(No Model.) 3 Sheets—Sheet 1.

B. KERR & I. L. BERRIDGE.

CIRCULAR KNITTING MACHINE.

No. 483,616. Patented Oct. 4, 1892.

Fig. 1.

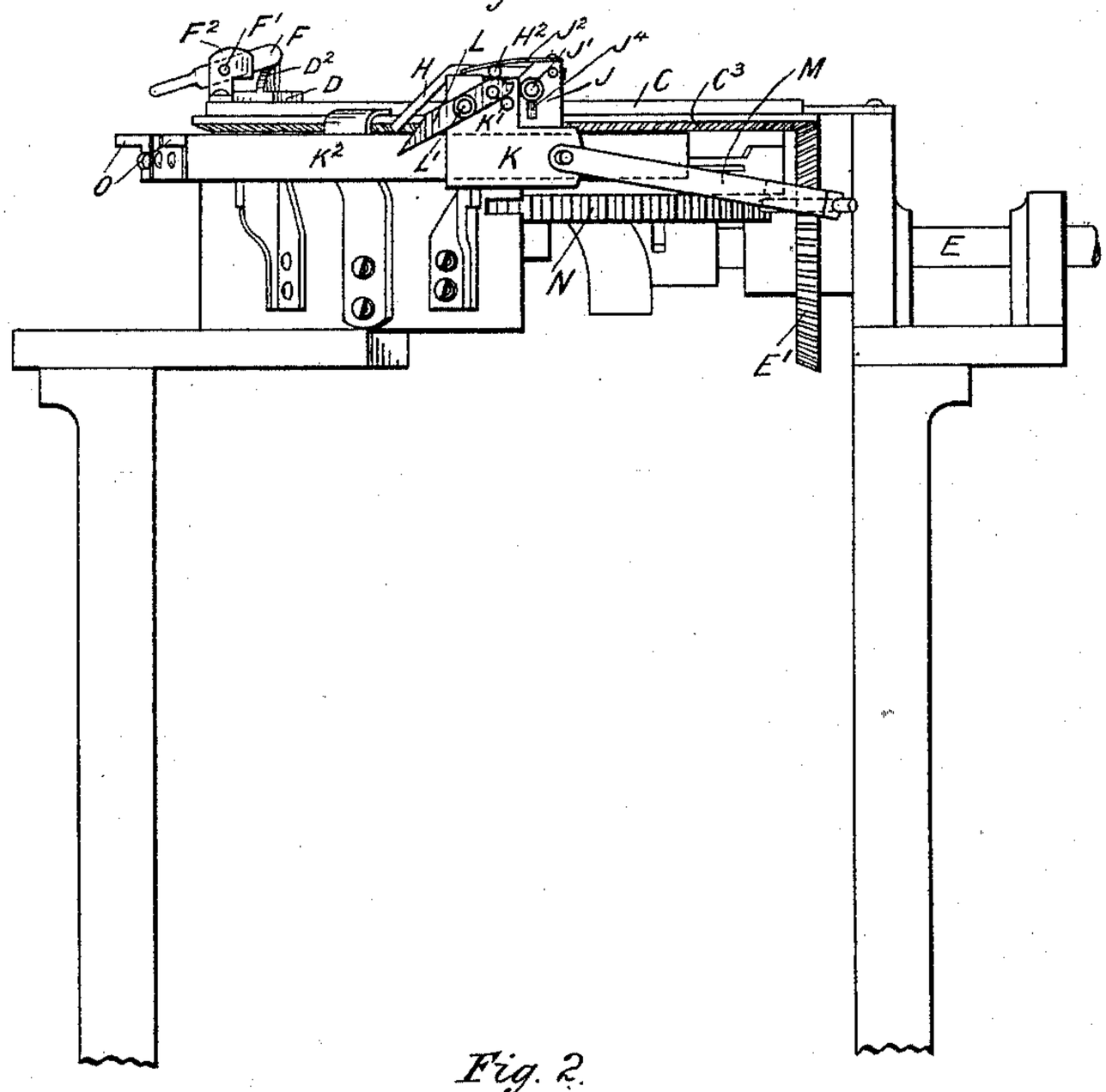
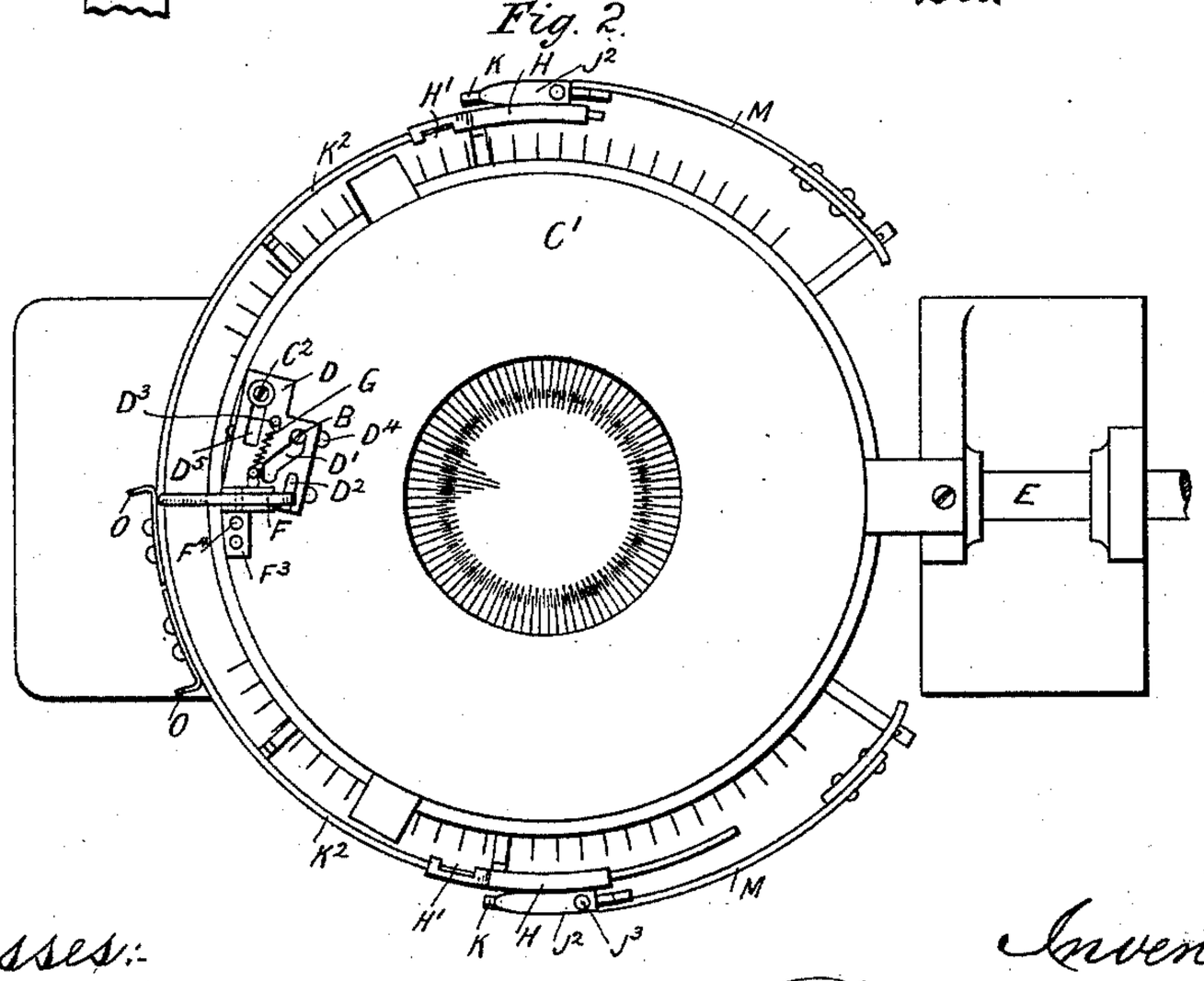


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

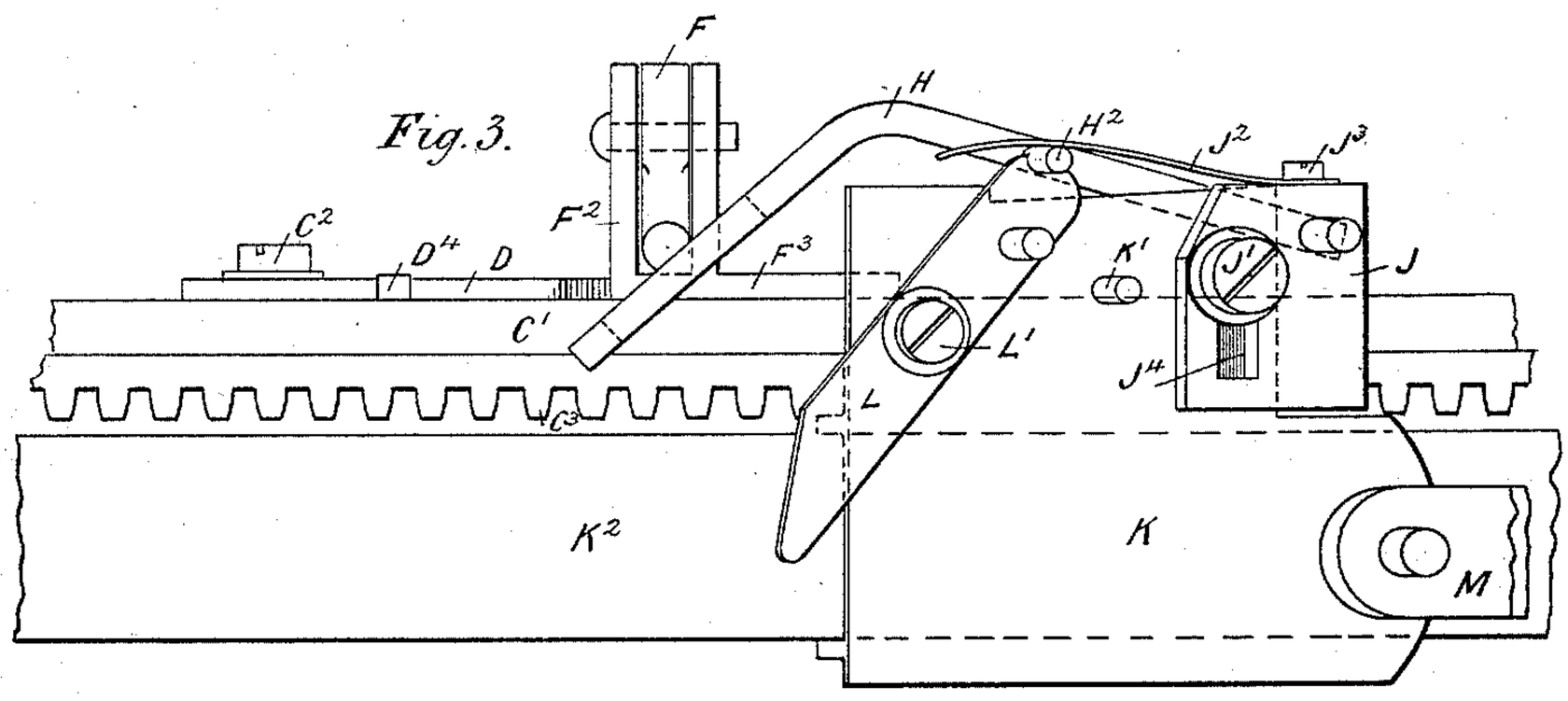
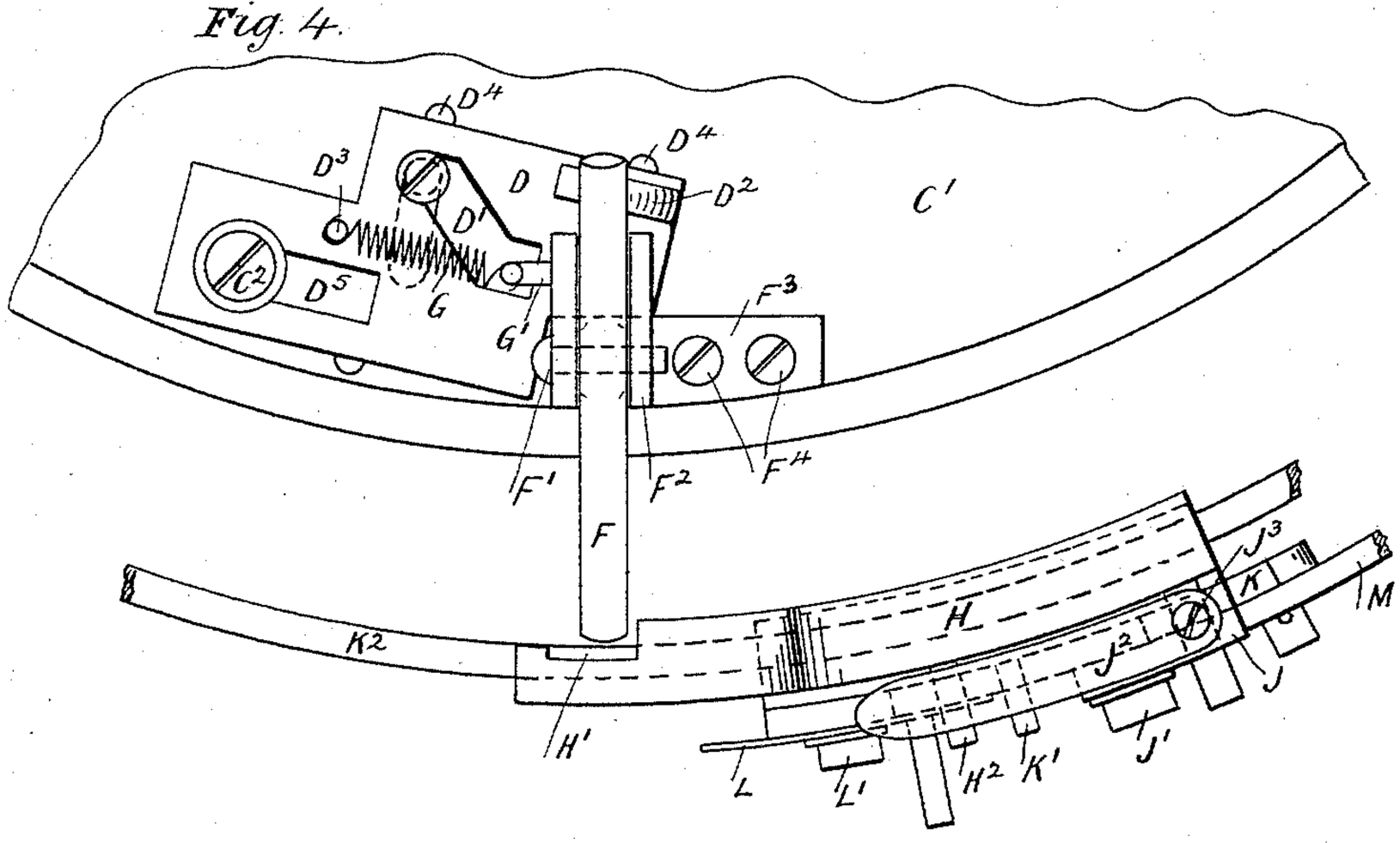


Fig. 4.



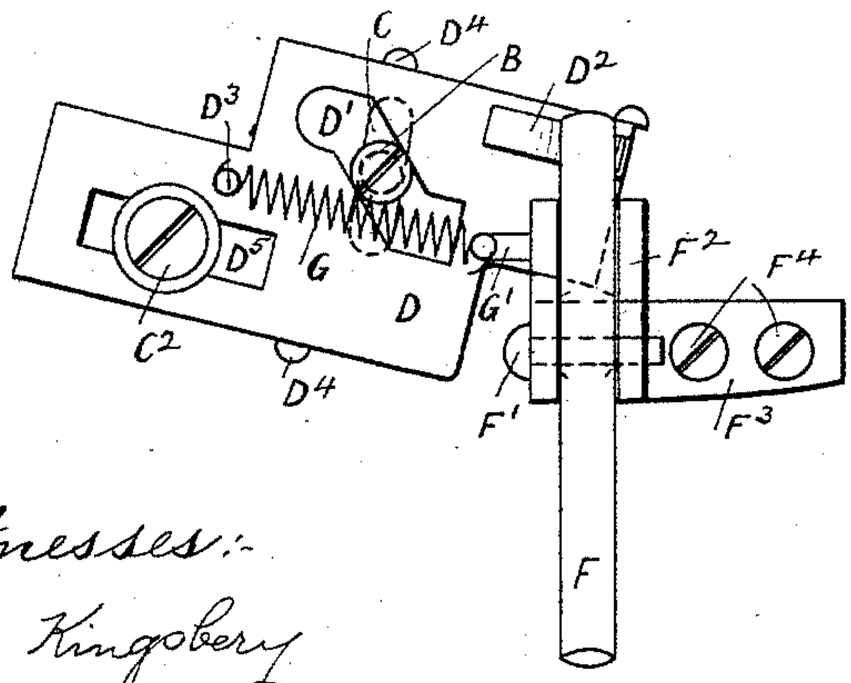


Fig. 5

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(No Model.) 3 Sheets—Sheet 3.

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CIRCULAR KNITTING MACHINE.

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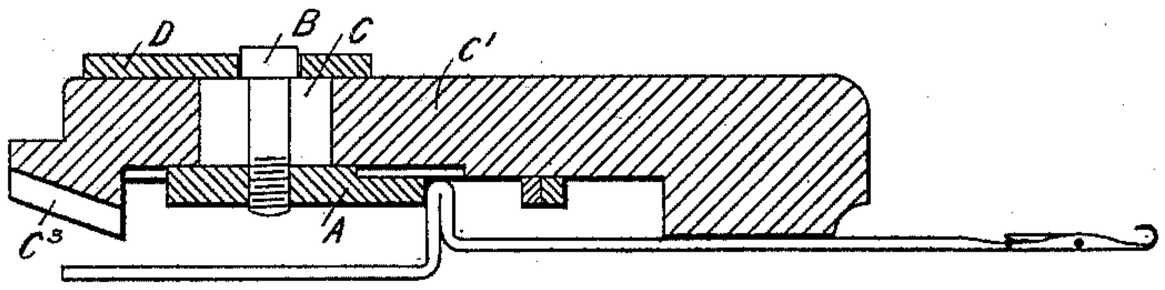
Fig. 7.



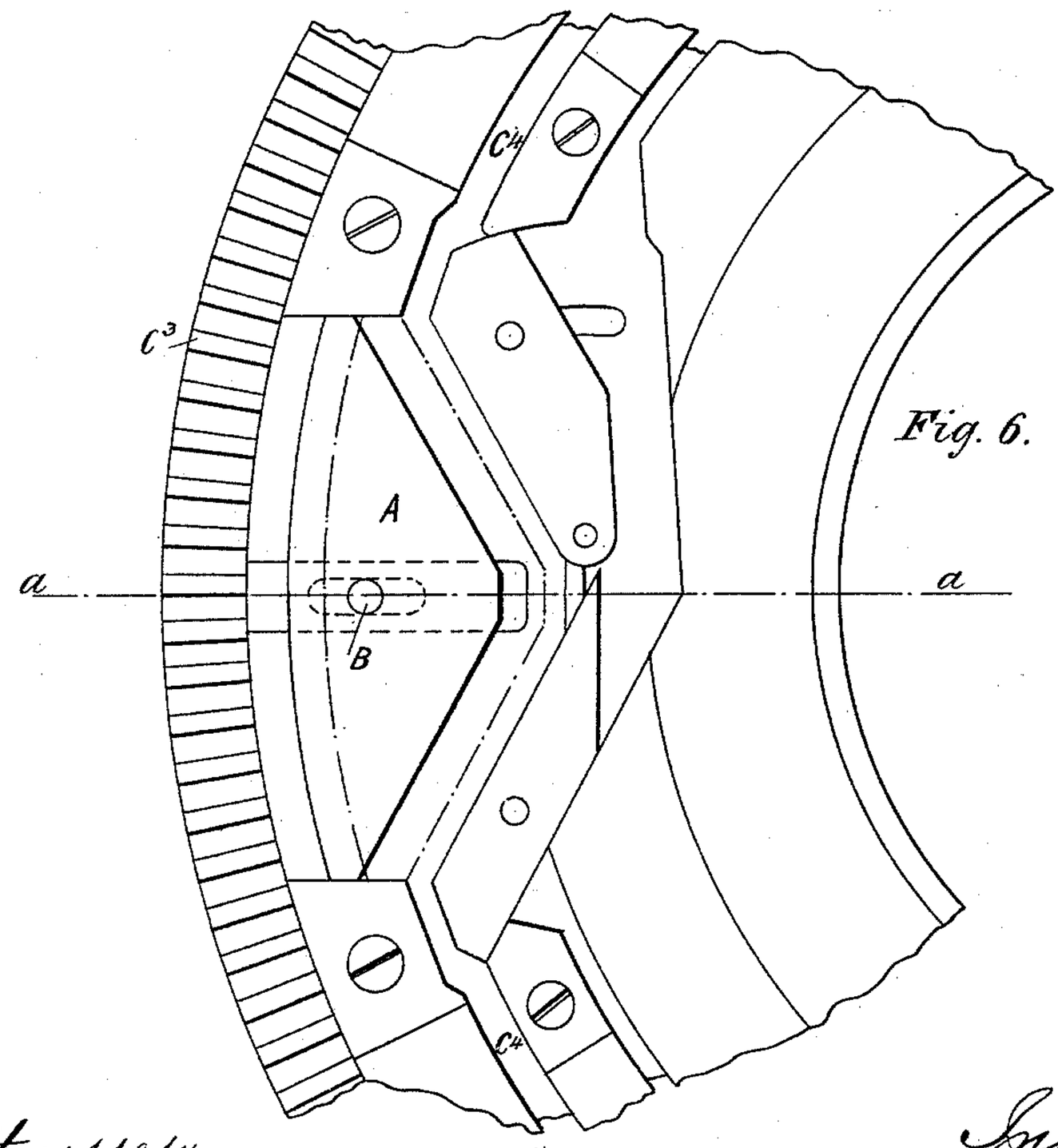


Fig. 6.

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Isaac L. Berridge,
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UNITED STATES PATENT OFFICE.

BENJAMIN KERR AND ISAAC LOVELL BERRIDGE, OF LEICESTER, ENGLAND.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 483,616, dated October 4, 1892.

Application filed November 30, 1891. Serial No. 413,510. (No model.) Patented in England February 28, 1891, No. 3,655.

To all whom it may concern:

Be it known that we, BENJAMIN KERR, mechanic, of Belgrave, in the borough of Leicester, and ISAAC LOVELL BERRIDGE, hosiery-machine builder, of Humberstone Gate, Leicester, England, subjects of the Queen of England, have invented certain new and useful Improvements in Circular-Knitting Machines, (for which we have obtained English Patent No. 3,655, dated February 28, 1891,) of which the following is a specification.

This invention relates to circular reversible knitting-machines for the manufacture of stockings and socks.

The object of the present invention is to obtain a better seam or juncture at the sides of the pouches forming the heel and toe, so as to impart an improved finish to such articles and avoid the holes and open-work which often characterize the seams or junctures of the toe and heel pouches in the goods referred to. Accordingly we provide certain improvements in the machine whereby the above-pointed-out object may be attained.

According to our invention we avoid the defect in the seams or junctures of the toe and heel pouches by forming a tuck or accumulated loop-stitch on each selvage-needle during the operation of narrowing or forming the first half of the pouch—this is to say, instead of allowing each needle to clear its loop each selvage-needle as it becomes inactive during the narrowing operation is allowed to retain its loop, so that when it is subsequently brought into action during the widening operation or formation of the second half of the toe or heel pouch a tuck-stitch is formed.

In order to produce a "tuck-stitch" upon the selvage-needles during the narrowing operation, as hereinbefore mentioned, we provide mechanism which, acting in conjunction with the stitch-cam, will restrict the movement of such needles so that they do not clear, but keep the loop upon the latch until again brought into action.

A heel or toe pouch formed in accordance with this invention will have the seam or juncture closed and well finished.

In the accompanying drawings we have shown our improvements applied to a circular reversible knitting-machine for which British Letters Patent No. 10,025 of 1885 and United States Patent No. 324,795 were granted to Walter Aiken.

Figure 1 is an elevation of so much of the machine named as is necessary to illustrate our invention which is embodied therein, and Fig. 2 is a plan. Fig. 3 is a side elevation, and Fig. 4 a, plan of apparatus forming the subject of this invention. Fig. 5 is a plan of the spring-controlled plate which withdraws the outthrow-cam and the lever which actuates the former. Fig. 6 is a plan of the under side of that portion of the needle-actuating circular cam-plate at which the knitting-cams are located. Fig. 7 is a section on the line *a a* of the last-named figure. Figs. 3, 4, 5, 6, and 7 are drawn to a larger scale than Figs. 1 and 2.

Similar letters of reference indicate the same parts throughout the drawings.

In order to enable the selvage-needles to produce tuck-stitches during the narrowing operation, it is necessary to limit or restrict the movement of such needles, so that they are not moved sufficiently far outward to clear or to cause the stitch already on the needle to pass over the end of the latch. For this purpose the outthrow-cam A is periodically partly withdrawn, so that the movement of the selvage-needles is relatively shortened and a tuck or accumulated stitch the subsequent result. Now to shorten the movement of the outthrow-cam, as and for the purpose described, a pin B is connected thereto and passes through a radial slot C in the needle-actuating circular cam-plate C′ and into an angular slot D′ in a plate D on the upper or outer side of the said cam-plate. The latter is provided with teeth C^3 on its under side and is rotated for the production of tubular web or reciprocated for the formation of the heel or toe pouch by the bevel-wheel E′ on the driving-shaft E. The plate D is moved to the left, as hereinafter described, at the end of the traverse of the needle-actuating cam-plate C′ during reciprocating knitting in the narrowing operation, thereby causing the pin B to travel in the slots C D′, as shown in Fig. 5, and partly withdrawing the cam A when it would otherwise cause the latches of the selvage-needles to clear their loops; but the effect

of such withdrawal allows the selvage-needle to retain the loop on its latch, and thereby form a tuck-stitch, as hereinbefore referred to.

To cause the plate D to move to the left, as before mentioned, it is provided with an inclined vertical lug D^2 (most clearly indicated in Fig. 1) in actual contact with a lever F, fulcrumed at F′ between the lugs F^2 on the plate F^3, secured to the cam-plate C′ by screws F^4. Upon the outward end of the lever F being elevated, as in Fig. 5, the inner end thereof presses against the inclined lug D^2, moving it to the left and with it the plate D, to or on which it is attached. Upon the outer end of the lever F being lowered the other end of same is removed from frictional contact with the inclined lug D^2. The spiral spring G, attached at one end to the lug-pin G′ and at the other end to the stud D^3 on the plate D, brings the latter back into its original position. The pin B will then simultaneously travel to the end of the slots C D′, as in Figs. 2 and 4, and the outthrow-cam will perform its usual function. The plate D moves, preferably, between flat-sided guide-pins D^4 on the cam-plate C′, and is also maintained in position by a screw C^2, fixed in the latter and located within the slot D^5 in the former.

As before mentioned, the movement of the plate D is dependent upon the elevation of the outer end of the lever F. This lever is actuated and depends for its proper movement upon duplicate mechanism carried on slides K, capable of moving upon a curved bar K^2 and operated through the medium of connecting-rods M, attached to the outer sides of the two usual toothed main segmental slides N, (shown in said patents,) which are moved intermittingly when it is desired to remove the butts of the needles one at a time from the cam-groove C^4, Fig. 6, in the cam-plate C′ out of the range of the knitting-cams, as described and illustrated in English Patent No. 10,025 of 1885, hereinbefore referred to.

The duplicated mechanisms are shown in their relative positions in Fig. 2, but singly in Fig. 1, and on an enlarged scale in Figs. 3, 4, and 5 for the sake of clearness. This mechanism in each case consists of an arm H, connected at one end to an adjustable plate J, attached by a screw J′ to the slide K. This arm H when in its operative position is in the lowered position shown in Fig. 1, so that as the lever F reciprocates with the cam-plate C′ during the narrowing operation it passes up the inclined plane of the arm H and onto the horizontal part thereof just prior to making its return journey, and remains thereon just sufficiently long to withdraw the outthrow-cam A and prevent the selvage-needle clearing its loop, as before described. The slides K are moved one needle-space nearer to each other by the action of the two toothed main segmental slides N, before referred to, and are thus able to cause the lever F to withdraw the outthrow-cam at each selvage-needle until the narrowest course in the heel or toe pouch is reached, by which time the inclined ends of the levers L, fulcrumed at L′ to the slides K, will have come into contact with the angular stop-plates O on the curved bar K^2 and be caused to move on their centers so as to elevate the arms H, as shown in Fig. 3. Upon the slides K returning to their original positions during the operation of widening, the end of the lever F passes through the cut-away or recessed portion H′ of the arm H, and the outthrow-cam resumes its ordinary functions. The lever L is hollowed at its upper end to receive a pin H^2 on the arm H, the latter being controlled in its movement by a spring-plate J^2, pressing on the pin H^2 and fixed to the plate J by a screw J^3. A stud K′ is fixed in the slide K to restrict the movement of the lever L, and the plate J is adjustable by means of the screw J′ and slot J^4 to regulate the height of the arm H, so as to elevate the end of the lever F, as before described, to withdraw the outthrow-cam to a greater or less extent, as required.

We claim—

1. In a circular reversible knitting-machine, the combination, with the outthrow-cam, of a spring-controlled and slotted plate, such as D, carried on the needle-actuating circular cam-plate C′, and means to actuate the said plate and withdraw the cam to cause the selvage-needles to produce tuck-stitches during the narrowing operation, substantially as and for the purpose described.

2. In a circular reversible knitting-machine, the combination, with the outthrow-cam, of a spring-controlled slotted plate, such as D, having a vertical inclined lug, such as D^2, a lever, such as F, carried by the needle-actuating cam-plate, and a movable slide, such as K, having provision for actuating said lever, substantially in the manner and for the purpose described.

3. In a circular reversible knitting-machine, the combination, with the lever F, of an adjustable spring-controlled arm H, a lever, such as L, a movable slide, such as K, and a curved bar, such as K^2, having lugs O, substantially as and for the purpose described.

4. In a circular reversible knitting-machine, the combination of an adjustable spring-controlled arm H, lever L, stop-plate O, bar K^2, slide K, rod M, and movable segmental cam slide or rack N, constructed and operating substantially in the manner and for the purpose described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

BENJAMIN KERR.
ISAAC LOVELL BERRIDGE.

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ARTHUR LOVELL BERRIDGE.