

(No Model.)

F. C. REHM.

LOOPING ATTACHMENT FOR CIRCULAR KNITTING MACHINES.

No. 535,461.

Patented Mar. 12, 1895.

Fig. 4.

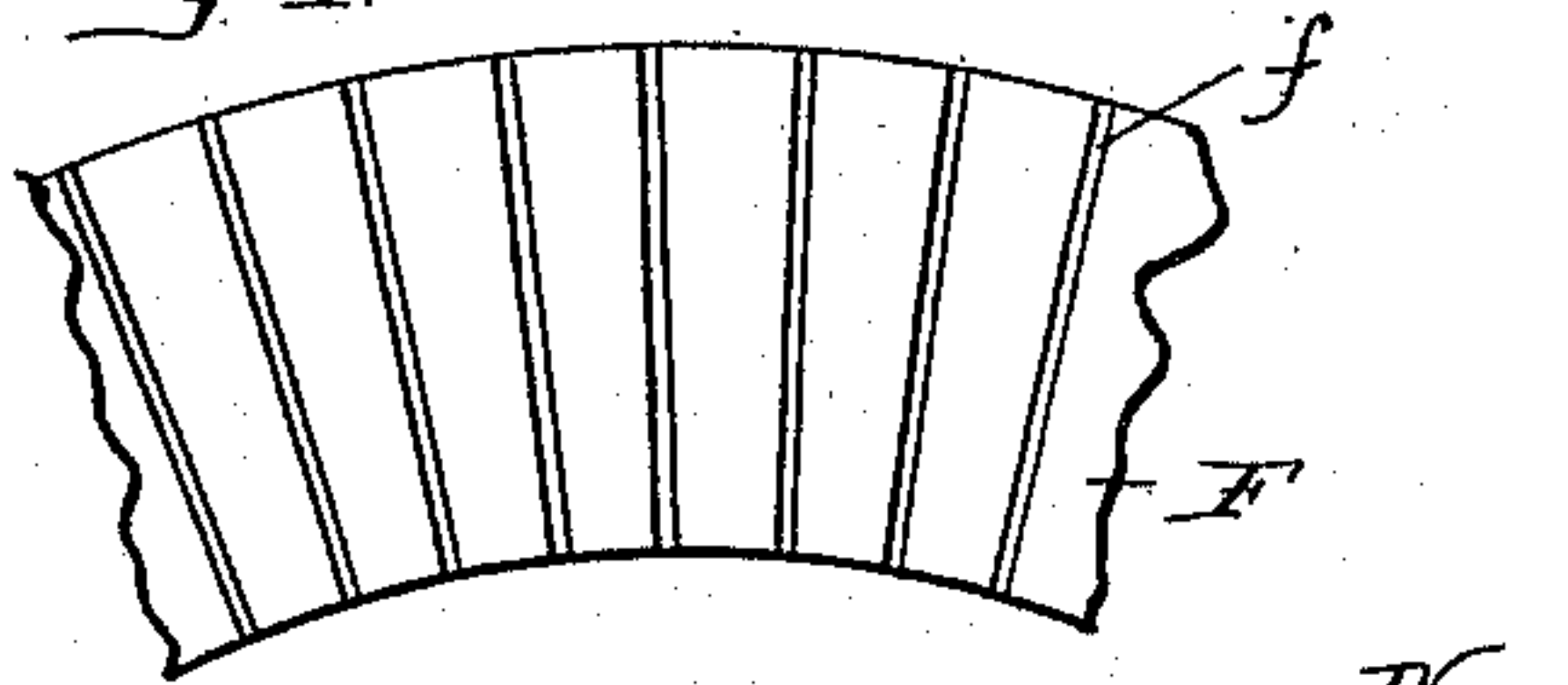


Fig. 2.

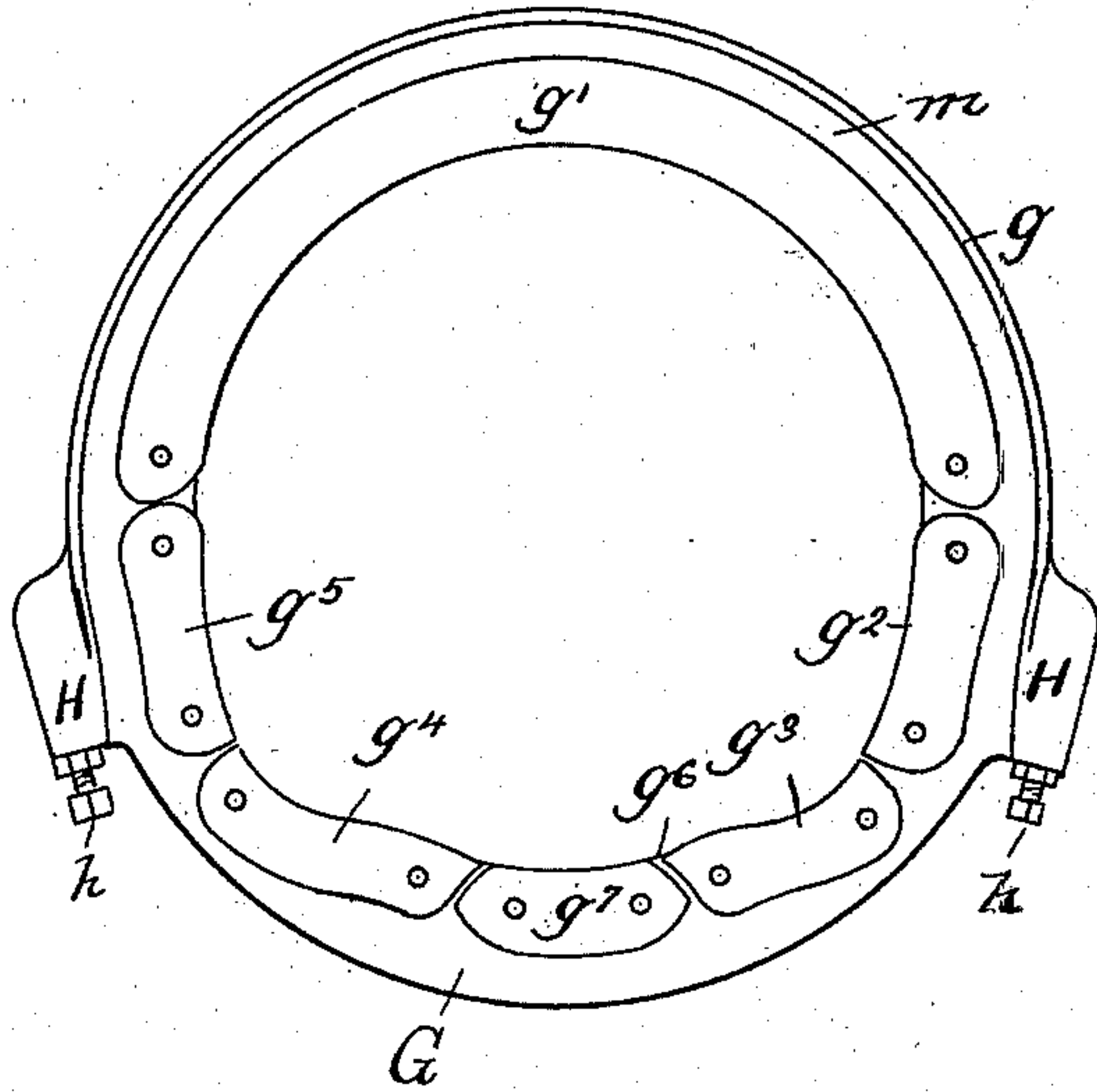


Fig. 1.

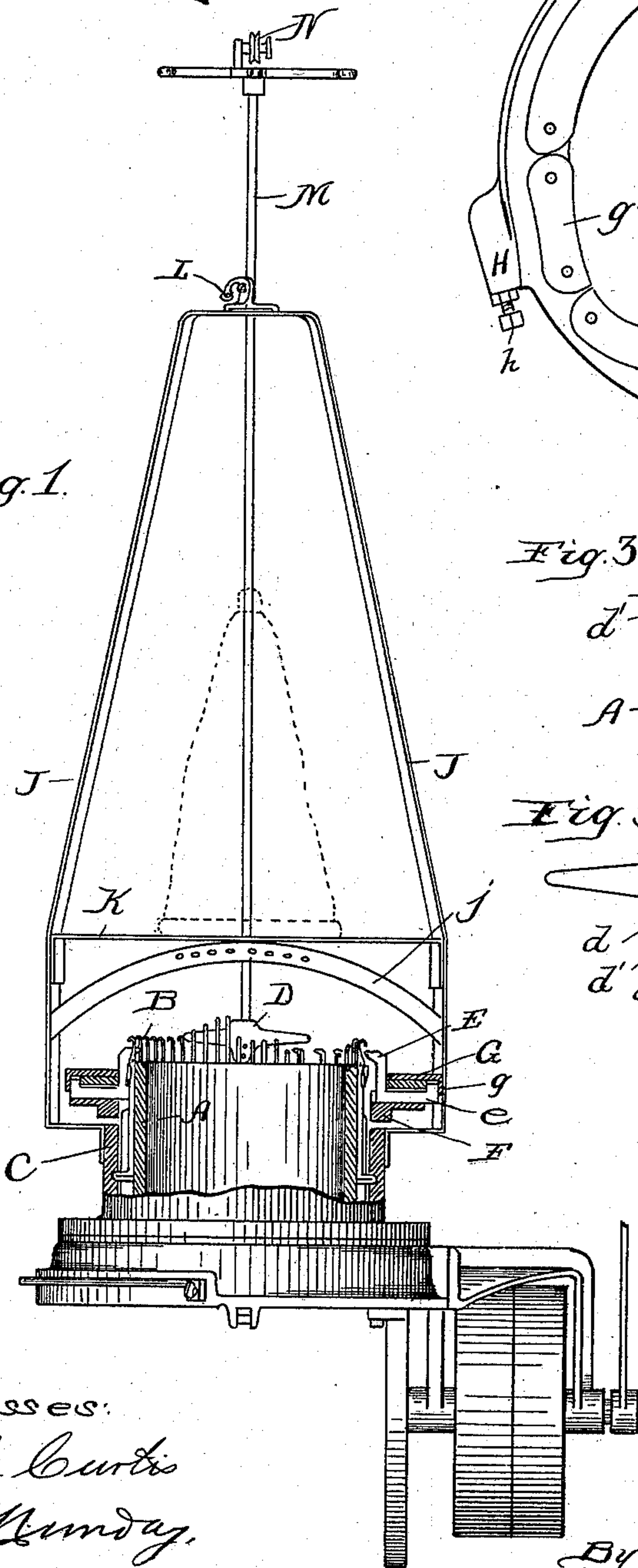


Fig. 3.

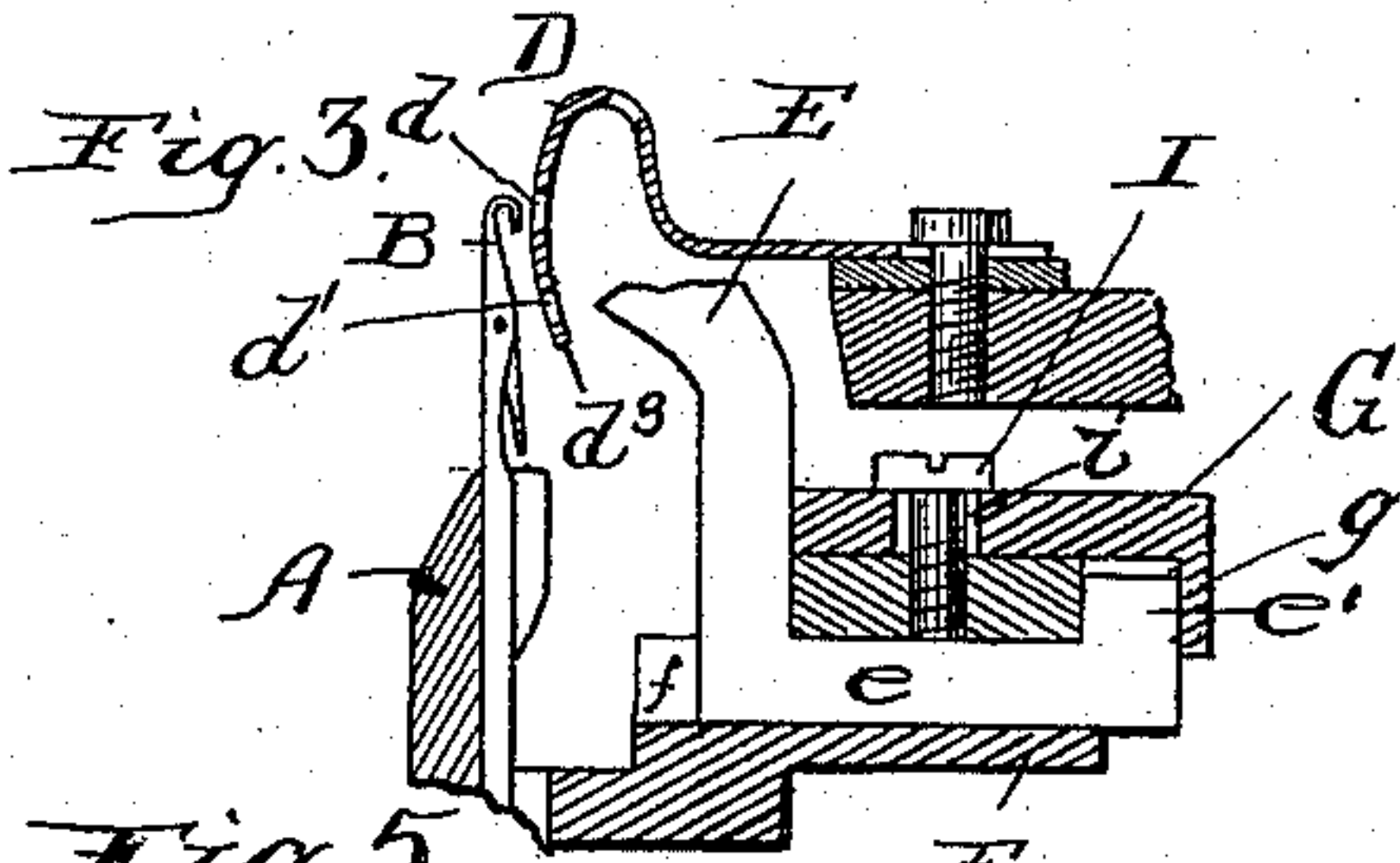
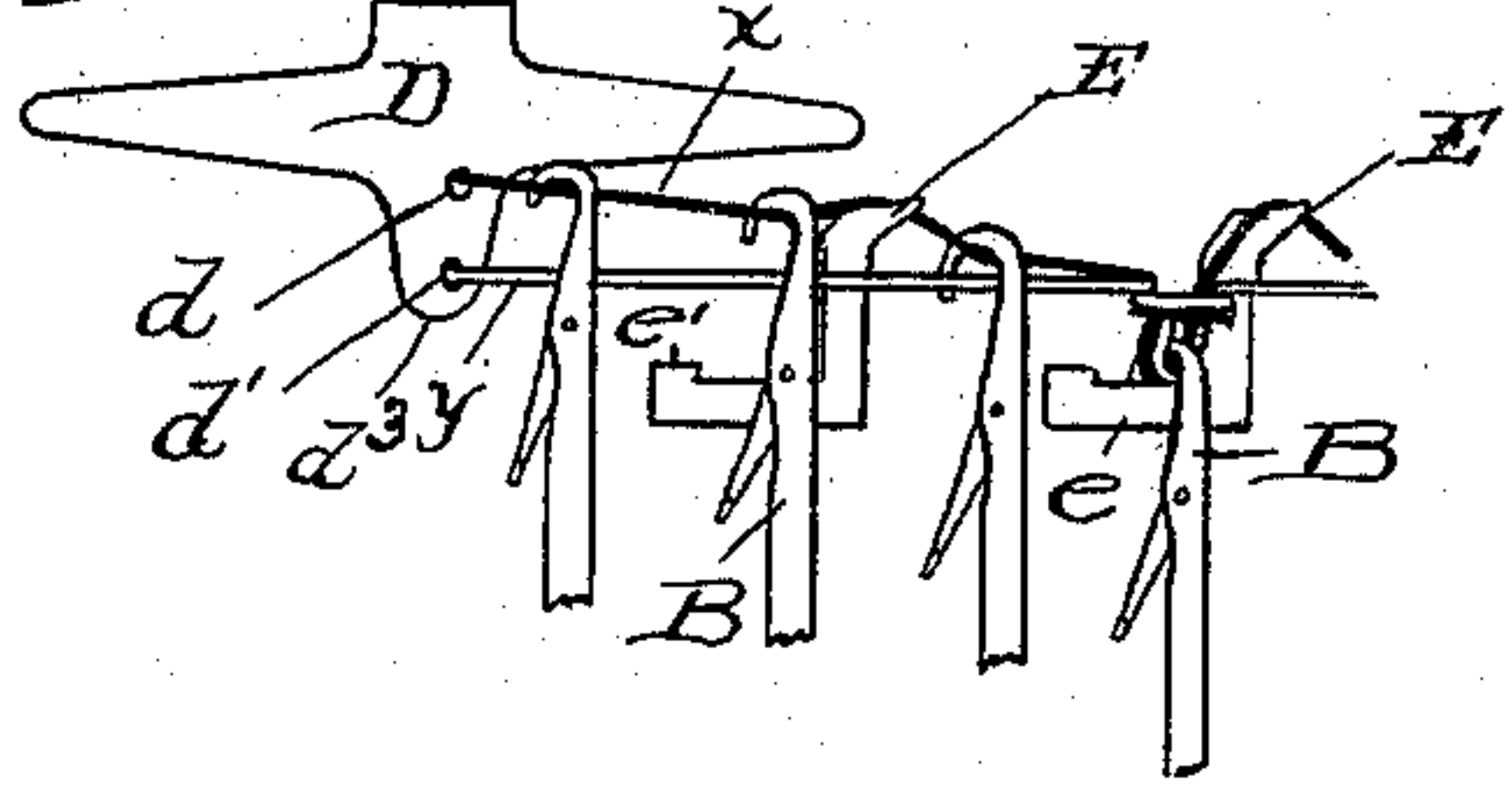


Fig. 5.



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UNITED STATES PATENT OFFICE.

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LOOPING ATTACHMENT FOR CIRCULAR-KNITTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 535,461, dated March 12, 1895.

Application filed May 15, 1893. Serial No. 474,196. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK C. REHM, a citizen of the United States, residing in Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Looping Attachments for Circular-Knitting Machines, of which the following is a specification.

This invention relates to an attachment for ordinary knitting machines whereby to effect the formation of loops upon the interior surface of the fabric knitted in the knitting machine.

The invention is designed to obviate some serious objections pertaining to the devices heretofore used for the same purpose.

One main object had in view in this invention is the avoidance of any construction whereby the space inside of the knitter is obstructed so as to render the fabric invisible to the operator. This is especially important because with those machines in which the looping devices are placed inside of the knitter the fabric is wholly hidden from view and the operator cannot know whether the machine is working perfectly until the fabric is completed and taken out of the machine, and it then is too late to remedy the defect if any existed. I overcome this objection by a construction which enables the operator to watch the operation of the machine as it proceeds so that she is enabled to stop the machine instantly if loops are being dropped or other imperfections exist in the working of the machine. In this improved construction I place the looping devices and their operating mechanism entirely outside the needles so that the hollow or interior of the knitter is occupied only by the fabric being formed.

The nature of the invention will be fully understood from the description hereinafter given and from the accompanying drawings.

In the drawings I show at Figure 1 a central vertical section of a knitting machine to which my attachment has been applied. Fig. 2 is a bottom view of the cam plate which is used to move the yarn supporting devices whereby the loops are formed. Fig. 3 is a partial vertical section enlarged showing one of the yarn lifters in elevation. Fig. 4 is a

partial plan, enlarged, of the grooved plate in which the yarn supporters are mounted. Fig. 5 is a diagram showing the operation.

I have illustrated in the drawings an ordinary Branson knitter in which the needles are supported in a stationary cylinder and are operated by an exterior cam cylinder which rotates. The invention is however applicable with very slight changes to that class of knitters wherein the needle cylinder rotates and the cam cylinder is stationary.

In the machine illustrated A represents the needle cylinder; B, the needles; C, the rotating cam cylinder whereby the needles are lifted and depressed, and D is the yarn guide secured in the machine shown to the cam cylinder in the usual manner. The guide has an upper opening *d* for the upper yarn *x* and a lower opening *d'* for the lower yarn *y*.

The looping devices consist of the yarn lifting points E having horizontal extensions *e* and heels *e'* and they are placed in radial slots *f* formed in the outstanding flange F attached to the needle cylinder, with freedom to slide in and out in said slots. These yarn supporting points or lifters are employed in such number as may be desired and one of them may be placed so as to operate between each adjacent pair of needles; or they may be placed between each second and third needle and so on, according to the number of loops desired; or they may be placed in groups so that portions only of the fabric will be provided with the loops. They are moved inward and under one of the yarns at proper intervals by any suitable mechanism and preferably by a revolving cam ring G placed above the series of lifters and between the lifting points and the heels *e'*, and the ring may be actuated in any suitable way, as for instance by the yarn guide D, which, in the knitter shown, is supported from the cam cylinder and comes in contact with one of the projections H upon the outside of the ring and thus pushes the ring around. The acting ends of these projections are preferably provided with set screws *h*. The ring G is circular through about one half of its circumference, and this portion is provided with an exterior downwardly depending flange *g* and an interior de-

pending flange or semicircular piece g' , a groove m being formed between g and g' adapted to receive the heels of the yarn lifters. Secured to the under surface of the ring and
 5 between the extremities of the piece g are a number of cams $g^2 g^3 g^4 g^5$, the ends of which are preferably rounded so they may act upon the heels of the yarn lifters and gradually force them into their proper positions. These
 10 cams co-operate with the inner edge g^6 of the ring in giving the necessary movements to the lifters and the concentric groove m merely holds the lifters stationary during the intervals between these operations. The outer
 15 edges of the cams $g^2 g^3$ are adapted to force the lifters outward from the positions occupied by them during non-action, so as to give a clearance for the passage of the yarn guide, the lower point d^3 of which traverses
 20 a plane below the top of the lifters. Immediately after this has been done the inner edge g^6 of the cam g^3 acts against the acting or upright portion of the lifters and carries them inward, forcing the points of the lifters
 25 between the yarns and into position where they will sustain the yarn during the descent of the needles, as plainly indicated at Fig. 5. The yarn lifters remain in this position until the needles have completed their downward
 30 movement, so that a loop is formed in the upper yarn as indicated at the right of Fig. 5. The continued movement of the ring brings the cams $g^4 g^5$ into action and they draw the lifters outward thereby insuring the casting
 35 off the loop and bringing the heels of the lifters into position for re-entrance into the groove m . The lifters are not of course forced inward until after the passage of the yarn guide.

40 I prefer that the cams $g^2 g^3 g^4$ and g^5 be made in short pieces as illustrated and that they be adjustably secured to the ring. This adjustability need be but slight and is adequately provided for by enlarging the openings i in
 45 the cam ring through which to pass the attaching screws I whereby the cam pieces are secured to the ring. The piece g^7 is merely a filling piece and is employed simply as a
 50 safe guard against any getting out of position by the lifters. It may however be dispensed with and the cams be brought closer together so that no objectionable gap will exist between them.

I have shown upon the cam ring two projections H and set screws h for operating the
 55 ring. This is done in order that the direction of rotation of the ring may be reversed whenever necessary, as is customary in knitting some portions of stockings for instance. Of
 60 course it is essential also that the cams $g^2 g^3$ should be the exact reverse of $g^4 g^5$ in their action, so that each pair may secure the proper positioning of the lifters. The set screws h
 65 enable the operator to properly time the movements of the yarn lifters relative to that of the yarn guide.

I mount one of the yarn bobbins over the

axis of the cylinders as indicated in the drawings by the broken lines, while the other bobbin may be stationarily located. In order to
 70 support this axial bobbin or spool I provide a frame work $J J$ connected by a cross bar K and secure it to the rotating cam cylinder. The brace j may have openings as shown for
 75 the guidance of the yarn. Another yarn guide L may be placed on top of the moving frame work.

M is the usual upright standard placed at the side of the machine and supporting yarn guide and take up devices such as are com-
 80 monly used in machines of this class, which are indicated at N .

In the operation of the machine the yarn guide D travels with the cam cylinder and the yarn lifters are withdrawn one after another
 85 as the guide approaches them and are immediately moved in as soon as the guides has passed them, so that their points enter between the two strands of yarn and the upper
 90 strand will be held up by them during the descent of the needles and a loop be thus formed in that strand. The lifters are next withdrawn and the loops cast off. This operation is repeated of course at each revolution
 95 of the cam ring and yarn guide.

I claim—

1. A knitter provided with looping devices located outside of the needles and means for actuating said looping devices also located
 100 outside of the needles, whereby the central opening of the machine remains uncovered and unobstructed, and the operator is enabled to watch the work as it proceeds, substantially as specified.

2. The combination with a knitting machine
 105 of a series of radially moving yarn lifters located outside of the needles and means for moving such lifters into and out of action, substantially as specified.

3. The combination with a knitting machine
 110 having a needle cylinder and a cam cylinder for operating the needles, of a series of radially movable yarn lifters located outside of the needle cylinder, and means for moving
 115 said lifters into and out of acting position, such actuating means being also located outside of the needle cylinder, substantially as specified.

4. The knitter having a stationary needle cylinder, a rotating cam cylinder and a yarn
 120 guide secured to the cam cylinder, in combination with radially moving yarn lifters supported from the needle cylinder, and a cam ring rotated by the yarn guide and acting to
 125 move said lifters, substantially as specified.

5. The combination with the needle cylinder having the slotted outwardly projecting flange, the rotating cam cylinder, the yarn
 130 guide moving with the latter cylinder, the radially moving yarn lifters located in the slots of the needle cylinder flange, and the cam ring rotated by contact with the yarn guide and serving to move said lifters, substantially as specified.

6. The combination with the yarn guide, the
radially movable yarn lifters and a support
for said lifters located outside of the needles,
of the cam ring having projections H H and ad-
5 justable contacts h, substantially as specified.

7. The combination of the moving yarn
guide, the series of yarn lifters, the support
for said lifters located outside of the needles,

and the cam ring adapted to retract the lift-
ers to give clearance to the guide, substan- 15
tially as specified.

FREDERICK C. REHM.

In presence of—

JOHN A. MACDONALD,
BENJAMIN SHELMIER.