

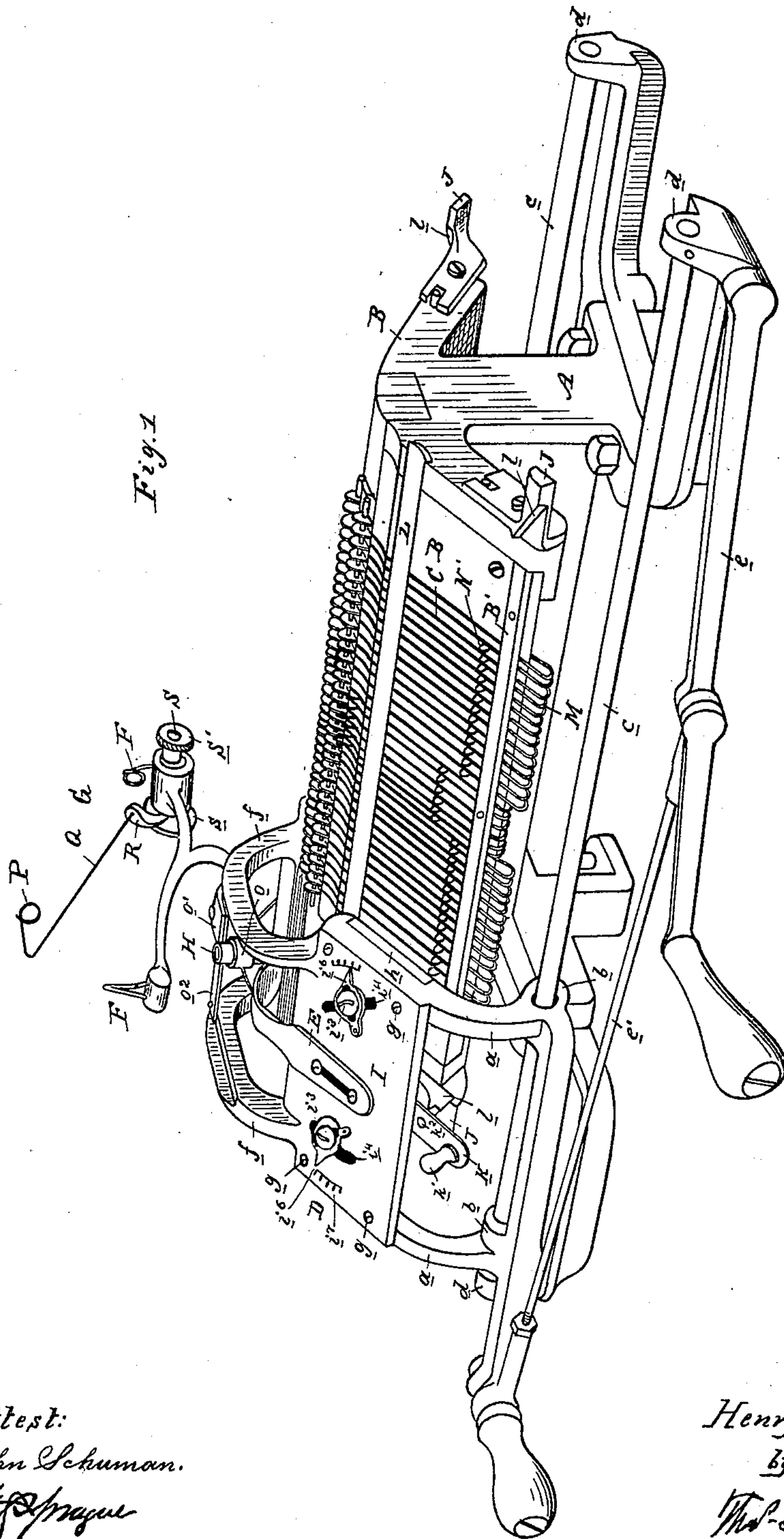
(No Model.)

3 Sheets—Sheet 1.

H. H. HUMPHREY.
STRAIGHT KNITTING MACHINE.

No. 390,023.

Patented Sept. 25, 1888.



Attest:
John Schuman.
H. S. Sprague

Inventor:
Henry H. Humphrey,
by his Atty
Wm. S. Sprague

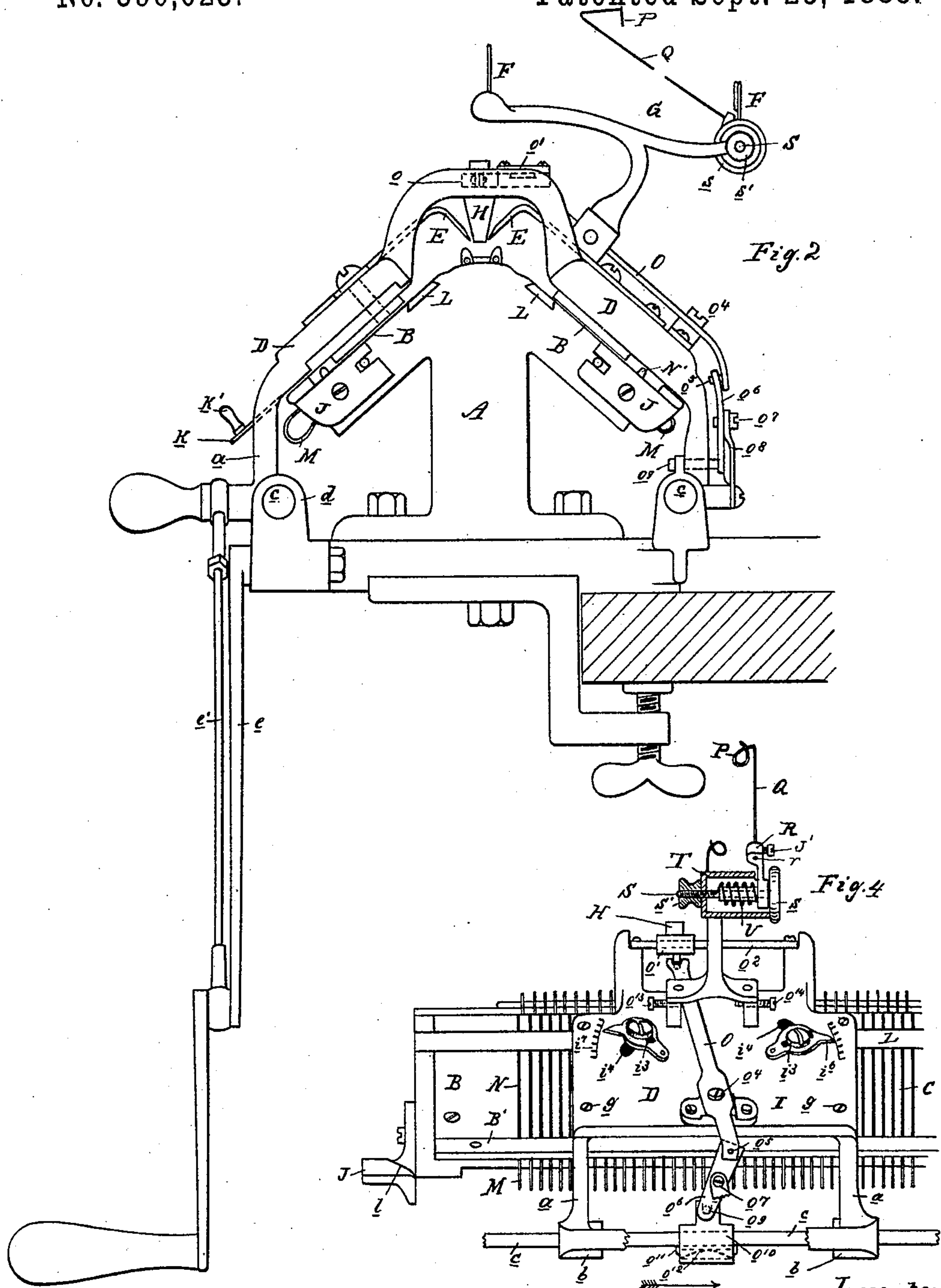
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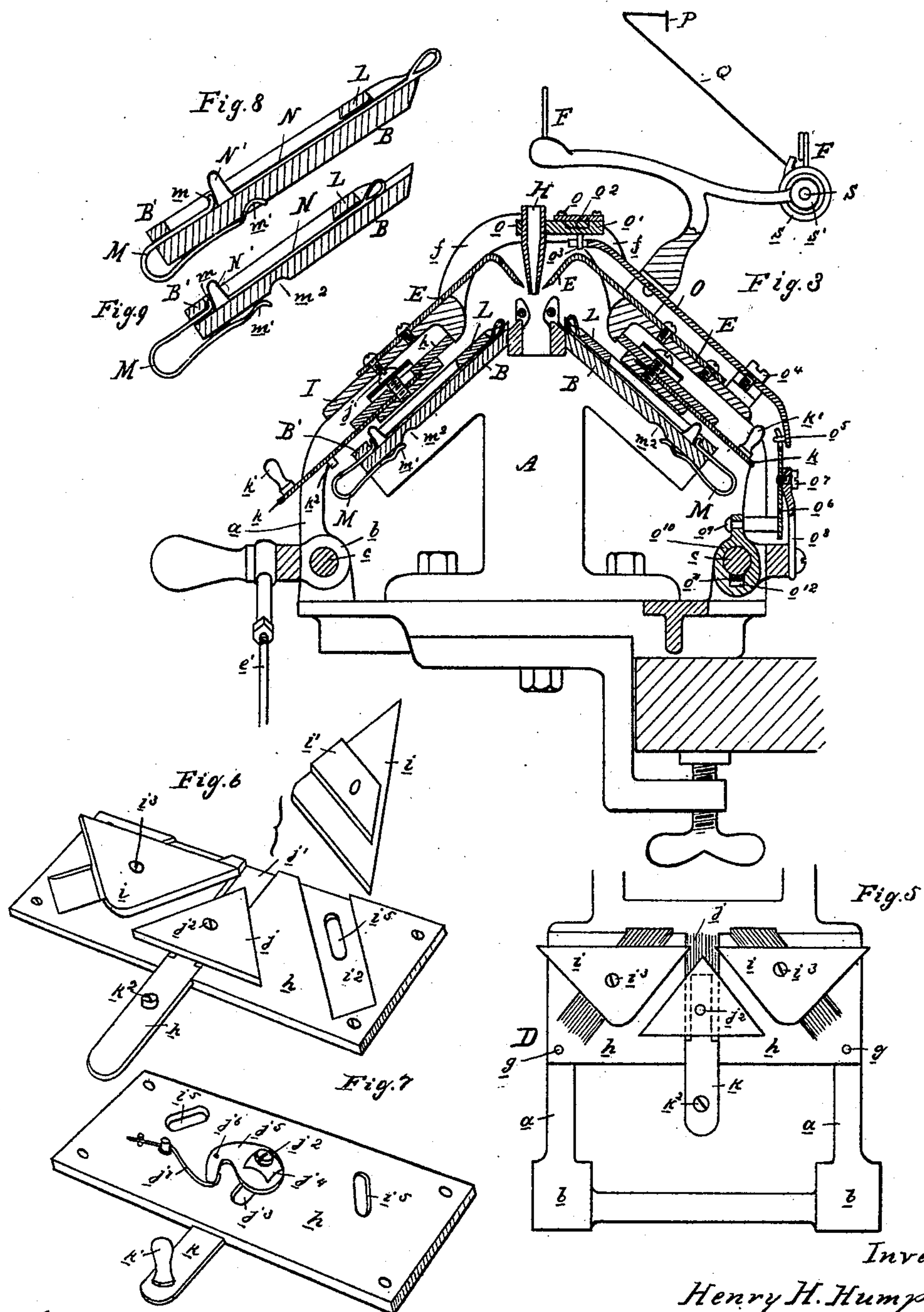
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UNITED STATES PATENT OFFICE.

HENRY H. HUMPHREY, OF DETROIT, MICHIGAN.

STRAIGHT-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 390,023, dated September 25, 1888.

Application filed February 17, 1887. Serial No. 227,878. (No model.)

To all whom it may concern:

Be it known that I, HENRY HUBERT HUMPHREY, of Detroit, in the county of Wayne and State of Michigan, have invented new and
5 useful Improvements in Straight-Knitting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.
10

This invention relates to new and useful improvements in straight-knitting machines; and the invention consists in an improved arrangement and construction of various parts,
15 all as hereinafter fully set forth, and shown in the accompanying drawings, in which—

Figure 1 is a perspective view of my improved knitting-machine. Fig. 2 is an end elevation thereof. Fig. 3 is a cross-section
20 thereof. Fig. 4 is a side elevation of a portion of the same, parts being broken away and parts in section. Fig. 5 is a bottom view of the needle-operating cams on one side of the carriage. Figs. 6, 7, 8, and 9 are details of
25 parts indicated by their letters of reference, and more specifically referred to hereinafter.

In the drawings, A is the frame supporting the double-inclined needle-bed B, which is provided with two rows of needles, N, movably supported in transverse grooves C. D is the reciprocating carriage, which carries on its under side the usual needle-operating cams for each row of needles. E E are the latch-openers. F F are the yarn-guides. G is the
35 tension and take-up device, and H is the shifting yarn-guide, all these parts being constructed, arranged, and operating in the usual manner, except as hereinafter set forth.

The carriage is provided with four legs, a, terminating in eyes or bearings b, which engage with the parallel guide-rods c, secured at some distance below the needle-bed in eyes d of the frame.
40

The reciprocating motion of the carriage is obtained, in the usual manner, by means of a crank, e, and pitman-connection e'. The carriage has a double-inclined bed, I, the two inclines being connected by arches f f, which provide the necessary room for the latch-openers E E and the shifting yarn-guide H.
50

To the under side of the carriage-bed are se-

cured by screws g the plates h, which carry the needle-operating cams. In Figs. 6 and 7 one of these plates is shown detached, Fig. 6 showing its under side and Fig. 7 its top side.
55 The needle operating cams are secured to this plate in the following manner: The wing-cams i i are provided upon their backs with tenons i' i', which fit adjustably into straight mortises i'', cut obliquely into the under side of the plate h, and each cam is provided centrally with a single adjusting-screw, i³, which passes through a slot, i⁴, Fig. 4, in the carriage-bed and through a coincident slot, i⁵, in the plate h into the cam. By these improved means I
65 overcome the constant liability of these cams to become loose under the severe strain to which they are subjected in operation, and at the same time I render them easily adjustable, there being but one screw for each cam, which,
70 when loosened, permits the cam to be readily adjusted for the well-understood object of knitting the fabric more or less loose. As a visual aid to the desired adjustment, I provide each set-screw with a pointer, i⁶, which is pivotally secured at one end to the carriage-bed and has a radial slot engaging on the shank of the screw. The position of the pointer is indicated by a little scale, i⁷, marked off at the
80 end of the pointer.

The shifting center cam, j, is adjustably secured to the plate h in a similar manner as the wing-cams, there being a mortise, j', cut transversely across the plate h, into which a corresponding tenon formed on the back of the center cam engages. This center cam is held to the plate h by a screw, j², which passes through a slot, j³, and has a spring-washer, j⁴, and also engages with one end of a little lever, j⁵, which is pivotally secured at j⁶ and engages with a
90 spring, j⁷. A downwardly-projecting arm, k, is secured to the center cam, and this is provided at the upper side with a handle, k', and upon the lower side with a pin, k².

By means of the construction described the
95 center cam is free to be shifted up or down to render it operative or inoperative, as desired. By tightening or loosening the screw j² the friction of the cam in sliding can be adjusted so as to be made sufficient to counteract any
100 accidental displacement by the jar of the machine in operation. Besides, the spring j⁷, act-

ing on the lever j^a , keeps the latter locked in position when the cam is either up or down. By means of the handle k' the center cam can be shifted at the option of the operator whenever required for special purposes well known; but in the normal operation of the machine this is done automatically by means of the cam-stop shifters J, which are secured to the corners of the bed and are made laterally adjustable thereon. These cam stop shifters are provided with suitable inclined planes, l , against which the pin k^2 on the arms of the shifting center cams strike at the end of each reciprocation of the carriage, thereby shifting each center cam automatically before the carriage begins its reverse movement. The inclines on the cam-stop shifters on one side of the needle-bed are reversely inclined to the inclines upon the opposite side of the needle-bed, so as to produce an alternate operation of the two rows of needles in the usual manner.

The needles N, which are of the usual kind, slide in transverse grooves in the needle-bed and are confined therein by the latch-bar L, which is secured in an undercut mortise in the needle-bed. The needles are provided with the usual heels, N' , which project above the face of the bed, and by their engagement with the cams of the cam-carriage produce the reciprocating movement of the needles.

Figs. 8 and 9, which are cross-sections through one side of the needle-bed, show the device for shifting the needles. It consists in clamp-springs M, slidably secured in the lower ends of the needle-grooves. The upper leg of each clamp-spring passes into the groove of the needle-bed underneath the bar B' , (which latter partially closes the lower end of the needle-grooves,) and is provided at its free end with an upturned toe, m , against which the heel of the needle rests and which also prevents the withdrawal of the spring-clamp farther than shown in Fig. 9. The lower leg of each spring-clamp engages on the under side of the needle-bed and has a catch or bend, m' , formed near its free end, which is adapted to engage with a slight projection or depression (such as the channel m^2) on the under side of the bed.

By pushing the clamp-springs up into the position shown in Fig. 8 the heels of the needles are thrown into the path of the needle-operating cams, and the needles are therefore rendered operative, and in this position they are firmly held against accidental displacement by the jar of the machine. By pushing down on the heel of the needle or by withdrawing the clamp-spring each needle may be readily retracted into its inoperative position. (Shown in Fig. 9.)

The shifting yarn-guide H, which guides the yarn into the hook of the needles, is of tubular form, conically contracted toward the lower end. It is secured with capacity for vertical adjustment by means of a clamp-sleeve, o , to the sliding box o' , which is fitted to slide upon the longitudinal guide-bar o^2 ,

secured to the carriage. The sliding box o' is provided with a stud, o^3 , which fits loosely into a slot cut at the free end of the yarn-guide lever O. This lever is pivotally secured at o^4 to the carriage-bed, and is provided at its lower end with a pin, o^5 , which engages with the free end of the shifting-lever o^6 . This lever is pivotally secured at o^7 to an arm, o^8 , of the frame of the carriage, and its lower end engages by means of a stud, o^9 , with the friction-sleeve o^{10} on the rear guide-bar, c , of the frame. A plate, o^{11} , carried within a recess of said sleeve and backed by a spring, o^{12} , produces a frictional resistance of this sleeve against lateral displacement. Two adjustable stops, o^{13} o^{14} , on the bed of the carriage arrest the oscillating movement of the shifting lever.

By examining Fig. 4 it will be seen that when the carriage is moving in the direction indicated by the arrow the shifting lever O is held in contact with the adjustable stop o^{13} ; but as soon as the motion of the carriage is reversed the shifting lever, on account of the frictional resistance of the sleeve o^{10} , oscillates on its pivot until it comes in contact with the stop o^{14} , and thus shifts the yarn-guide into its proper relative position required to engage the yarn into the hooks of the needles. While the carriage passes over the needle-bed the sleeve o^{10} travels with it and keeps the yarn-guide in position; but at the reversal of the yarn-guide lever the sleeve is momentarily at rest.

By means of the adjustable stops o^{13} and o^{14} the shifting lever can readily be adjusted to hold the yarn-guide in its proper working position.

P is the tension yarn-guide. It is formed at the free end of the spring-lever Q, the other end of which is removably secured in the hole r of the rock-arm R by means of the set-screw J' , the arm R being sleeved upon the shank of the adjusting-screw S. This screw passes through the axis of the spring-barrel T, and is provided with a milled head, s , and a tightening-nut, s' , and thereby permits of adjusting the tension of the coil-spring U, one end of which is secured to the shank of the screw, while the other end is secured to the rock-arm R. The spring-barrel is cut away at one end to permit the free play of the rock-arm within the desired limit. The object of this construction is to lessen the expense occasioned by the frequent breakage of the tension-lever, as by constructing it in two parts, as shown, any damage is generally restricted to the spring-lever Q, which can be quickly and cheaply replaced.

As the operation of knitting with my improved machine is conducted in the same well-known manner as with other machines of this class, I deem it unnecessary to enter into a description thereof.

What I claim as my invention is—

1. The combination, with the center cam, of the carriage-bed, the cam-stop shifters J, secured to the corners of said bed and provided

with inclined planes l , and the pin k^2 on the arm of said center cam, substantially as described, and for the purpose specified.

2. The combination, with the center cam and the downwardly-projecting arm k , secured thereto and provided with handle k' and pin k^2 , of the carriage-bed and the cam-stop shifters J , secured to the corners of said bed and provided with inclined planes l , said inclines being reversely arranged, substantially as and for the purpose specified.

3. The combination of the reciprocating carriage D , having transverse mortise j' formed in its bed, and with the shifting cam j , provided with a tenon engaging into said mortise, the screw j^2 , the spring-washer j^4 , the lever j^3 , the spring j^7 , and the shifting arm k , all substantially as described.

4. The combination of the laterally-grooved needle-bed and the needles placed therein, with the reciprocating carriage carrying the knitting-cams, the laterally-shifting center cam, the outwardly-projecting shifting arm secured thereto, a pin secured to such arm, and shifting cam-stops secured to the corners of the bed and provided with inclined planes arranged to operate in connection with the pin on the shifting arm to shift the center cam, substantially as described.

5. The combination of the laterally-grooved needle-bed B and two series of needles placed therein with the reciprocating carriage D , carrying the knitting-cams, the laterally-shifting cams j , the outwardly-projecting arms k , secured to the shifting cams, the pins k^2 and handles k' , secured to said arms, and the shifting cam-stops J , secured at the corners of the needle-bed and having the inclined planes l , substantially as described.

6. The combination of the reciprocating carriage with the tubular shifting yarn-guide H , conically contracted toward its lower end, the sliding box o' , the longitudinal guide-bar o^2 ,

and the shifting yarn-guide lever and its actuating mechanism, substantially as described.

7. The combination of the reciprocating carriage with the shifting yarn-guide H , the clamping-collar o , adjustably securing said yarn-guide in position, the sliding box o' , carrying said clamping-collar, the guide-bar o^2 , and the means for shifting the sliding box on its guide-bar, substantially as described.

8. The combination of the reciprocating carriage with the shifting yarn-guide H , the clamping-collar o , the sliding box o' , the guide-bar o^2 , the yarn-guide lever O , the lever o^6 , the friction-sleeve o^{10} , and the guide-bar c , all arranged to operate substantially as described.

9. The combination of the reciprocating carriage with the shifting yarn-guide H , the sliding box o' , carrying said yarn-guide, the guide-bar o^2 , the shifting yarn-guide lever O , actuating means for said lever, and the adjustable stops o^{13} o^{14} , substantially as described.

10. The combination of the reciprocating carriage with the yarn-guide, the shifting yarn-guide lever O , the lever o^6 , the guide-bar c , and the sliding sleeve o^{10} , having the friction plate o^{11} and the spring o^{12} , all arranged to operate substantially as described.

11. The combination, with the barrel T , of the screw S , passed through the axis of said barrel and provided at one end with milled head s and at the other with adjusting-nut s' , the coil-spring V around said screw within said barrel, the rock-arm R on said screw and provided with hole r , the spring-lever O , formed at one end with tension yarn-guide P and its other end inserted in the hole in the rock-arm, and the set-screw J' , for holding said end in the rock-arm, substantially as described.

HENRY H. HUMPHREY.

Witnesses:

H. S. SPRAGUE,
E. I. SCULLY.