

H. B. Scudder.

3. Sheets, Sheet 1.

Knitting Mach.

No 100,810.

Patented Mar. 15. 1870.

Fig. 1.

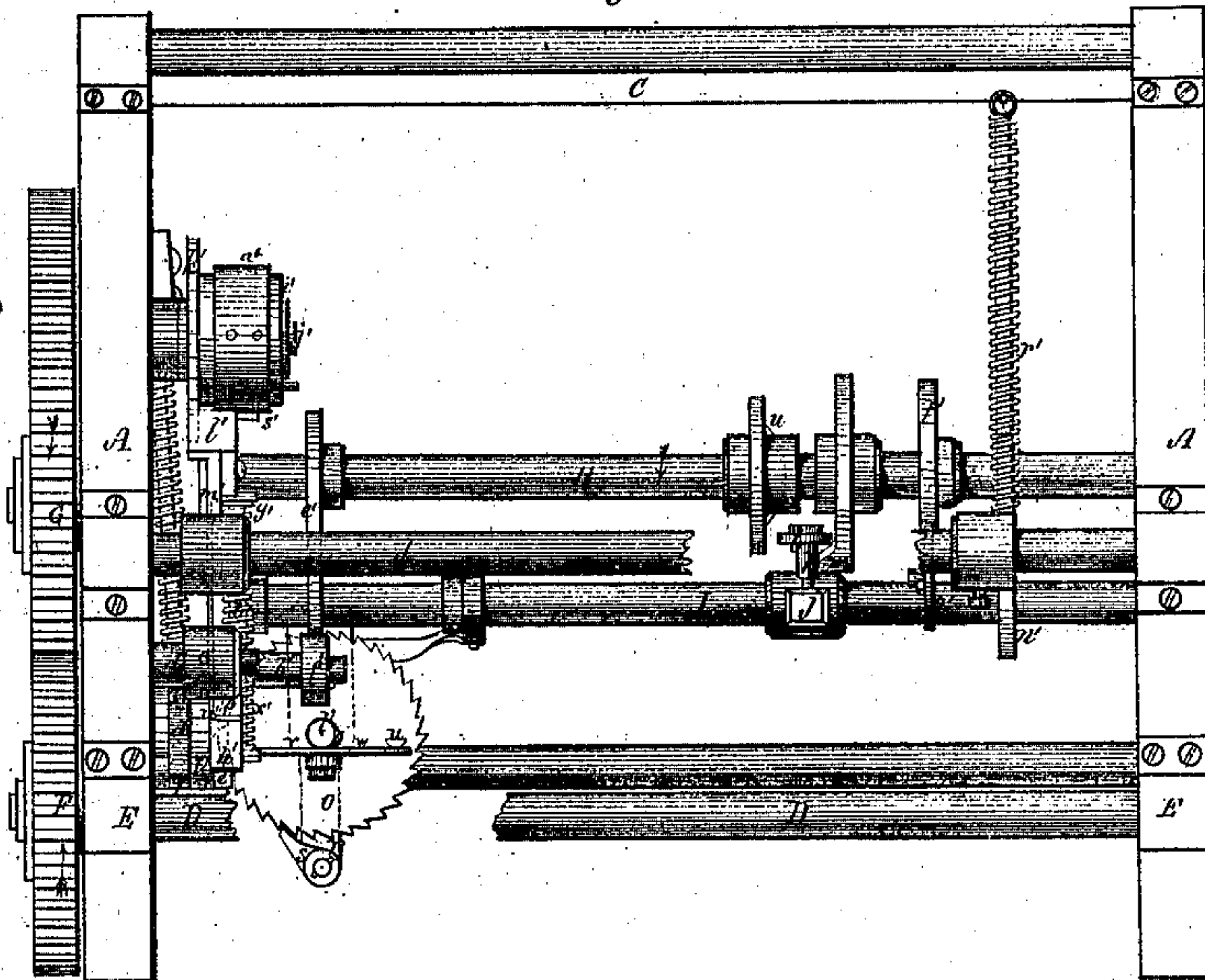
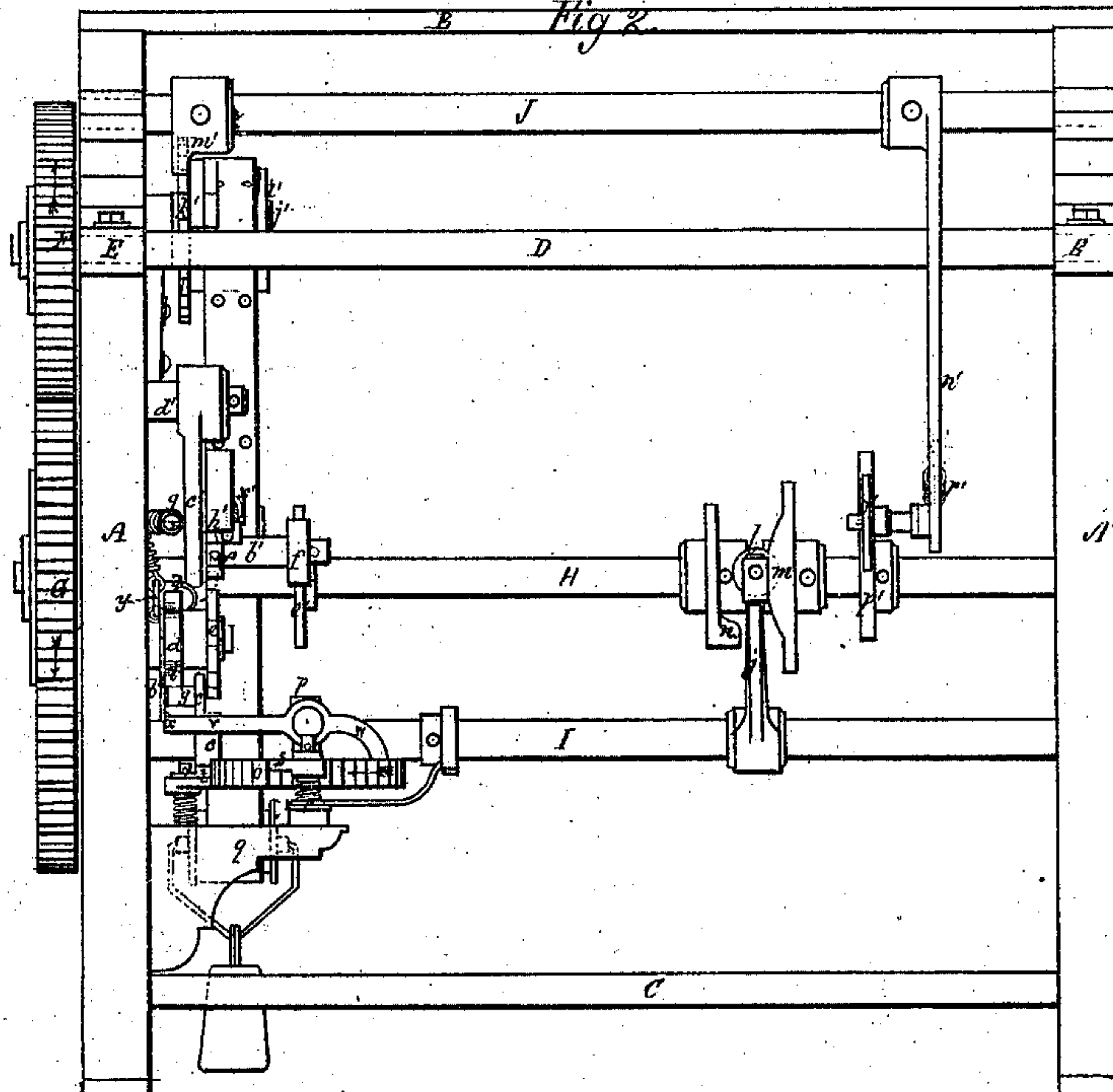


Fig 2.



Witnesses
Edward H. Nelson
Edward Griffiths

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by his Attorney,
Frederick Curtis

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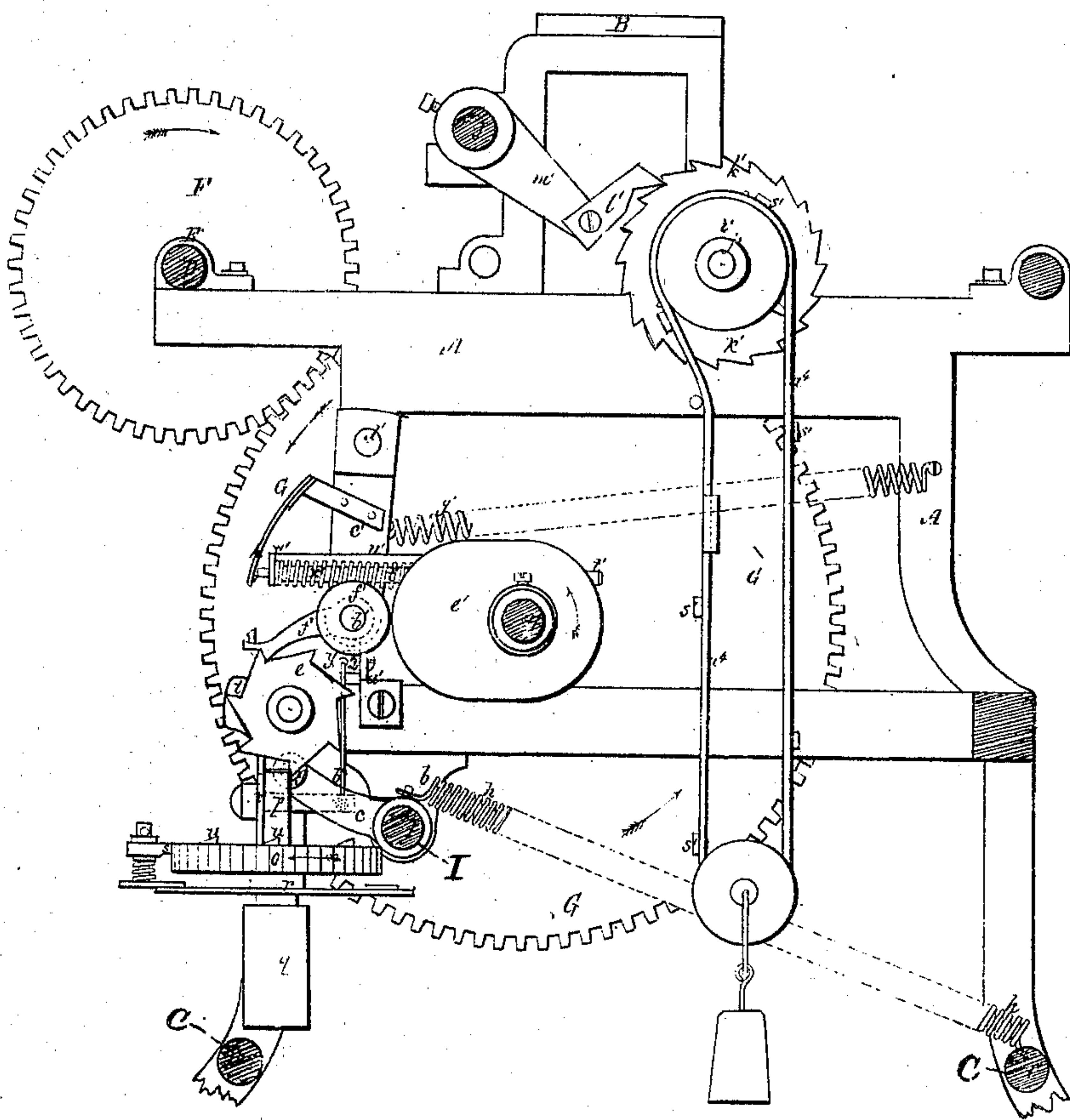
3. Sheets, Sheet 2.

Knitting Mach.

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Fig. 3.



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3 Sheets Sheet 3.

Knitting Mach.

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Fig. 6.

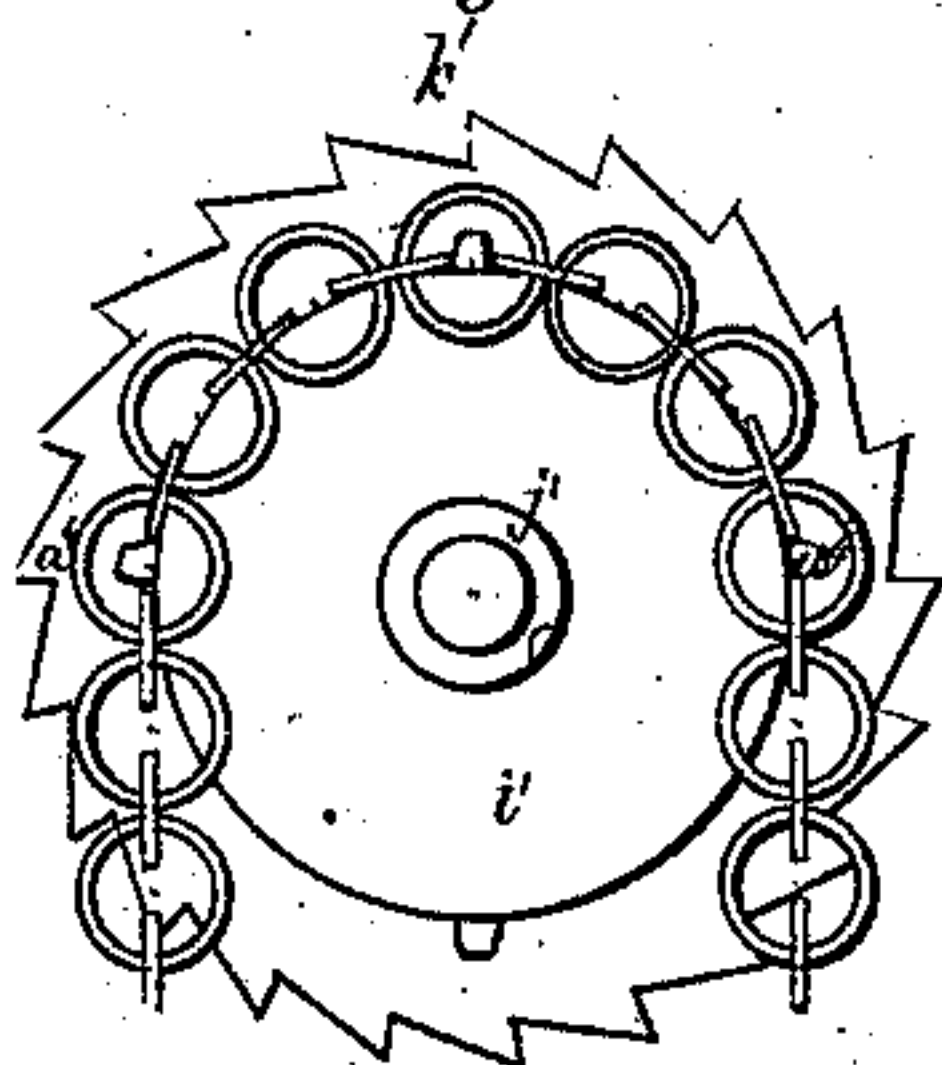


Fig. 4.

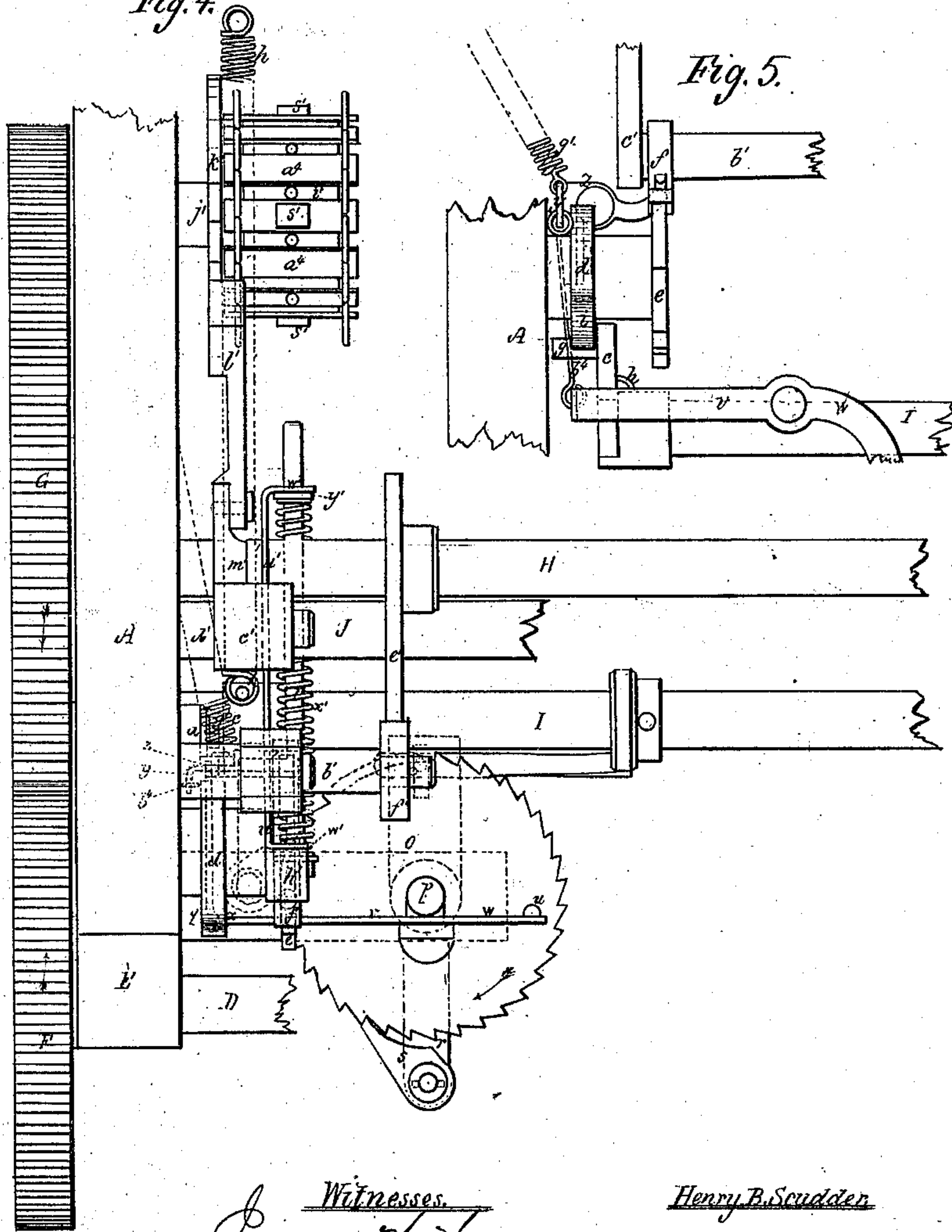
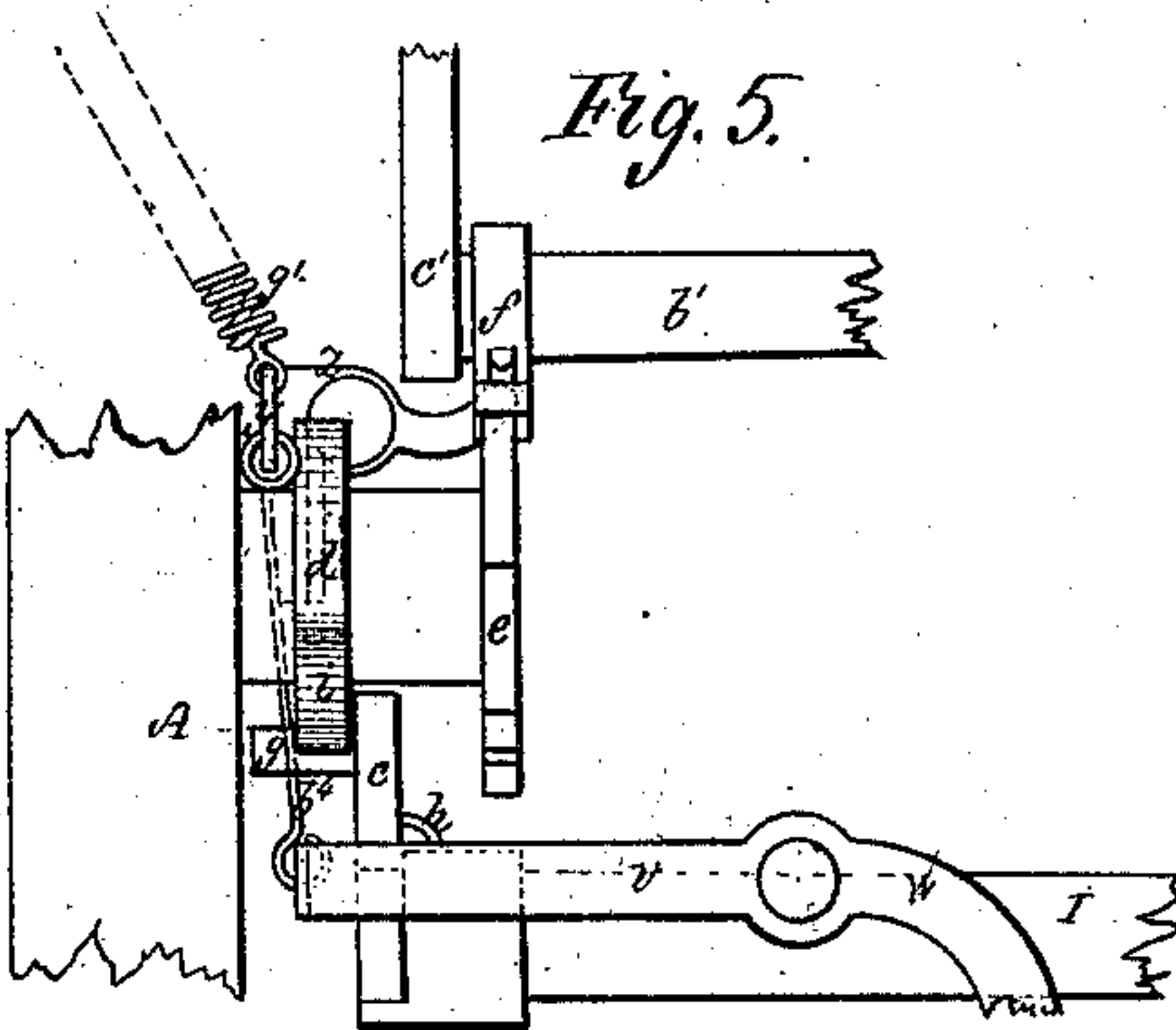


Fig. 5.



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United States Patent Office.

HENRY BATCHFORD SCUDDER, OF NEEDHAM, MASSACHUSETTS.

Letters Patent No. 100,810, dated March 15, 1870.

IMPROVEMENT IN KNITTING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all to whom these presents shall come:

Be it known that I, HENRY BATCHFORD SCUDDER, of Needham, in the county of Norfolk, and Commonwealth of Massachusetts, have made an invention of certain new and useful Improvements in Machinery for Knitting Looped Fabrics; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a plan;

Figure 2, a front elevation;

Figure 3, a vertical and transverse section of portions of a knitting-machine embracing my improvement;

Figure 4 is a plan; and

Figure 5, an elevation of a portion of the mechanism to be described;

Figure 6 being an end elevation of its suspensory.

The invention comprising the subject-matter of these Letters Patent is an improvement in machinery for knitting looped fabrics of the class known as "plane knitting-machines," my invention being in the present instance adapted more especially to machines for knitting drawers, sleeves, and hose, and in which the traveling needles, transferring selvage-prongs, or instruments and the needle-bed with their appurtenances, are so arranged and organized that such needles are upheld and point in a perpendicular direction, and are moved, in the process of producing the fabric, to and fro in the direction of their longest axes, and somewhat at right angles thereto, as well as the garment or fabric produced passing away from them in a horizontal plane.

The class of machines I have herein referred to, wherewith to exhibit my invention, is to contain two series of barbed needles and two series of sinkers to operate in the formation of loops from yarn, laid on or presented to the needles by carriers, and to make, at one and the same time, two pieces of work or fabric, formed upon opposite sides of the centre of such machine, so that, for instance, one leg and half the body of a pair of drawers may be knit on one half of the machine, while another such leg and portion of the body are being knit upon the opposite half of the machine.

I do not, however, limit the machine to a restricted number of such divisions, since it may possess them in plurality to vary its effective capacity for producing work, each piece of work, however, being produced by like means.

The herein-described invention relates to means whereby the act of widening and narrowing or "fashioning" of the fabric is to a certain extent governed by the machine automatically, the advantages to be derived from the adoption thereof being a more per-

fect fabric than has yet been produced, combined with a reduction in the cost of such production, owing to economy of manual labor, and to some extent of saving of material.

A special instance of the class of knitting machinery to which my invention is applicable is shown and described in Letters Patent of the Kingdom of Great Britain, No. 3,123, and issued on the 16th day of December, 1864, to William Cotton, of Longborough, Leicester, England, as well as in Letters Patent of the United States of America, issued for the same invention and to the same inventor, on the 20th day of November, 1866.

As not only the construction and organization of such machine, but its operations and the nature of the fabric produced by it are elaborately described and exhibited in such Letters Patent; and as my invention relates not to extended changes in its general form or characteristics, but only to local and simple application of devices for governing details of said machine, I shall not dilate upon its principles in general, or its productions, except in so far as may be found conducive to the full understanding of the nature and purposes of my present improvement.

Although my present invention, herein to be described, is, as before premised, especially adapted to the individual machinery, as embodied in the Letters Patent above mentioned, it possesses inherent characteristics and principles which will render valuable its application to machines other than those of the class herein referred to.

Heretofore the operation of "fashioning" the fabrications of Cotton's machinery has been effected by the manual dexterity and labor, as well as undivided attention of the attendant, since he is obliged to adjust certain details of the machine at every change in the breadth of the fabric which is being knit under his supervision. Hence, any device or attachment which enables the machine to effect automatically this fashioning of the fabric, according to a given and predetermined form or size, becomes of importance.

My invention then in detail, but not in principle, relates to certain devices connected directly with the wiper-cam, ratchet-wheels, and clawkers, which, in Cotton's machine, produce, by intervening devices hereinafter explained, the movements of the fashioning instrumentalities, and consists in the employment of a horizontal ratchet-wheel disposed below the first-named ratchet-wheel, and provided with an oscillating depressing-lever, and a lifting-spur or grade for elevating the clawker and disengaging it from the fashioning mechanism to cease the operation of fashioning, as well as combining therewith a holding-up catch and a releasing-bolt, the latter acting in conjunction with a traveling endless chain or belt to release the

clawker, which has been previously thrown up out of work by the agency of the lifting-ratchet and lever before mentioned, incidental details of these devices being in due time alluded to.

As the ratchet and suspensory last referred to effect at proper and given times the disengagement of the clawkers or pawls, and, as a consequence, the cessation of the widening or narrowing of the fabric, as the case may be, therefore, to each individual pattern and size of fabric to be knit upon the machine, a corresponding ratchet-wheel and chain or belt are adapted, and are applied to the machine prior to beginning the knitting of the article, the resultant advantage being that the fashioning of the fabric becomes self-regulated and continuous, and not dependent upon manipulation and constant attendance on the part of the operator, thus enabling me to employ a much less expensive class of help.

The portion of the mechanism which, in Cotton's original machine above mentioned, effects the laying or delivery of the yarn to the needle, in order to effect "fashioning" of the fabric, is by my invention forced into and out of action by the agency, primarily, of the wipers or studs fixed to the endless chain or belt, and of the lifting-spurs or sloping grades of the horizontal ratchet, the various details of the mechanism, which in the aggregate embody my improvements, being so organized, and the effects of the chain being such that, in the intervals of time between the action of said ratchet, chain, and their accessories, the machine is knitting a fabric of uniform width; but when such parts are in action their effect upon the fashioning mechanism of the machine is such as to put it in motion, and the fashioning of the fabric is thereby accomplished. Hence, the greater the extent of the blank spaces between two adjacent wipers or spurs of the chain, and the greater the number of the lifting-slopes of the ratchet, the greater will be the extent of the straight portion of the work, since it is by the agency of these wipers and grades that the rotations of the wiper-cam, which effects "end on" movements of the fashioning or "bowl"-shaft, are effected.

We have now seen that the action of the ratchet and its lifters throw the clawkers or pawls out of work and allow the machine to knit a fabric of uniform width, while the action of the wiper fixed upon the chain is such as to force the pawl into engagement with the ratchet, and by means of the wiper-cam put into action the fashioning mechanism. Therefore, in order to produce the various portions of garments knit upon a machine to which my invention is applied, we have either to vary by some means the number of wiper-studs upon the chain, or to provide an individual one for each form and size of fabric.

I prefer to accomplish the former, as I can without difficulty adapt an endless chain of sufficient length to contain all the studs that may be found necessary for any form or size of fabric, these studs to be applied or removed in number and manner according to need, it being understood that present experiments induce me to adopt an individual ratchet-wheel for each different form and size of fabric, though future experience may determine this to be unwise or unnecessary.

In the drawings attached to this specification, and which will be found to illustrate my invention, I have represented only such parts of a knitting-machine as are necessary to enable mechanics of good acquirements to produce and put into practical operation such invention.

In the following description I shall confine myself, without extreme qualification, to the use of terms generally adopted by knitters to designate the various parts of the machine, since it is to such persons mainly that this specification is addressed; and I

would call the reader's attention to the fact that I have considered it necessary to show the adoption of but one ratchet-wheel and pawl or "clawker" as it is termed by the craft, since any multiplication of such parts will be readily apparent to skilled persons, and the explanation of one will suffice for a plurality.

Persons of experience will at once understand that, as the number of teeth composing in aggregate the periphery of the upright ratchet determines the number of courses between the times of action of the fashioning instruments, variations in the number of these teeth will cause corresponding variations in the shape of the fabric.

Referring to the accompanying drawings, it will be seen that A A' denote the two upright standards which constitute the end portions of the frame of a knitting-machine, these standards being united at top by a flat longitudinal bar or rail, B, and at bottom by one or more rods or braces C C, after the manner substantially of several knitting-machines now in operation, the traveling-needles, selvage-prongs and their adjuncts, being disposed above and in rear of the rail B, in manner as will be readily understood by persons conversant with such machines, these component parts of a machine being abbreviated in length for obvious reasons of economy in space, in the drawings.

The driving-shaft of the machine is shown at D, as supported in suitable bearings E E affixed to the upper front part of the standards A A', the outer and left extremity of this shaft carrying a pinion, F, which engages with and drives a spur-gear, G, which in turn is affixed and imparts a rotary motion to the main or "tappet" shaft, shown at H in the drawings, this latter shaft having suitable boxes fixed to the inner part of the standards A A', and vertically about midway thereof.

Rotations of the pinion and driving-shaft in one direction impart revolution to the gear G and tappet-shaft in a contrary direction, such paths of revolution being indicated by the arrows thereon.

I denotes the bowl or "shagging"-shaft, supported in bearings b b, attached to the end standards of the machine-frame, this shaft I being a rocker-shaft, and disposed somewhat below and slightly in advance of the tappet-shaft H.

Rockings of this shaft I are effected by a "nodding" arm or lever, c, which has vertical vibrations imparted to it by a wiper-cam or depressing hub, d, making part of and disposed along side of a ratchet-wheel, e, such cam and ratchet revolving in unison with intermittent rotations caused by the horizontal reciprocations through the arc of a circle of a pawl or "clawker," f, suspended and actuated as hereinafter explained.

A horizontal rod or spur, g, extends laterally from the free end of the nodding lever c, and impinges against the periphery of the wiper-cam d, against which it is held by the action of a spring, h, arranged as shown in fig. 3 of the drawings.

One complete revolution of the cam d, imparted to it by the repeated reciprocations of the clawker f, brings its enlargement or wiper i in contact with the rod g, and, by depressing the lever c, advances the upper and free end of a vibrating arm or support, j, which is secured, immovably at its lower end, to the rocker-shaft I, the said upper and free end of this arm j carrying an inwardly-projecting start or journal, k, upon which is mounted an anti-friction roller or bowl, l.

This outward movement of the lever and its bowl forces the latter into contact with, or subjects it alternately to, the action of one of the two inclined or arched grades or tappets m n, oppositely disposed upon the rocker-shaft, and embracing the bowl l, but not in longitudinal alignment, since the bowl, and

with it the arm *j* and rocker-shaft I, is to be pushed endwise alternately by each tappet, which would not be the case were they otherwise disposed.

The depression outward of the free extremity of the arm *j*, caused by the nodding or lowering of the arm or lever *c*, throws the bowl *l* into contact with the tappet *m*, while the revolution of this tappet, through a circle, produces an endwise movement of the rocker-shaft in one direction.

Simultaneous with the escape of the bowl from the tappet *m*, the wiper *i* of the cam *d* passes by the rod *g*, and allows the lever *c* to be raised by the action of its spring, thus releasing the bowl from the action of the tappet *m*, and throwing it into the path of revolution of the tappet *n*, which is advancing to meet it, and which impinges against it after it leaves the face of the tappet *m*. The interval of time during which the cam *i* is passing over without actuating the arm *c*, or during one tooth movement of the ratchet, is the time, of course, occupied by the action of the fashioning instruments, which are put in motion by the endwise movement of the rocker-shaft, it being understood that while the arm *c* is depressed by means of the cam *i*, and, as a consequence, the bowl *l* maintained out of the path of the advancing tappet, the latter makes one revolution upon its axis without impinging against such bowl; therefore the peripheral length of the cam *i* determines the extent of time at which the fashioning instruments shall be at work, since, by controlling the time during which the bowl is kept from contact with the tappet *n*, it also controls the time of action of such instruments, whose labors are directly dependent upon the functions of the said tappet *n*.

The above-described grouping and construction of parts are substantially, if not identically, synonymous with the machine of Cotton, before referred to, and as exhibited in his patent, and so far contain no points of novelty peculiar to myself, it being borne in mind that when it becomes necessary to put into operation the fashioning mechanism in order to widen or narrow the fabric, the attendant is obliged to release and lower the clawker or clawkers into connection with the ratchet, and when the fashioning is completed to raise the clawker from contact with the ratchet; this act, and the necessary judgment, requiring the undivided time and attention of an experienced knitter, and one who requires high wages.

To effect the engagement and disengagement of the clawkers at the proper time, and, consequently, to govern automatically the fashioning devices, is, as has been hereinbefore premised, the purpose of this invention, and I will now proceed to explain the mode I have adopted of carrying out such object, this specification thus far having been restricted to the description of a portion of Cotton's machine.

It is evident that, from the endwise or reciprocating rectilinear motions of the rocker-shaft I, I may easily obtain an intermittent rotary motion; therefore, I dispose, a short distance below the vertical ratchet-wheel *e*, and about on a level with and closely contiguous to the rocker-shaft I, a second and horizontal ratchet or toothed wheel, *o*, such wheel being mounted and revolving upon an upright post, *p*, erected upon a bracket, *q*, disposed below it, and projecting inward from the end standard of the machine-frame.

Straddling or encompassing the post *p*, and situated below the ratchet, is a horizontal carrier-bar, *r*, carrying, at its front extremity, which extends beyond the periphery of the ratchet, a spring pawl, *s*, which is properly pivoted to it, such pawl engaging with the teeth of the said ratchet, as represented.

The inner and rear extremity of the carrier-bar *r* is pivoted, in a suitable manner, to the rocker-shaft I or an arm projecting therefrom, and so that endwise

reciprocations of such shaft shall produce partial rotations of the ratchet in the direction of its arrow, such ratchet being further provided with a second and holdfast pawl, *t*, pivoted to the bracket *q*, for the purpose of preventing any retraction of the said ratchet.

To the upper face of the ratchet-wheel *o* I affix a series of lifting-grades or sloping studs, such lifters being represented in the accompanying drawings at *u*, the working-face of each lifter receding in a direction contrary to that traveled by the ratchet.

v, in the drawings, denotes a horizontal depressing-lever surmounting the ratchet-wheel *o*, and with its shorter arm, *w*, curved and resting upon the surface of the same, the opposite and longer arm of the lever *v* being extended longitudinally of the machine, and having a right-angular termination, *x*, which extends, in a rearward direction, below the cam block or wiper-cam *d* before alluded to, the extremity of this lateral bend *x* being pivoted or swiveled by a rod, *b'*, to the outer and shorter arm *y* of a second oscillating horizontal lever or link, *z*, which, in its turn, is mounted upon a projection or bracket, *a'*, reaching inward from the end standard A of the machine frame and in rear of the wiper-cam, the altitude of this lever *z* being about equal to the upper surface of the vertical ratchet-wheel *e*, in order that it may abut against the under surface of the pawl or "clawker" *f*.

This clawker *f* is pivoted in the usual manner at its rear end to a horizontal shaft, *b'*, which, in turn, projects inward over the ratchet-wheel *e* from a swinging or pendulous rod or arm, *c'*, suspended from a stud or journal, *d'*, arranged above the shaft *b'*, and substantially in vertical alignment therewith, the desired pendulous movements of the said rod *c'*, in one direction, being obtained by the agency of a tappet or wiper, *e'*, fixed to the tappet-shaft H of the machine, such tappet impinging against a roller, *f'*, mounted upon the free extremity of the shaft *b'*, the retractions of the rod *c'* being effected by the action of a spring, *g'*, one end of which is made fast to its lower part, and the opposite end secured to the opposite or rear side of the standard A.

Endwise reciprocations of the rocker-shaft I, by instrumentalities before explained, produce intermittent movements of the ratchet *o*, until one of its lifters, *u*, impinges against and elevates the shorter arm of the lever *v*, which, of necessity, effects the depression of its longer arm, and by actuating the lever *z* raises its outer arm and with it the clawker *f* out of engagement with the ratchet *e*, and to such an altitude that it is locked to a spring catch-bar, *h'*, which is suspended over it from the pendulous support *c'*, the clawker being so formed or provided as to cling to this catch until released by force, in manner to be explained, the longer arm of the lever *v* rising to its normal position immediately after the passage of the lifter past its shorter arm.

The mode of automatic disengagement of the clawker and ratchet, and the ensuing cessation of the action of the fashioning devices having been understood, it now remains to provide a means by which to effect the engagement of the clawker *f* with the ratchet *e*, in order to bring the fashioning instrumentalities into play.

To this end, and in furtherance of the purpose of my invention, I mount a sprocket-wheel, *i'*, upon a horizontal stud, *j'*, projecting inward from the standard A, such wheel being situated at the rear upper corner of such standard, and provided, upon its outer face, with a serrated or toothed feed-wheel, *k'*, fixed to it, such wheels being driven together by a pawl, *l'*, which engages with the latter, this pawl being pivoted to the inner and free end of a vibrating arm, *m'*, the opposite end of such arm being mounted upon a rocker-shaft, J. This shaft is the "sinking"-shaft, so called,

of the machine, and which is supported in bearings or boxes applied to the extreme upper front corners of the standard A A'.

Rockings of the shaft J induce intermittent partial revolutions of the sprocket-wheel upon its axis, such rockings being effected by a pendent swinging arm, *n'*, hanging or suspended from such shaft and fixed to it, the lower end of this arm carrying a roller or "bowl," *o'*, which impinges against the periphery of an oblong tappet, *p'*, fixed to the main tappet-shaft H of the machine, and alongside of the tappet *m*, hereinbefore alluded to, the returns of this arm *n'* being produced by a spring, *r'*, applied as represented in the drawings.

Traveling about and carried by the wheel *i'* is an endless chain or belt, *a'*, this chain being provided, upon its outer face, with a series of spurs or wipers, *s' s'*, &c., disposed equidistant from each other, and being applied thereto in such number as to correspond to the number of sloping lifters upon the ratchet-wheel *o*, since the office of these wipers is to release the clawker after each successive elevation by means of such ratchet or "step-by-step" wheel.

The wipers or studs *s' s'*, &c., impinge, in succession, against the rear end of a bolt, *t'*, which plays in a long vibrating clasp or plate, *n'*, secured to the inner face of the swinging arm *c'*, before mentioned as carrying the clawker or clawkers *f*, such clasp being disposed at right angles to the length of the machine, as represented.

This clasp or plate carries between its ends *w¹ w²* a helical or spiral spring, *x'*, which also encompasses the bolt *t'*, and by bearing against a collar, *y'*, formed upon the rear end of the latter, serves to force the bolt rearward toward or against the endless chain *a'*.

The impact of one of the wiper-studs, carried by the endless chain against the rear end of the bolt *t'*, slides such bolt and releases the clawker *f*, thus allowing it to fall upon and engage with the ratchet-wheel *e* with results before explained.

As the bolt *t'* moves with the swinging arm to which it is attached, it preserves at all times the same relationship thereto, and consequently is ready for action upon the clawker when it may be necessary.

By means of the above-described arrangement of devices, embodying my invention, it will be apparent that the fashioning of the fabric may be automatically governed, presupposing, of course, that the number of spurs upon the endless chain or belt is arranged with reference to the lifters of the ratchet *o*, and both chain and ratchet arranged and applied to the machine with due regard to the character of the work to be produced.

Having thus described the purposes of my invention, as well as its nature and operation, in one of its manifest varying forms of adaptation,

What I believe to be novel and original with myself, and desire to secure by Letters Patent of the United States of America, is as follows:

Claims.

1. The ratchet-wheel *o*, and its lifting-grades *u u*, and the endless chain *a'*, or its equivalent, provided with the spurs or wipers *s' s'*, the said ratchet and chain being combined with mechanism, substantially as described, for imparting their action to the fashioning devices of the machine for the purposes set forth.

2. The ratchet-wheel *o* and its lifting-grades *u u*, the lever *v*, and lever *y z*, in combination with pawl *f*, and its detaining-spring *h'*, for throwing the fashioning-mechanism out of action.

3. The combination and arrangement of the ratchet-wheel *o*, with its lifting-grades *u u*, and actuating devices, the depressing-lever *v*, connected with the lever *z*, as explained, the chain or suspensory *a'*, with its studs *s' s'*, &c., carried by the sprocket-wheel or its equivalent, suitably driven, and the sliding bolt *t'*, such parts being combined with the clawker or clawkers *f*, cam-block *d*, ratchet *e*, and shafts I and II, with their appurtenances, and the whole operating to produce results hereinbefore explained.

HENRY B. SCUDDER.

Witnesses:

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CHAS. E. CHESTER.