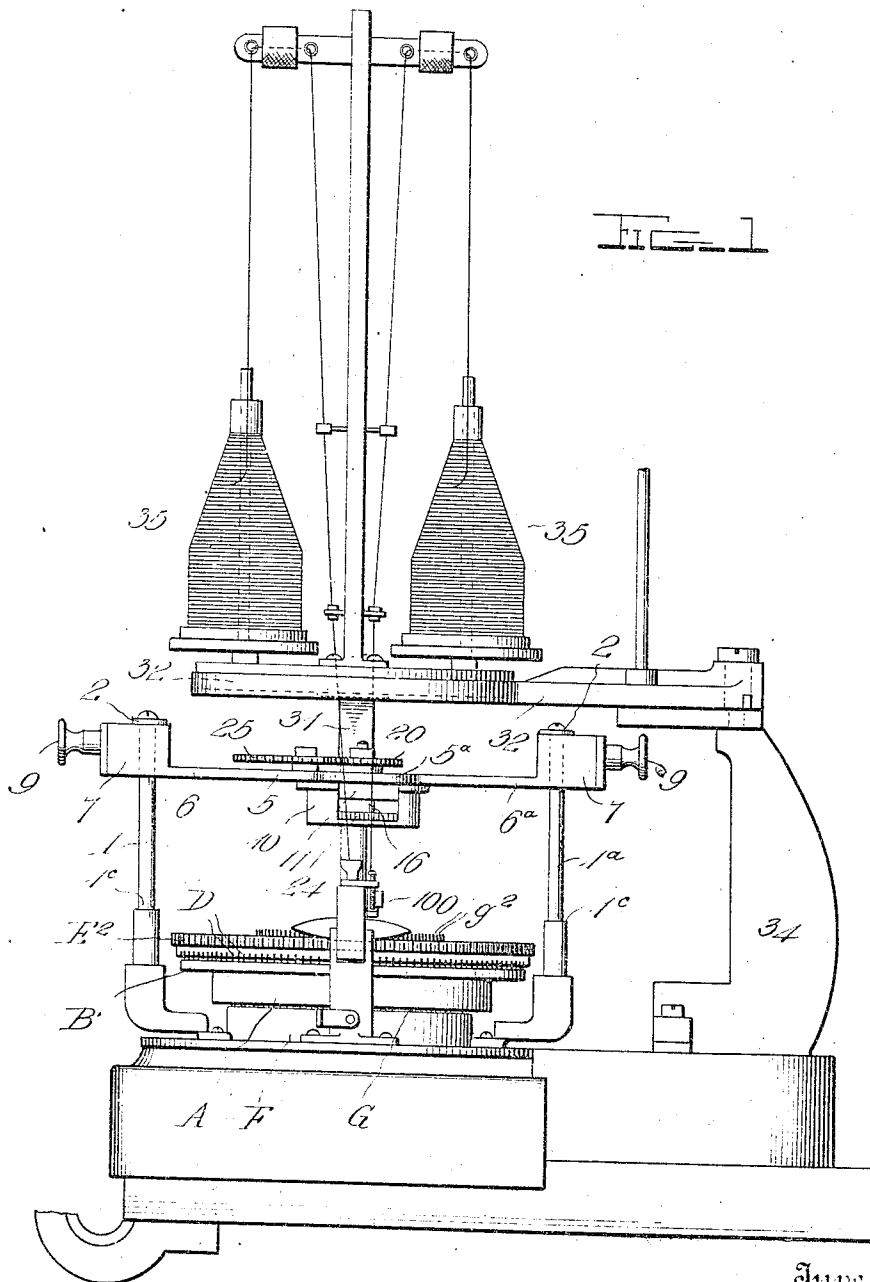


H. H. WEST.
ATTACHMENT FOR KNITTING MACHINES.
APPLICATION FILED MAY 13, 1912.

1,064,185.

Patented June 10, 1913.

5 SHEETS-SHEET 1.



Inventor

Harry H. West

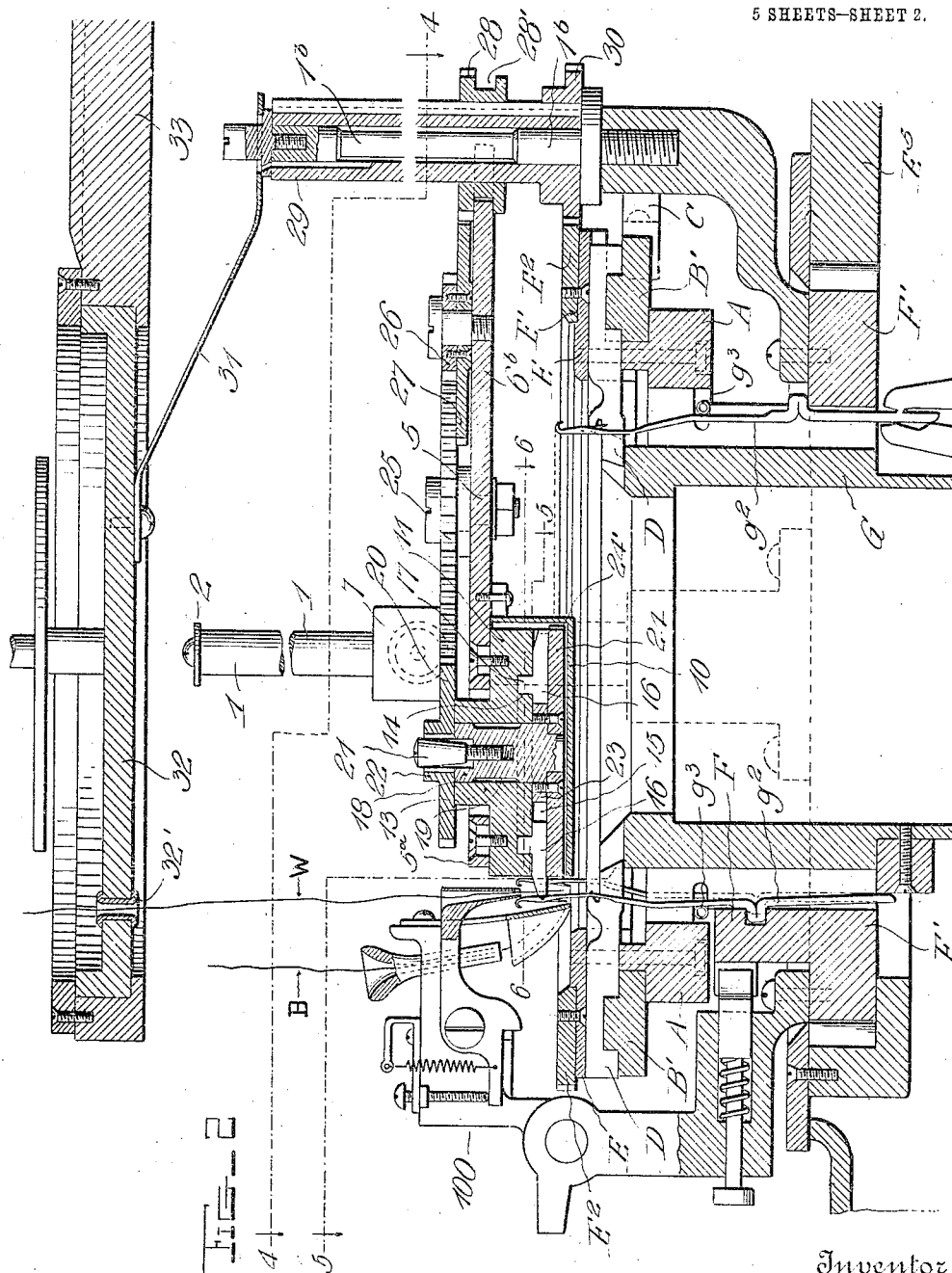
Witnesses

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5 SHEETS—SHEET 2.



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5 SHEETS--SHEET 3.



C. C. C. C. C.
S. M. M. C. C.

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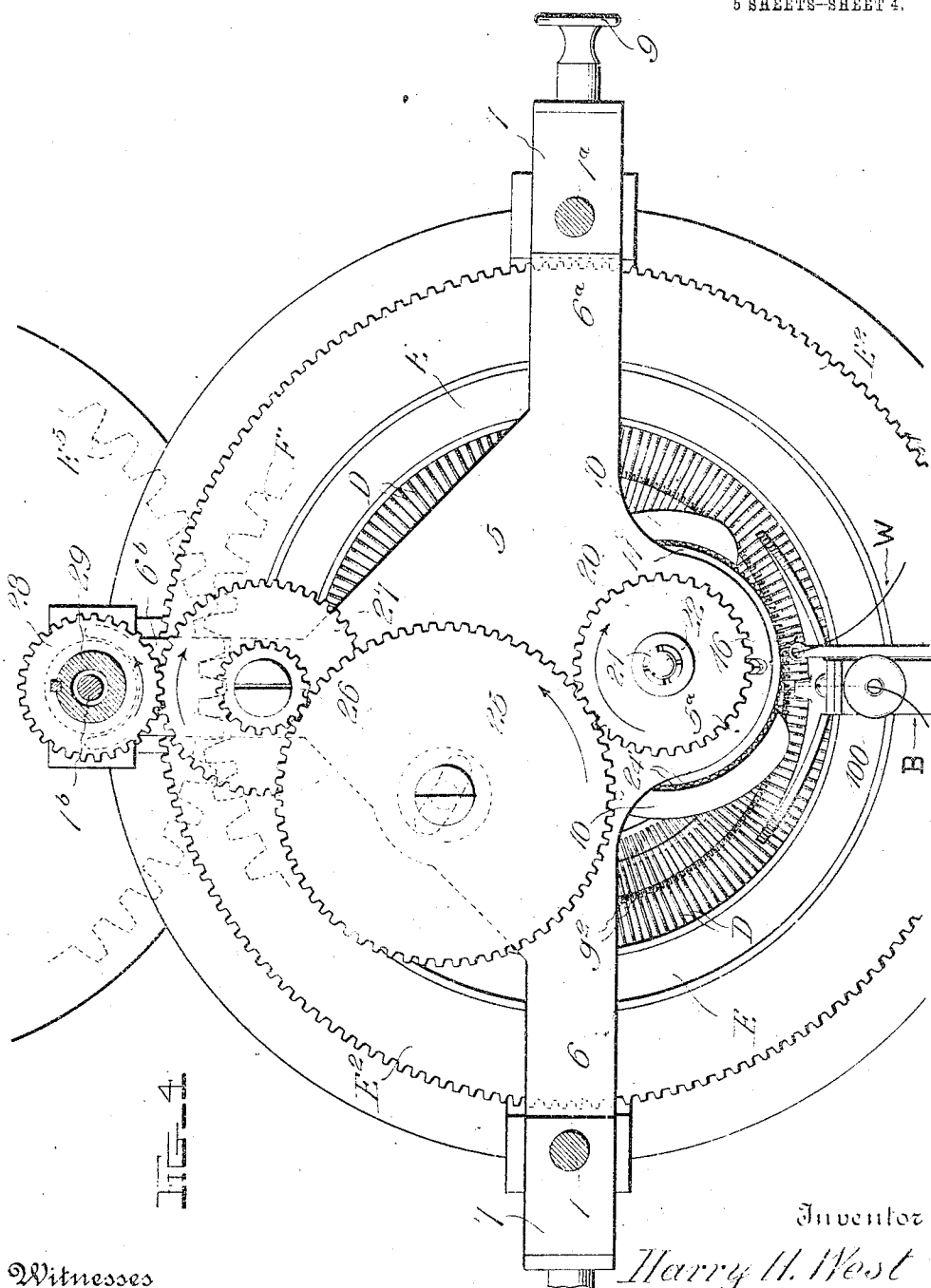
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5 SHEETS-SHEET 4.



Witnesses

E. Clement
S. M. McColl

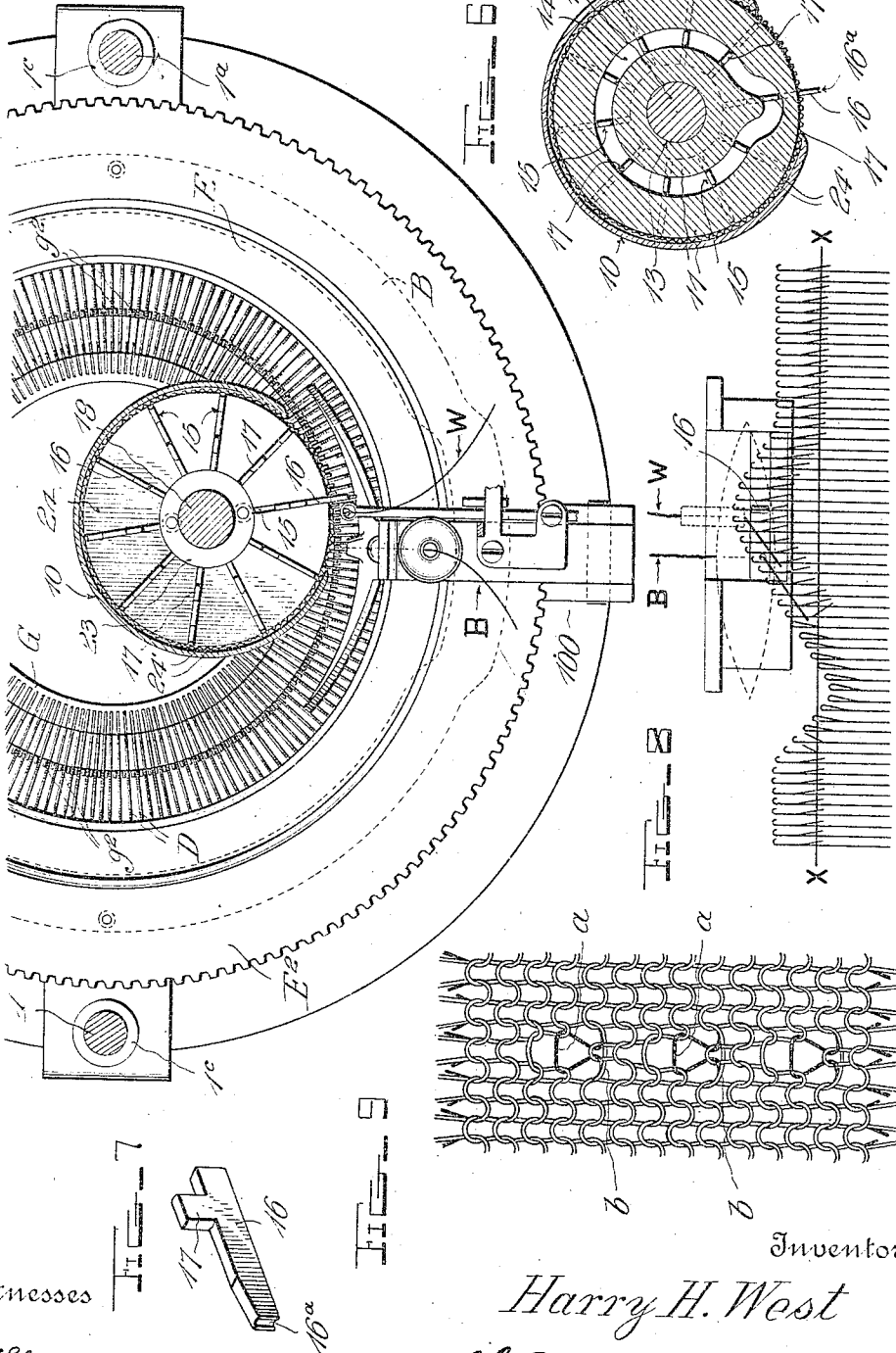
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5 SHEETS-SHEET 5.



Witnesses

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UNITED STATES PATENT OFFICE.

HARRY H. WEST, OF PLYMOUTH, PENNSYLVANIA.

ATTACHMENT FOR KNITTING-MACHINES.

1,064,185.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed May 13, 1912. Serial No. 696,950.

To all whom it may concern:

Be it known that I, HARRY H. WEST, a citizen of the United States, residing at Plymouth, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Attachments for Knitting-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in circular knitting machines such as are employed in knitting tubular fabric, and relates especially to needle actuating appliances for producing various designs of knitted fabric.

For convenience in illustration the invention is shown applied to what is known to the trade as the "Standard" machine, the general structure of which is shown in United States Patents Nos. 484,738, dated October 18, 1892, and 774,473, dated November 8, 1904, to H. A. Houseman, although obviously the invention is applicable to other machines of similar character.

The machine shown in the patents above referred to is of the class known as the "full automatic" machine, in which the knitting is performed by a circular series of needles which are moved up and down in vertical grooves in the needle cylinder under the action of the knitting cams on the cam cylinder which partially encircles the needle cylinder, the knitting of the tubular work being performed in continuous circular courses by all of the needles under a continuous rotary motion of the knitting cylinder. Such parts only of the machine as may be necessary to show the connection of this improved attachment are illustrated herein.

One object of the invention is to provide simply constructed mechanism for producing various designs of knit fabric and which may be applied to any circular knitting machine already in use.

Another object of the invention is the provision of simple mechanism for producing various designs of knit fabric composed of regular meshes interspersed with enlarged or stretched stitches arranged regularly or irregularly to form a desired pattern.

Another object is to provide simple means for positively moving certain needles laterally at predetermined intervals for forcibly

stretching certain stitches to permanently enlarge them and thereby produce open work fabric of a predetermined pattern.

Another object is to provide simple means under the control of the operator for varying the pattern to be knit by positioning the stitch stretching devices to form the stretched stitches in alinement, alternately, zigzag, or in any other desired form.

Another object is to provide means whereby these enlarged stitches are formed from a different thread from that used in the other exposed stitches which form the exterior of the fabric, thus accentuating said stitches and thereby rendering the openings formed by said stretched stitches more noticeable.

With these and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings—Figure 1 represents a side elevation of a knitting head equipped with this improvement, and with the attachment in elevated or inoperative position. Fig. 2 is a vertical transverse section thereof on an enlarged scale, with the parts of the attachment in operative position; Fig. 3 is a similar view taken in a plane at right angles to Fig. 2; Fig. 4 is a horizontal section on line 4—4 of Fig. 2; Fig. 5 is a horizontal section on line 5—5 of Fig. 2; Fig. 6 is a detail horizontal section taken on line 6—6 of Fig. 2, showing the housing and cam groove in which the needle actuating jacks of the attachment are mounted; Fig. 7 is a detail perspective view of one of these jacks or detents; Fig. 8 is a diagrammatic view taken opposite the jack housing, and showing the position of the needles and the threads fed in at this point; Fig. 9 is an enlarged fragmentary view of one form of fabric produced by this improved attachment.

The drawings show the main instrumentalities of a knitting head to which the present invention may be applied, as comprising a stationary needle cylinder G, provided in its peripheral or barrel portion with uniformly spaced longitudinal grooves to receive a circular series of independent latch needles g^2 , having the usual lateral studs or butts whereby they may be actuated by the operating cams (not shown) on the rotary

cam or knitting cylinder F. This cam cylinder is fixed to a gear F' which meshes with a power driven gear E^a. The needles g^a are resiliently held in the grooves of the cylinder by the usual spring band g^a, which permits said needles to move laterally when sufficient pressure is exerted on them to overcome the tension of the band. A fixed sinker-head A is also shown, having insets in which a sinker operating cam ring B' is mounted to rotate said ring being secured by a bracket C to a revolvably mounted standard to be described, and by means of which the sinker cam ring is revolved.

Horizontally movable sinkers D are engaged with the ring B' by means of the usual recesses in which the cam of the ring B fits, and by which the sinkers are reciprocated in the usual manner. The function of these sinkers is in general substantially the same as that of the sinkers usually employed, and they are held in operative position against accidental removal by a fixed cap ring E. This cap ring has an annular seat E' in its upper face near its outer edge, in which an annular gear E² is fixed for a purpose to be described.

This improved attachment is mounted on the cam cylinder gear F' to rotate therewith and comprises, as shown, three posts or standards 1, 1^a and 1^b, which are fixed to said gear at suitable points and project upwardly any desired or suitable distance, the posts 1 and 1^a being equipped with caps or retaining washers 2 and having longitudinally spaced sockets 3 and 4 in their outer faces for a purpose to be described. A plate 5 of any desired configuration is slidably mounted on the uprights 1 and 1^a, and is here shown substantially triangular with arms 6, 6^a and 6^b, extending from the corners thereof. The arms 6 and 6^a are provided with bosses or enlargements 7 apertured for the passage of the posts 1 and 1^a therethrough. Spring pressed catches 8, having operating heads 9, project into the apertures or bores of the bosses 7, and are designed to engage the sockets 3 or 4 in the posts 1 and 1^a to lock the plate in lower operative position or in elevated inoperative position, respectively, as may be desired. The posts or standards 1 and 1^a have shoulders 1^c arranged suitably to support the weight of the plate 5 and its attachment, and to limit the downward movement of said plate, as is shown clearly in Fig. 3. One side of this plate 5, between the arms 6 and 6^a, has a lateral extension 5^a from the lower face of which depends a substantially cylindrical casing or hood 10. This hood is open at one side and is positioned to project into the upper end of the needle cylinder near one side thereof adjacent the inner faces of the needles at a point opposite a thread carrier 100, the open side of the casing or hood

being arranged adjacent the needles, as is shown clearly in Figs. 2 and 5. Arranged within this casing 10 and protected thereby is a cylindrical casting 11 fixed to the plate 5 and having a central bore 12 therein with an upwardly projecting sleeve 13 communicating with said bore and extending through an opening in the plate 5 for a purpose to be described. This casting 11 has a cam groove 14 in its lower face which registers with a plurality of radially extending seats 15 formed in a rotary member to be described. Any desired number of these seats may be employed and they are designed to receive needle actuating jacks or detents 16. These detents 16 are constructed as shown in detail in Fig. 7, each having a vertical groove 16^a in its front end for reliably engaging a needle and having a lug or finger 17 extending upwardly from its upper edge near its rear end. These lugs 17 are designed to fit in the cam groove 14 of the casting 11 and when these jacks reach a predetermined portion of the cam groove they are moved outwardly by means of the eccentric formation of the groove to cause the free ends of the jacks which are projected to engage and bear against the rear face or edge of the needle opposite, and force the hooked end of the needle laterally outward against the tension of the spring needle retaining band g^a, whereby said needle is moved out of the path of a thread marked W fed in from a suitably disposed thread guide as shown in Fig. 2 to permit said thread to pass behind the needle so actuated and thus escape engagement by said needle. The laterally deflected or projected needle so engaged by the jack thus misses the thread marked W which passes behind it and forms a floating thread or loop, as indicated at b in Fig. 9.

For demonstrating the invention two threads B and W, preferably of different colors, are herein shown and both are engaged during the knitting process by all of the needles except those which are projected by the jacks at predetermined intervals, and one thread forms the outer face of the fabric and the other the inner face, as is shown clearly in Fig. 2, the white thread being here shown outside and the black thread on the inside. While two threads only are shown it will be obvious that more may be employed when a suitable yarn changer is provided. When a needle is projected by one of the jacks, the black loop or stitch which remains on the stem or neck of the deflected needle is stretched to a predetermined extent controlled by the formation of the cam groove 14, and this stretched loop shown at a in Fig. 9 is permanently enlarged, forming the open work or plated work pattern of the fabric. The stretching of the loop or stitch a on the projected

needle necessarily tightens or draws in the adjacent stitches which supply the quantity of yarn requisite for the formation of the stretched or enlarged stitch, as is shown clearly in Fig. 9.

A hub or spindle 18 fits in the bore 12 and sleeve 13 of the casting, and is preferably cut out intermediately of its ends on its outer face, as shown at 19, to reduce friction. A gear 20 is secured to this spindle 18 by means of a screw 21 having a tapered head which fits in the split upper end of said sleeve and forces it into frictional engagement with the sleeve 22 of the gear 20, as shown in Figs. 2 and 4, said split spindle end forming gripping jaws for securely holding said gear on said spindle and the screw head forces said parts into locking engagement. This rotary spindle 18 has an annular flange 23 to which is fixed an annular plate or wheel 24 in which the radial jack seats 15 are formed and which serves to revolve the jacks in the cam groove 14 to cause them to be projected at the proper point to engage the needle to be deflected.

Rotary motion is imparted to the gear 20 which actuates the jacks by means of a train of gears here shown consisting of a large gear wheel 25 rotatably mounted on the upper face of the plate 5 and which meshes with said gear 20 and with a pinion 26 fixed to a gear 27, also rotatably mounted on the plate 5. This gear 27 is driven by a gear 28 slidably keyed to a sleeve 29 revolvably mounted on the post 1^b. This sleeve 29 has a gear 30 fixed to its lower end which meshes with the large gear E² on the knitting head and is rotated by the turning of the gear F', which causes the post 1^b to move bodily with said gear and the gear 30 meshing with the gear E² to be thereby rotated. The gear 28 has a peripheral groove 28' in which fits the bifurcated end of the arm 6^b of the plate 5, whereby said gear may be moved with the plate 5 on the post 1^b. A spring arm 31 is loosely engaged at one end with the upper end of the post 1^b, and is fixed at its other end to a plate 32 which is revolvably mounted in a bracket arm 33 pivotally mounted on a standard 34 fixed to the machine frame. Yarn bobbins 35 are carried by the plate 32 which is revolved bodily with the standard 1^b, by means of the arm 31 on the turning of the gear F' and tangling of the threads consequently avoided. The threads are fed through eyes 32' in the plate 32, (see Fig. 2), into the thread guide above described. The wheel or plate 24 is provided on its periphery with serrations or teeth 24' which are of the same gage as the needles contained in the cylinder and are designed to engage the needles at the opening in the hood 10 opposite the thread feeding attachment as is shown clearly in Figs. 4 and 5 and serve to hold the parts in

operative relation during the projection of the jacks, as hereinafter described.

The pattern of the plated work may be varied in a number of ways, for instance, by varying the number of jacks 16, which may be accomplished by removing certain of the jacks from the wheel 24 or inserting others therein. The hood 10 and its inclosed casting and wheel 24 may be removed and a larger or a smaller wheel substituted therefor, as desired, suitable slots and bearings being provided to permit this substitution. When a wheel and casting are changed, the gears 20 and 25 may also be changed to cause the jack carrying wheel to rotate at the desired speed.

In Fig. 8 a diagrammatic view of a portion of the inner face of the needle cylinder disposed opposite the yarn feeder is shown, $\alpha-\alpha$ representing the top of the web or the plane where the loops are formed and which is commonly known as the "cast off" line. In this figure the two threads B and W are shown fed in and it will be obvious from this illustration and from Fig. 2 that the jack projected needles do not knit the thread W which is here shown white, but knit only the thread B here shown as black, the white thread being fed in behind the projected needle and thus forming the floating loop b , and that the loop a formed by the black thread only which is knit on the so projected needle is stretched sufficiently to form an opening in the fabric and these openings so produced may be arranged to form any desired pattern in the fabric by varying the number of the needle projecting jacks employed, and arranging them certain distances apart.

At a point opposite the thread guide 100 the sinker cam ring B' withdraws the sinkers a predetermined distance as shown in Fig. 2 to relieve the strain and prevent tearing of the fabric when the stretched loops are being formed, the eccentric portion of the cam which performs this function being clearly shown in dotted lines in Fig. 5.

When for any reason it is desired to throw this attachment out of operation, for instance, when knitting the heel or toe of a stocking, the plate 5 is moved upwardly on the posts 1, 1^a and 1^b until the catches 2 snap into the sockets 4 at the top of the posts 1 and 1^a, whereby said device is held out of operation and out of the way during the reciprocatory knitting in which the attachment is not desired to be used and one thread only is used in this knitting operation, the other thread being thrown out. When the attachment is in operative position the catches engage the sockets 3 and hold the plate securely against movement.

I claim as my invention:

1. A knitting machine attachment for producing plated work comprising supports

adapted to be secured to the rotary member of a knitting head, a plate slidably engaged with said supports, means for locking said plate in adjusted position, reciprocable jacks on said plate positioned to engage and move outward a needle when said jacks are reciprocated in one direction, and means for actuating said jacks.

2. A knitting machine attachment for producing plated work comprising supporting standards adapted to be secured to a rotary member of a knitting head, a plate slidably engaged with said standards, means for locking said plate in adjusted position, laterally reciprocable jacks on said plate positioned to engage and move outward a needle when said jacks are reciprocated in one direction, and means for actuating said jacks.

3. A knitting machine attachment for producing plated work comprising supporting standards adapted to be secured to a rotary member of a knitting head, a plate slidably engaged with said standards, means for locking said plate in adjusted position, a rotatable member depending from said plate and having a plurality of radial seats therein, jacks mounted to slide in said seats, a cam arranged to engage said jacks and move them outward at predetermined intervals and to withdraw them after projection.

4. In a knitting machine, the combination with laterally yieldable needles, their support, and plural thread feeds, of a revoluble plate or table arranged over said needles, a fixed casting depending from said table and having a cam element thereon, a rotatable member arranged in a plane below said casting and provided with a plurality of radially disposed seats, jacks mounted to slide in said seats and having means engaging the cam element of the casting, and means operable by the rotation of the knitting mechanism for rotating said jack carrying member whereby said jacks are projected at predetermined intervals to move certain of said needles laterally outward.

5. In a knitting machine, the combination of a stationary needle cylinder having laterally yieldable needles therein, a table supported above said cylinder and mounted to revolve relatively thereto, a cam member fixed to the lower face of said table and having a hub extending through the table, a spindle rotatably mounted in said hub and projecting through the lower end thereof, means controlled by the rotation of the knitting mechanism for rotating said spindle, a laterally extending member secured to said spindle in a plane below said cam member and provided with radial seats, and needle projecting jacks mounted to slide in said seats and engage with said cam member.

6. In a knitting machine, the combination of a stationary needle cylinder having laterally yieldable needles therein, a table sup-

ported above said cylinder and mounted to revolve relatively thereto, a cam member fixed to the lower face of said table and having a hub extending through the table, a spindle rotatably mounted in said hub and projecting through the lower end thereof, means controlled by the rotation of the knitting mechanism for rotating said spindle, a laterally extending member secured to said spindle in a plane below said cam member and provided with radial seats, and jacks mounted to slide in said seats and engage with said cam member, said jacks each having a vertical groove on its outer end for reliably engaging a needle.

7. In a knitting machine, the combination of a stationary needle cylinder having laterally yieldable needles therein, a table supported above said cylinder and mounted to revolve relatively thereto, a cam member fixed to the lower face of said table and having a hub extending through the table, a spindle rotatably mounted in said hub and projecting through the lower end thereof, means controlled by the rotation of the knitting mechanism for rotating said spindle, an annular plate secured to said spindle in a plane below said cam member and having a plurality of radial seats in its upper face, jacks slidably in said seats and having means engaged with the cam member whereby they are projected at predetermined intervals to engage and laterally project a needle.

8. In a knitting machine, the combination of a stationary needle cylinder having laterally yieldable needles therein, a table supported above said cylinder and mounted to revolve relatively thereto, a member fixed to the lower face of said table and having a hub extending through said table, said member having a cam groove in its lower face, a spindle mounted to rotate in said hub and projecting through the lower end thereof, an annular flange on said spindle below said fixed cam grooved member, and an annular plate secured to the lower face of said flange and having radial seats in its upper face, and jacks mounted in said seats and having lugs extending into the cam groove of said fixed member whereby said jacks are guided and projected on the rotation of said plate.

9. In a knitting machine, the combination of a stationary needle cylinder having laterally yieldable needles therein, a table supported above said cylinder and mounted to revolve relatively thereto, a cam member fixed to the lower face of said table and having a hub extending through the table, a spindle rotatably mounted in said hub and projecting through the lower end thereof, means controlled by the rotation of the knitting mechanism for rotating said spindle, an annular plate secured to said spindle in

a plane below said cam member and having
a plurality of radial seats in its upper face,
jacks slidable in said seats and having means
engaged with the cam member whereby they
5 are projected at predetermined intervals to
engage and laterally project a needle, said
annular plate having serrations in its pe-
riphery of the same gage as the needle con-
tained in the cylinder arranged to engage

said needles to hold the parts in operative 10
position while the jacks are projected.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

HARRY H. WEST.

Witnesses:

JOSEPH WEST,
THOMAS WEST.