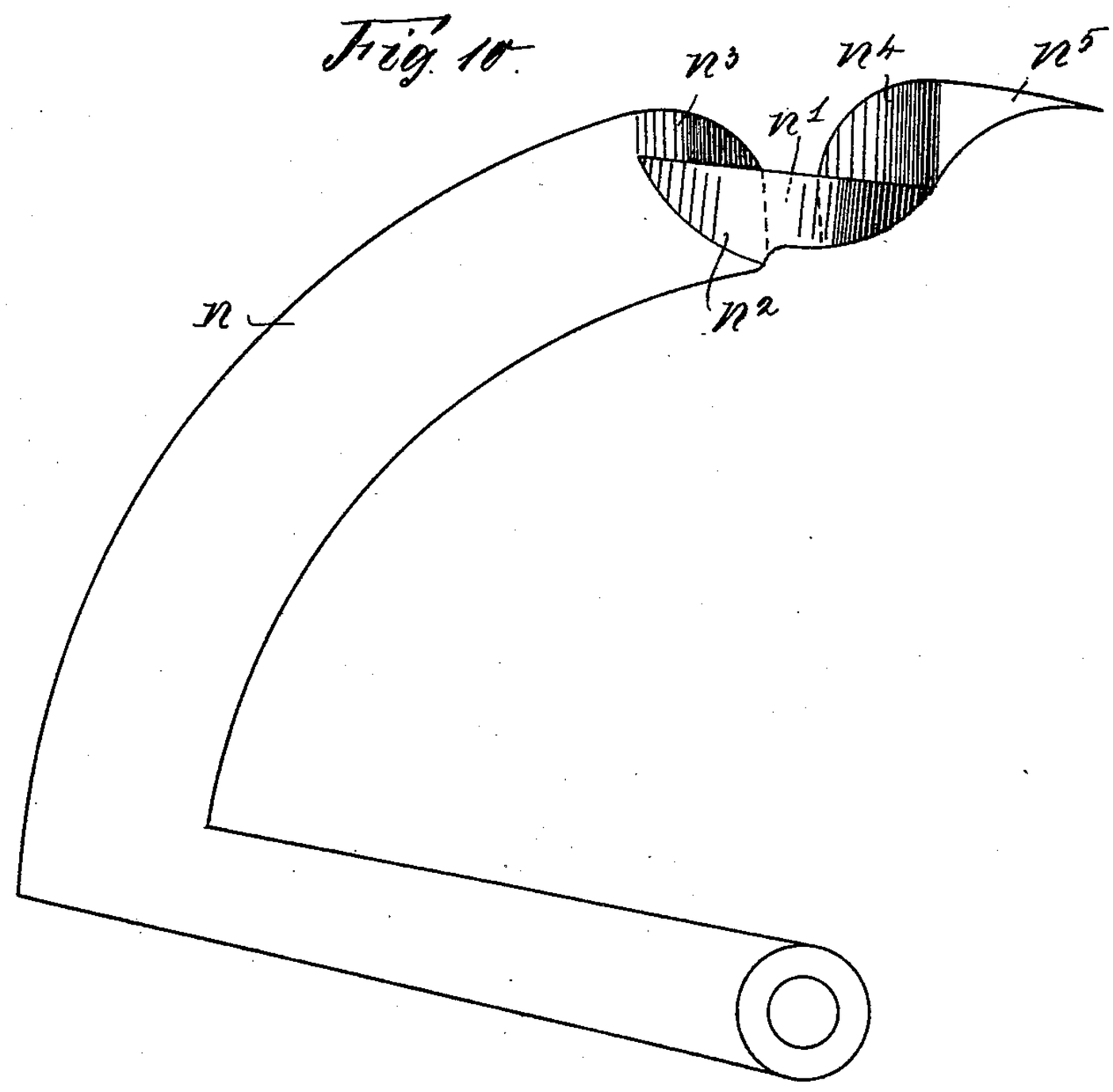
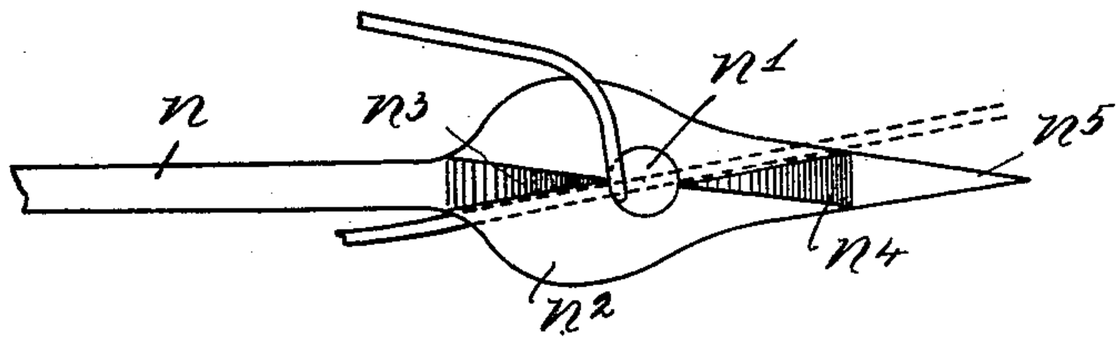


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHANN SCHMITT, OF COLOGNE, GERMANY, ASSIGNOR OF TWO-THIRDS TO JEAN BAPTIST COBLENZER, OF COBLENZ, GERMANY.

KNITTING-MACHINE WITH TRANSPLACEABLE THREAD-GUIDE.

SPECIFICATION forming part of Letters Patent No. 583,129, dated May 25, 1897.

Application filed September 25, 1896. Serial No. 606,974. (No model.) Patented in Germany September 21, 1893, No. 78,327; in Sweden June 7, 1894, No. 6,247; in France June 7, 1894, No. 239,111; in Belgium June 7, 1894, No. 110,323; in Austria-Hungary June 20, 1894, No. 13,687 and No. 24,098; in Switzerland June 27, 1894, No. 8,863; in Italy June 27, 1894, No. 36,671; in England June 27, 1894, No. 12,424, and in Denmark March 26, 1896, No. 479.

To all whom it may concern:

Be it known that I, JOHANN SCHMITT, a subject of the King of Prussia, German Emperor, and a resident of Cologne, in the Province of the Rhine, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Knitting-Machines with Transplaceable Thread-Guides, (for which patents have been obtained in Sweden, No. 6,247, dated June 7, 1894; in Germany, No. 78,327, dated September 21, 1893; in France, No. 239,111, dated June 7, 1894; in Belgium, No. 110,323, dated June 7, 1894; in Austria-Hungary, No. 13,687 and No. 24,098, dated June 20, 1894; in Switzerland, No. 8,863, dated June 27, 1894; in Italy, No. 36,671, dated June 27, 1894; in Great Britain, No. 12,424, dated June 27, 1894, and in Denmark, No. 479, dated March 26, 1896,) of which the following is an exact specification.

This invention refers to knitting-machines of the kind in which the fabric is carried as well as transported by means of a horizontal horseshoe-like spiral, which is turned in such a manner that the two ends of the spiral, or the first winding and the last winding of the same, respectively rotate in contrary directions. There is in said knitting-machines employed a thread-guide carrying the thread through that mesh which is just held by the last winding of the spiral or which is to be dropped next, respectively, and carrying then the loop now formed out of the thread to the first winding of the spiral, so that said loop is taken up by said first winding, and is thus turned into a mesh.

A knitting-machine of the kind in question is shown and described in the United States Patent No. 421,526, dated February 18, 1890. There are in said machine two shafts for operating the thread-guide. One shaft is situated above the spiral, the other below the same, and the thread-guide is operated alternately by said two shafts. In other words, when one row of meshes (according to the number of windings of the spiral) is completed the thread is removed from the respective shaft and put upon the other shaft, and the machine, or, more precisely, the spiral, is then turned in an opposite direction as long as the thread-guide is operated by said other shaft. This is done until the next row of meshes is completed, when the thread-guide is again transplaced and the direction of rotation of the spiral is again reversed. The fabric produced by this manner of working is a flat or open one. There is in said fabric the drawback that the meshes are very wide. In other words, the fabric is very loose. This results from the point of the thread-guide lying not always close to the spiral, but in a certain distance therefrom. During the time in which the thread-guide is operated from the lower shaft its point lies close to the respective (left hand) end of the spiral, but when the thread-guide has been transplaced to the upper shaft then there is a distance between the point of the thread-guide and the respective (right hand) end of the spiral. Therefore the first, third, fifth, &c., rows of meshes are duly narrow, whereas the second, fourth, sixth, &c., rows are unduly wide. It might seem that this drawback could be overcome by letting the point of the thread-guide be situated not exactly at the convex edge of the latter but in the middle between the convex and the concave edge of the same. The meshes produced while the thread-guide is operated by the upper shaft would then be but half so wide as formerly, it is true, but the meshes produced while the thread-guide is operated by the lower shaft would be twice as wide as formerly. Therefore the fabric consisting of said combined meshes or combined rows of meshes, respectively, would practically be exactly as loose as formerly.

Arranging one of the two thread-guide-operating shafts above and the other below the spiral is a consequence of the facts that, first, the thread must in any case pass into and through the eye of the thread-guide from one and the same side of the latter, and, second, the machine would be practically useless if the thread-guide had to be unthreaded and rethreaded at every time of its being transplaced.

The purpose of my invention is to produce a knitted fabric all the meshes of which are of due narrowness, and I attain that object, first, by letting the eye extend through the thread-guide not from the front side to the rear side of the latter, but from the convex side or edge to the concave side or edge of the same, so that the eye lies about radially to the axis of oscillation of the thread-guide or to the respective shaft of the latter, respectively, and, second, by arranging both the shafts for said altered thread-guide below the spiral. I am enabled to do this on account of the novel position of the eye of the thread-guide, and by combining said novel position of the thread-guide with the novel position of the thread-guide-operating shafts, or, more precisely, of one of said shafts, I obtain the advantage of having the point of the thread-guide lie in any case close to the spiral. In other words, there is no longer an undue space between the latter and said point.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters denote similar parts throughout the different views, and in which—

Figure 1 is a diagrammatical view of the two positions which the thread-guide n alternately received in the old form of construction of knitting-machines of the kind in question. In the position I the thread-guide receives the meshes from the spiral end o^2 and carries the fresh loops to the spiral end o'. In the position I I the thread-guide receives the meshes from the spiral end o' and carries the fresh loops to the spiral end o^2. n' is the eye of the thread-guide. It is distinctly to be seen that the eye passes from the front side to the rear side of the guide n.

Fig. 1^a is a plan of the main portion of the thread-guide.

Fig. 2 is a diagrammatical view of the two positions which the thread-guide alternately receives in my novel form of construction. The position I I is the same as formerly, but the position I is another one, in that not the concave edge, (position I, Fig. 1,) but the convex edge of the thread-guide lies close to the spiral end o^2.

Fig. 2^a is a plan of the main portion of my improved thread-guide. It is distinctly to be seen that the eye now passes from the convex side to the concave one, or vice versa.

Fig. 3 shows the thread-guide taking meshes up from the spiral end o' and carrying loops to the spiral end o^2. Fig. 4 shows the thread-guide taking meshes up from the spiral end o^2 and carrying loops to the spiral end o'. Fig. 5 is a plan of my improved knitting-machine. Fig. 6 is a side view of the same. Fig. 7 is a front view of the same, the thread-guide being put upon the left-hand shaft r. Fig. 8 shows the thread-guide put upon the right-hand shaft r'. Fig. 9 is a diagrammatical rear view of the machine, showing the means for operating all the shafts of the same, the shaft of the bevel-wheel x^3 being left out. Fig. 10 is a side view of the improved thread-guide drawn on an enlarged scale, and Fig. 11 is a plan of the head of said thread-guide.

Referring to Figs. 5 and 6, $s\,s'$ are two standards which support four shafts $r\,r'\,r^2\,r^3$. The shaft r^3 carries a cog-wheel x and a bevel-wheel x^2, the former meshing with a cog-wheel x', secured to the shaft r^2, the latter (bevel-wheel x^2) meshing with a bevel-wheel x^3, secured to a shaft r^4. The bevel-wheel x^3 is provided with a handle x^4. The rear ends of the shafts $r\,r'$ are furnished with oscillating crank-arms $z\,z^3$, Fig. 9. The crank z is oscillated by the mediation of a rod z' from a disk z^2, secured to the rear end of the shaft r^2. The crank z^3 is oscillated by means of an eccentric z^4, attached to the rear end of the shaft r^3. If, thus, the bevel-wheel x^3 is turned by means of the handle x^4, the shafts $r^2\,r^3$ are continuously rotated, whereas the shafts $r\,r'$ are merely oscillated. The front ends of the shafts $r^2\,r^3$ are provided with boxes e, Figs. 5 and 6, having each an oblique series of projections or teeth e'. The latter match with corresponding holes or cavities provided in the ends of the two legs of the horseshoe-shaped spiral o. Said legs are held in proper position, first, by the arms m of the angular double-armed levers $m\,m'$, Figs. 7 and 8, fulcrumed at m^2, and, second, by the lower projecting ends w', Figs. 5, 7, and 8, of the adjustable slides w. The arms m, as well as the projections w', are furnished with rollers bearing against opposite sides of each end of the spiral. In order to press the arms m against the latter, the ends of the arms m' are somewhat enlarged and provided with conical borings, (shown in dotted lines in Fig. 6,) into which take eccentrically the points of screws b. On screwing the latter more or less forward the rollers of the arms m are more or less pressed against the spiral.

As to the mounting of the thread-guide n upon the front end of the shaft r or r', I refer to my United States Patent No. 421,596, heretofore mentioned.

That end of the spiral o which drops meshes must project beyond the other end, as shown in Fig. 5. As now either end of the spiral must be able to take up as well as to drop meshes it becomes requisite to let the right-hand end project one time beyond the left-hand one, Fig. 5, and at another time the left-hand end beyond the right-hand one. For this purpose there is arranged on each of the shafts $r^2\,r^3$ a box d, carrying an arm d' with a screw d^2 and with a threaded pin d^3. The latter is provided with a nut d^4. By turning one of the screws d^2 in the direction of the hands of a clock the respective boxes d and e are drawn forward, whereby a like displacement of the respective end of the spiral o is caused by the influence of the respective projections e' on said end.

An important feature of my improved machine, or, more precisely, of the thread-guide of the same, resides in the configuration of

the head of said thread-guide. I have shown said configuration in Figs. 10 and 11. The point n^4 n^5 of the thread-guide is connected with the shaft n of the same by an enlarged intermediate piece n^2, containing the eye n'. The upper portion of the end of the shaft forms a wedge n^3, that extends close to said eye and the opposite portion of the point forms a wedge n^4, which also extends from the point proper, n^5, close to the said eye. The purpose of the enlarged intermediate piece n^2 is to provide a certain distance between the thread and the shaft, so that the point of the take-up spiral may freely enter the loop presented by the thread-guide, and the purpose of the low position of said piece n^2 or the purpose of the wedges n^3 n^4, respectively, is to hinder the thread h from coming from the rear side of the thread-guide to the front side of the same.

Figs. 3 and 4 represent the manner in which the meshes are formed and interlocked with each other if a flat or straight fabric is to be produced. The spiral end o', Fig. 3, is that which drops the meshes, and the thread-guide n is therefore assumed to be carried and operated by the shaft r', Fig. 8. The mesh h' is the next to be dropped by the spiral end o'. The guide n enters that mesh beforehand and carries the thread h (coming from the last fresh mesh h^2 and passing through the last mesh h^3 dropped by the spiral end o') into and through said mesh h'. The loop formed thus out of the thread h is carried by the thread-guide into the way of the end proper or point of the spiral end o^2, when said loop will be seized by its end and taken up as a fresh mesh.

After the respective row of meshes is completed the position of the thread-guide is reversed, when the operation just described will be repeated in a contrary direction. The meshes will then be dropped by the spiral end o^2, Fig. 4, and the fresh loops will be taken up by the spiral end b'. This end, however, must then project beyond the other end in accordance with the position of the respective parts shown in Fig. 5.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

1. A knitting-machine with a bent spiral for holding and transporting the meshes, an oscillating thread-guide adapted to coöperate with the ends of said spiral, and two shafts adapted alternately to receive said thread-guide, in which the eye of the latter extends radially to the axis of oscillation of the said thread-guide, and in which both said shafts are situated in a plane lying parallel to the longitudinal axis of said spiral, for the purpose as described.

2. A knitting-machine with a bent spiral for holding and transporting the meshes, an oscillating thread-guide adapted to coöperate with the ends of said spiral, and two shafts adapted alternately to receive said thread-guide in which the eye of the latter extends radially to the axis of oscillation of the said thread-guide, and in which both said shafts are situated in a plane lying parallel to the longitudinal axis of said spiral; the head of the thread-guide having an enlarged intermediate piece n^2 containing said eye, for the purpose as described.

3. A knitting-machine with a bent spiral for holding and transporting the meshes, an oscillating thread-guide adapted to coöperate with the ends of said spiral, and two shafts adapted alternately to receive said thread-guide, in which the eye of the latter extends radially to the axis of oscillation of the said thread-guide, and in which both said shafts are situated in a plane lying parallel to the longitudinal axis of said spiral; the head of the thread-guide having an enlarged intermediate piece n^2 forming the connection between the shaft n and its point n^5, and containing said eye n'; the upper surface of said enlarged intermediate piece being situated below the corresponding surfaces of said shaft and said point, and the two latter parts forming projections n^3 n^4 extending upon the said enlarged intermediate piece in the direction to the said eye, for the purpose as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHANN SCHMITT.

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