

A. Paget.
Knitting Mach.

N^o 64,900.

Patented May 21, 1867.

Fig.1.

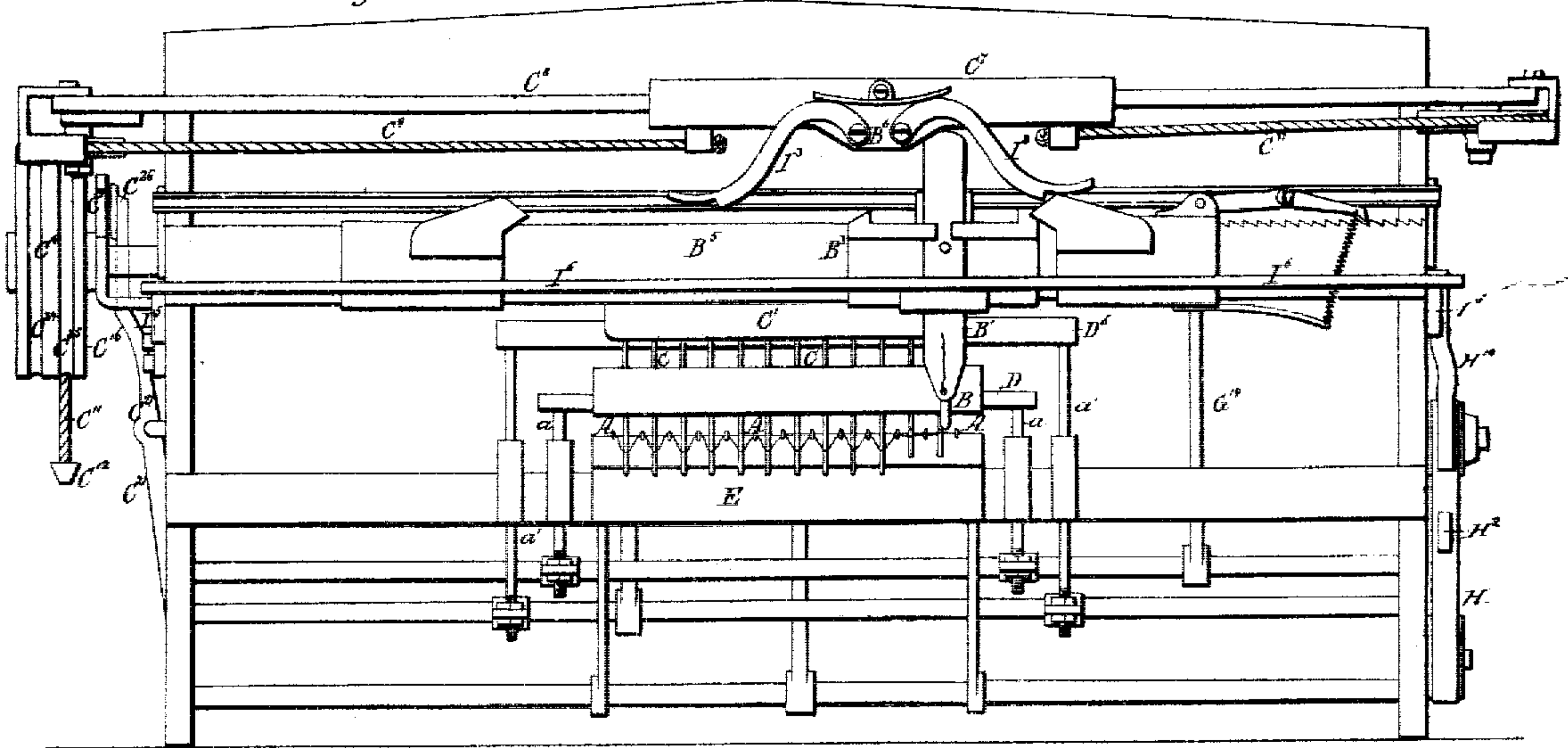


Fig. 2.

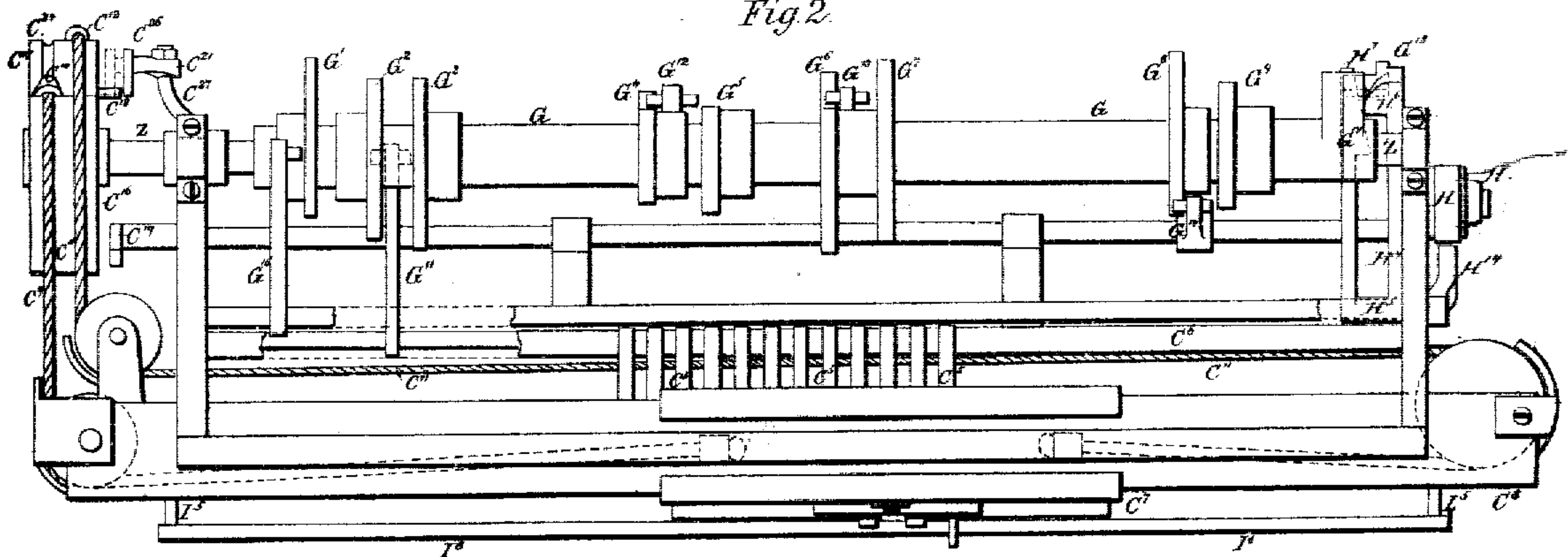
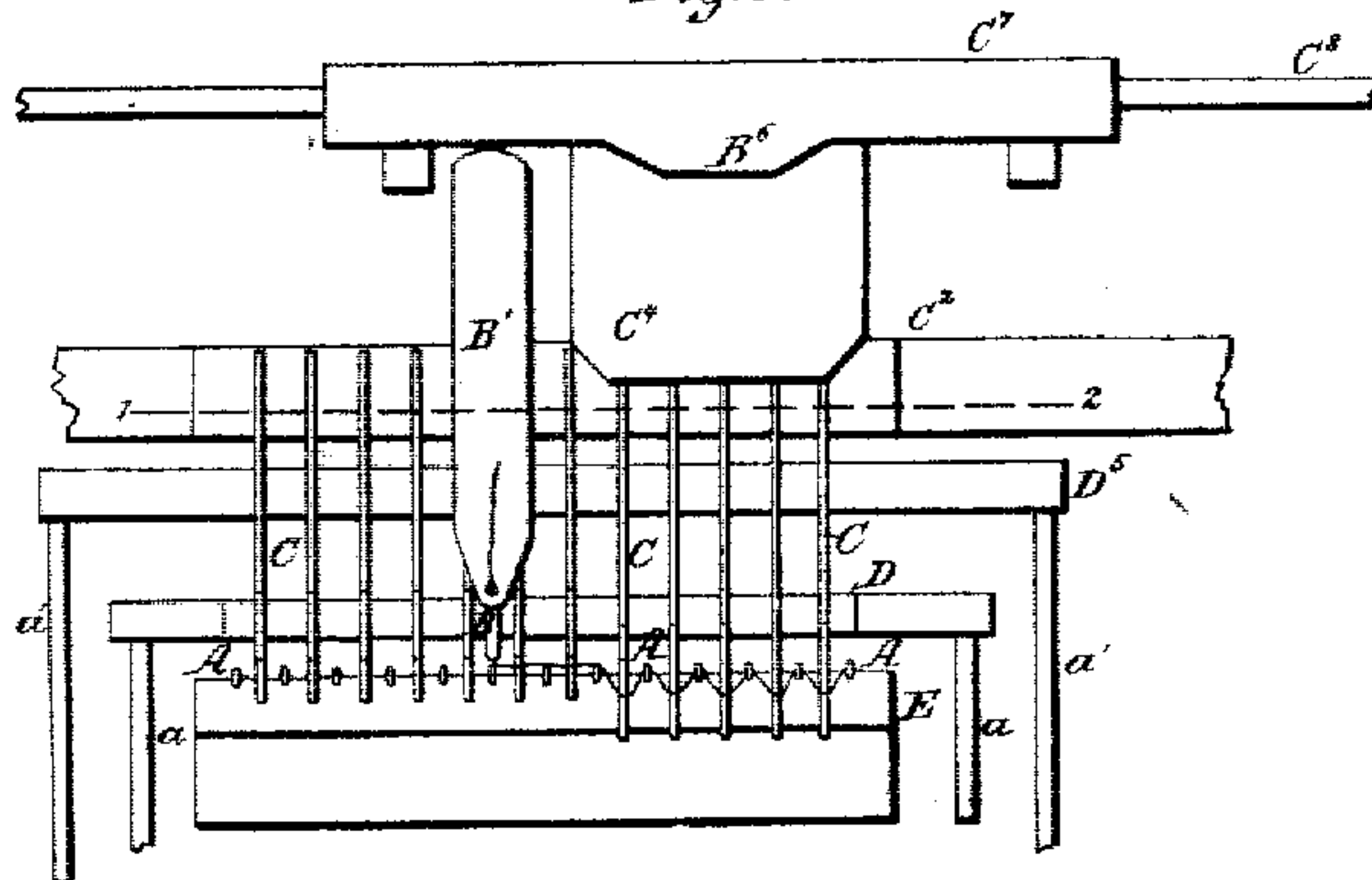


Fig. 3.



Witnesses

Wm. Albert Steel.
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Fig. 4.

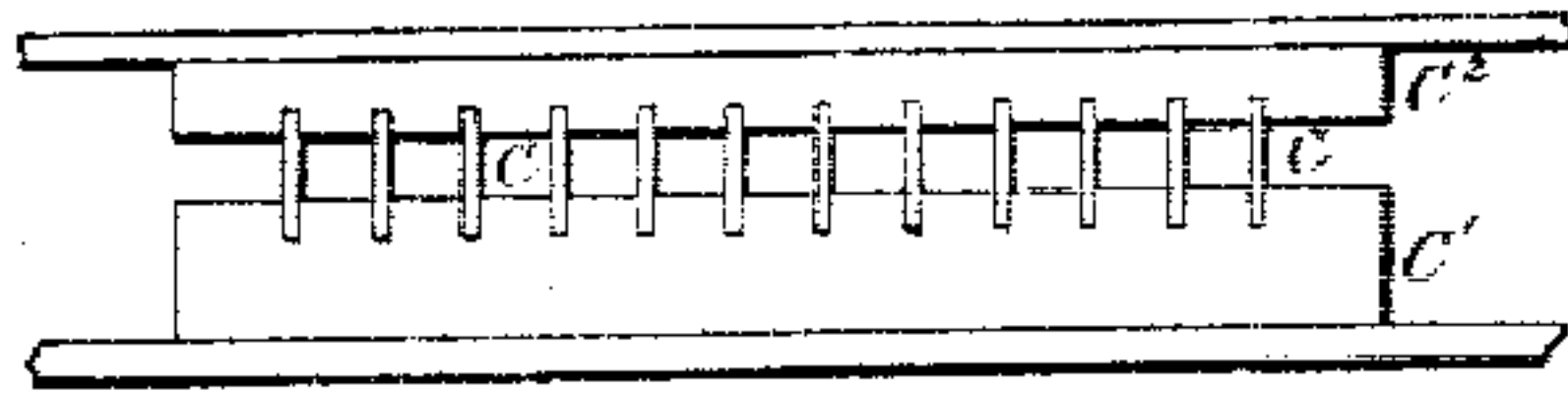


Fig. 5.

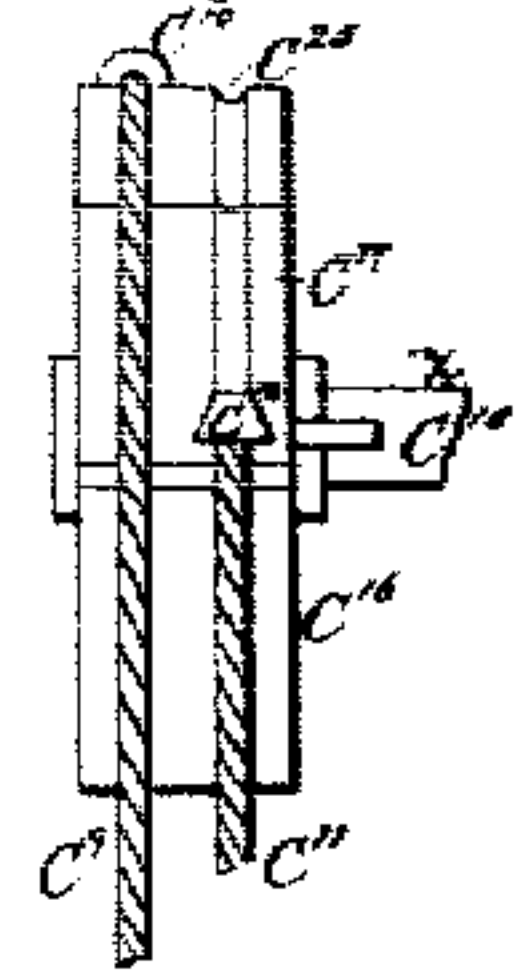


Fig. 7.

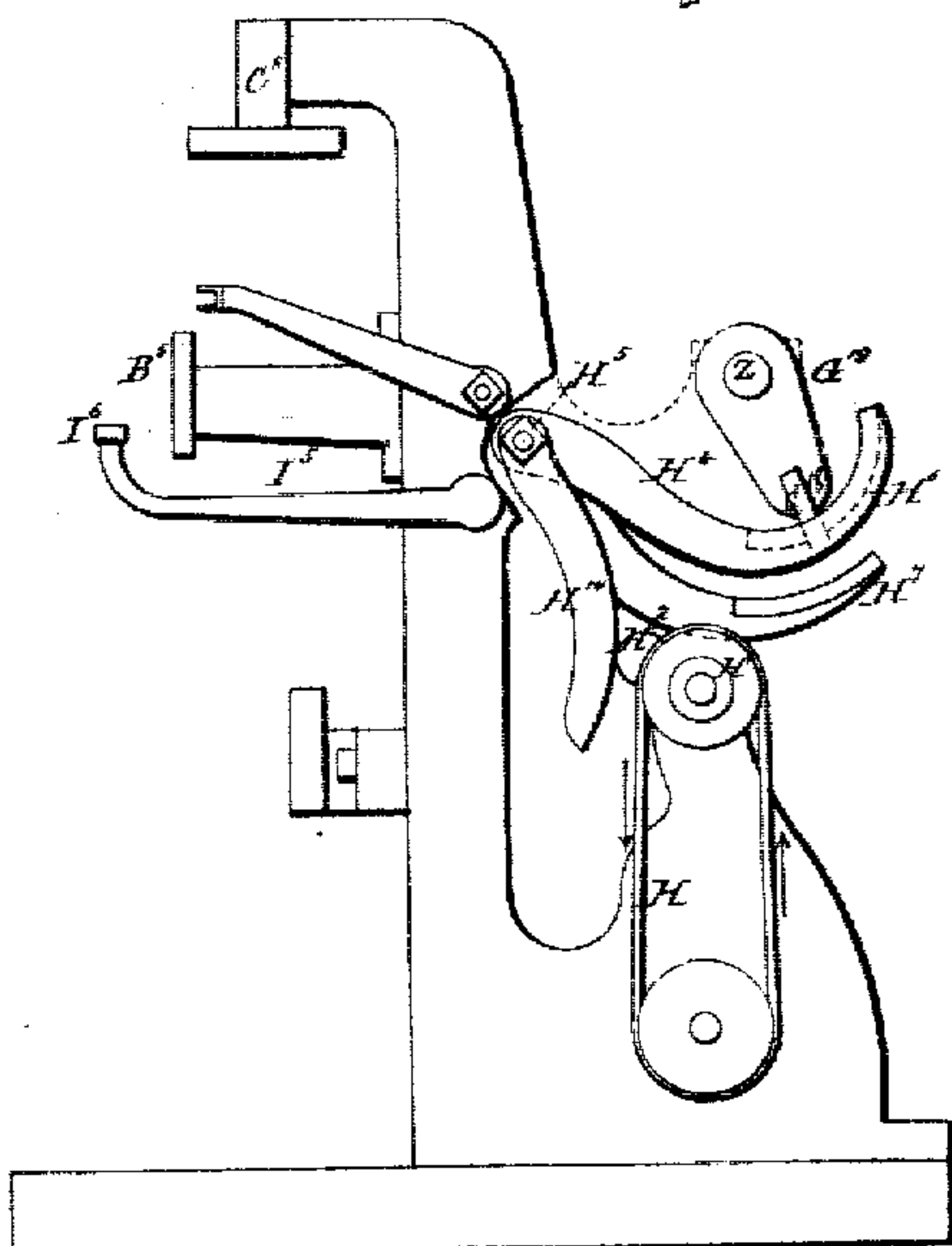


Fig. 6.

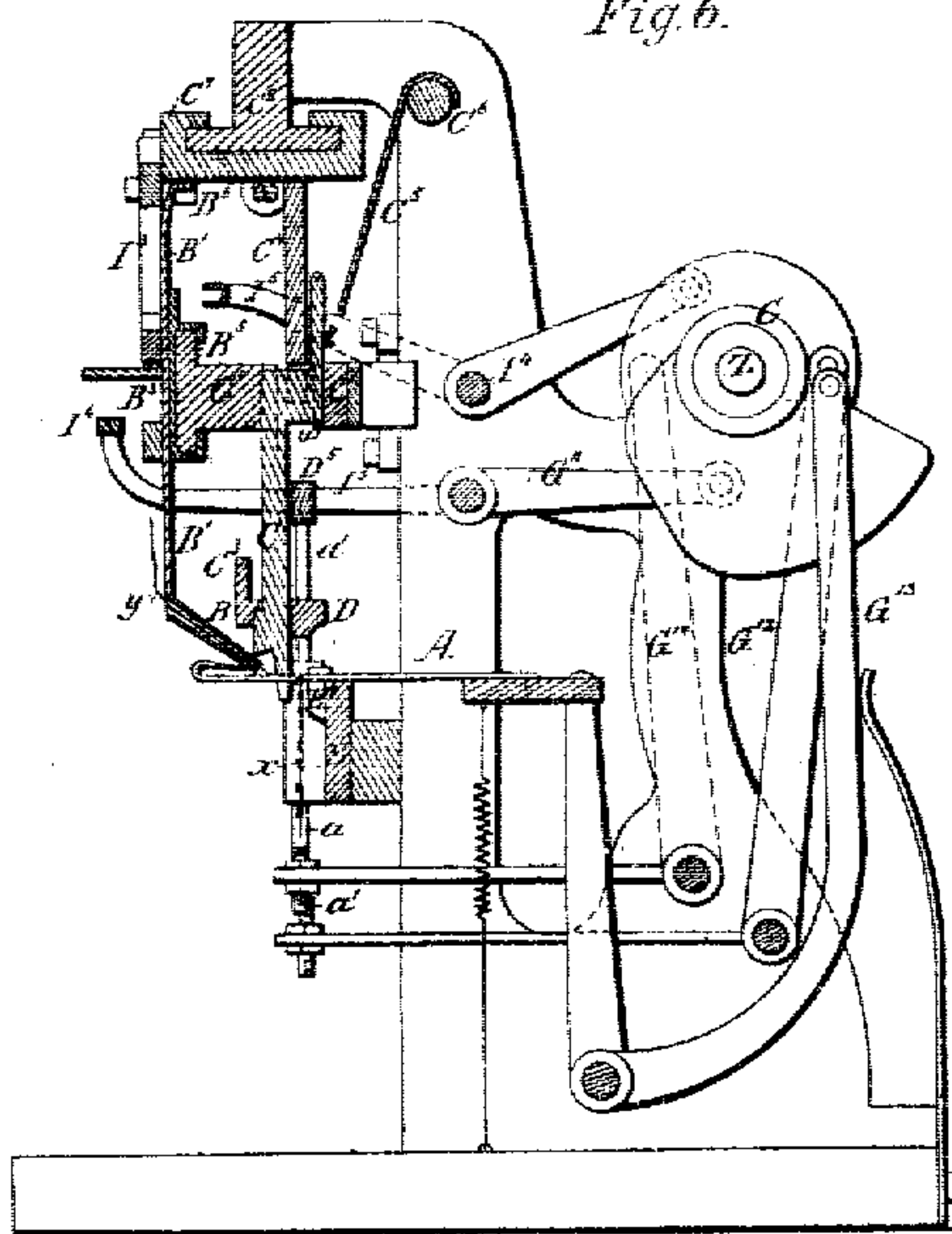


Fig. 8.

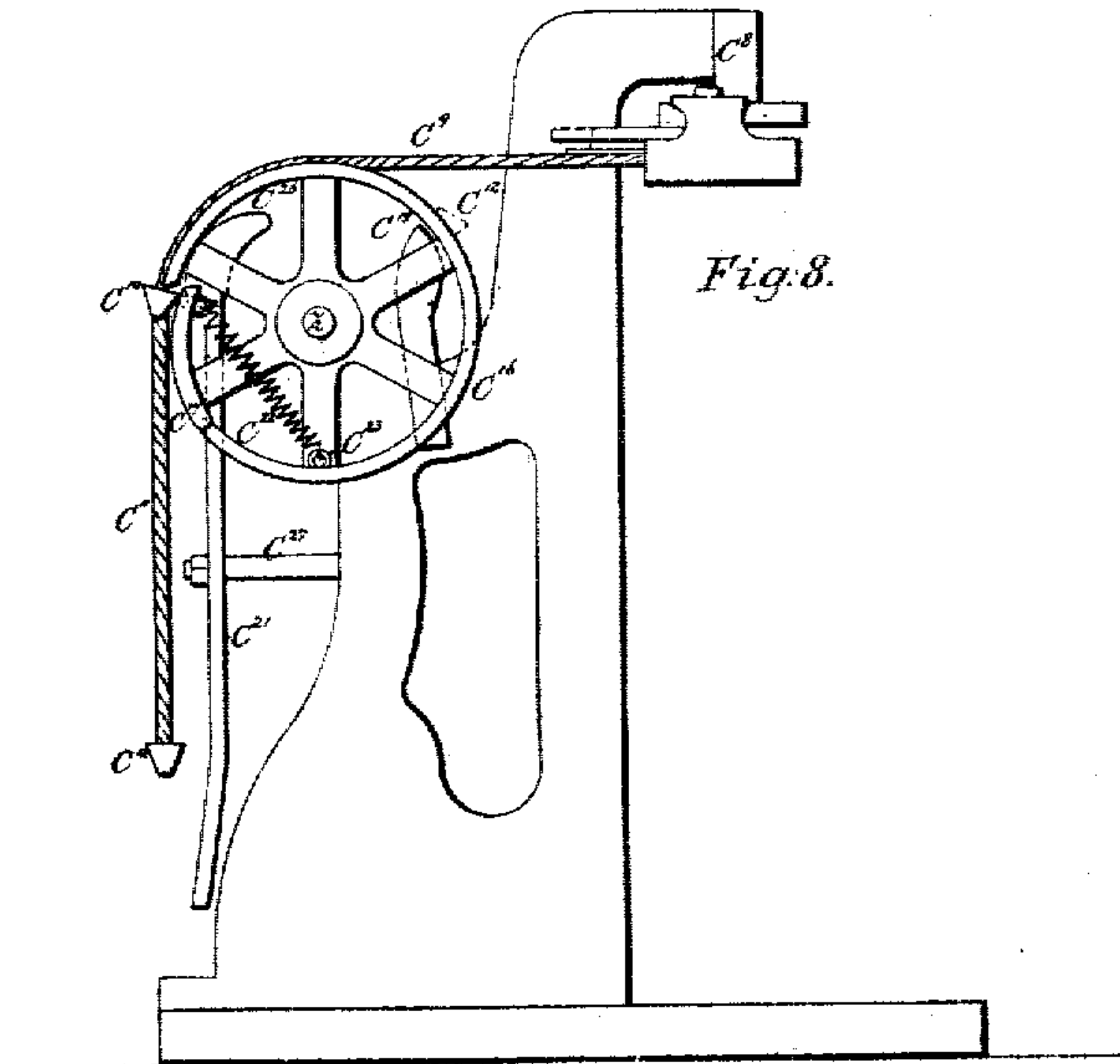


Fig. 9.

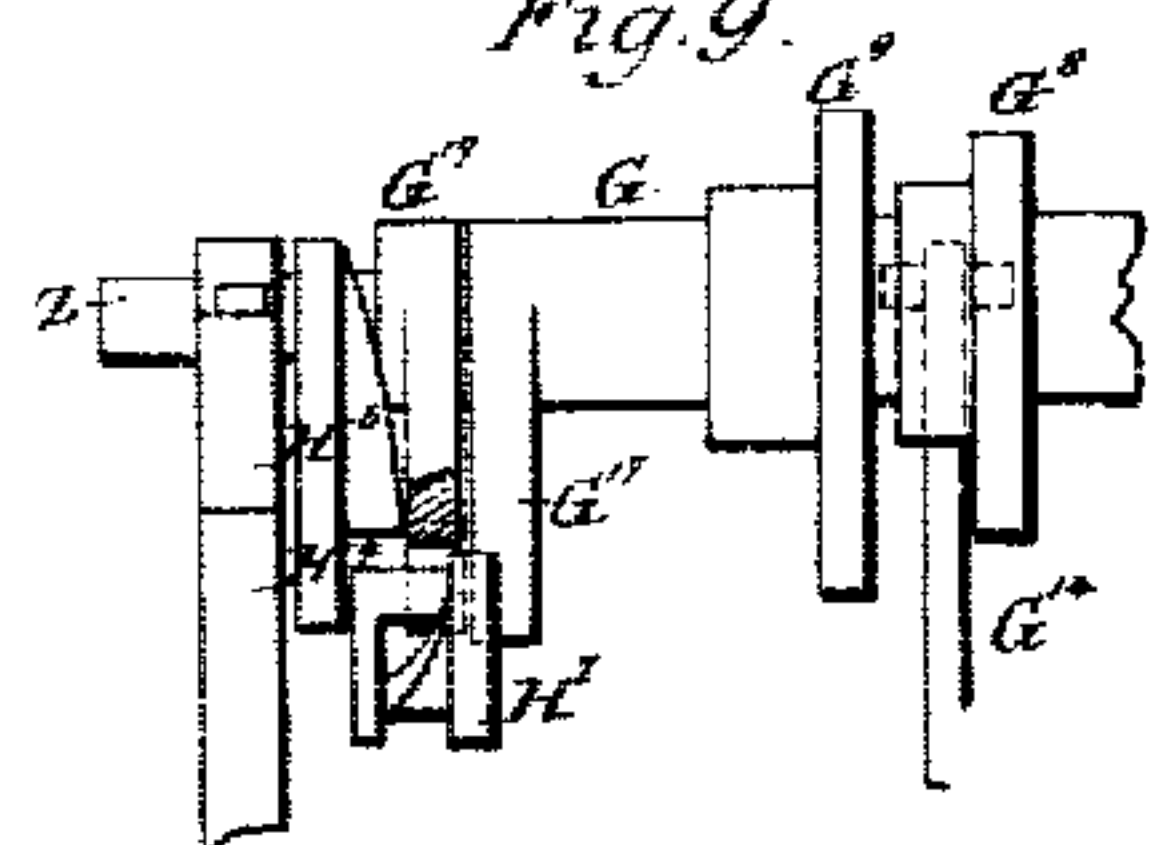
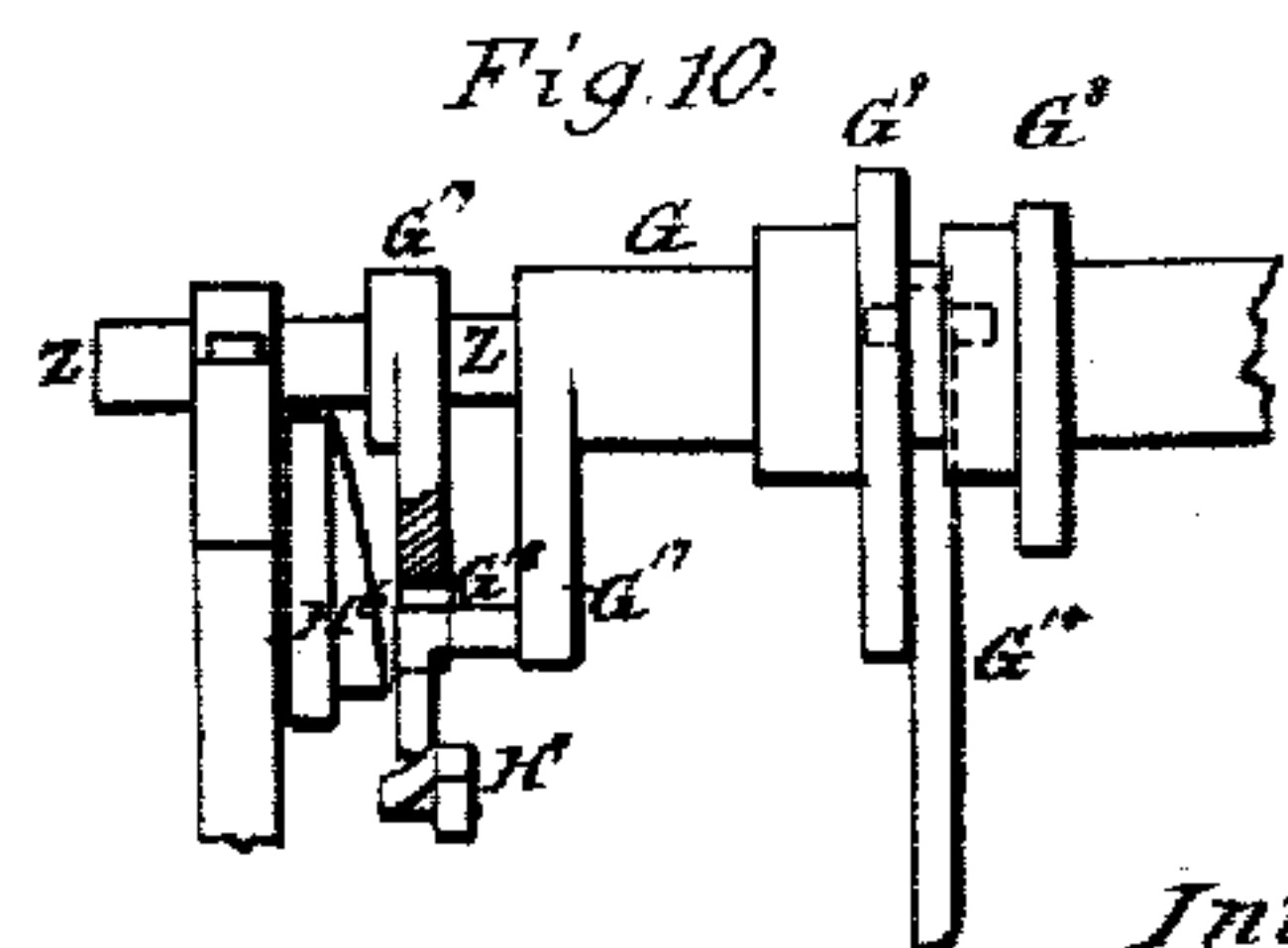


Fig. 10.



Witnesses.
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United States Patent Office.

ARTHUR PAGET, OF LOUGHBOROUGH, GREAT BRITAIN.

Letters Patent No. 64,900, dated May 21, 1867.

IMPROVEMENT IN KNITTING MACHINES.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that I, ARTHUR PAGET, of Loughborough, in the county of Leicesters, Kingdom of Great Britain, manufacturer, have invented a new and useful improved Knitting Machine; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The improvements comprised in the present invention for knitting or manufacturing looped fabrics, consist,

Firstly, in a method of and arrangement for using a sinker to each needle, and actuating each sinker consecutively by an incline or other mechanical equivalent acting directly upon such sinkers; also in a method of and arrangement for supporting the sinkers in a grooved bar or comb on each side of the part on which the incline or other mechanical equivalent acts; also in a method of and arrangement for retaining each sinker in position by a spring, which also assists the action of the sinker when sinking the thread.

Secondly, in a method of and arrangement for using a presser-bar with gaits or grooves for the sinkers to slide through, the walls of such gaits or grooves being made to press the needle-beards.

Thirdly, in an arrangement for drawing across the incline, or other equivalent, by a doubled-grooved pulley revolving with the main shaft, and by cords or chains, and weights or catch-blocks, so arranged as to draw across once during a part of each revolution, and in opposite directions during each alternate revolution.

Fourthly, in a method of suspending the action of the drawing-across motion by the employment of an incline or cam-piece, so arranged that when required it can be made to lift a hinged incline piece, or other mechanical equivalent, and thus prevent the catch-block entering the notch in the drawing across pulley, by which the said catch-block would otherwise be carried round.

Fifthly, in a method of producing a selvedge in any part of the width of the frame by the employment of an incline, or other mechanical equivalent, attached to and traversing with the incline for actuating the sinkers or their equivalents; by which first-mentioned incline the thread-layer or thread-layers is or are made to descend and pass between the needles at the end of each course.

Sixthly, in a method of making the knocking-over bar with the knocking-over pieces of steel plate, or other suitable material, and of securing them in gaits or grooves in a bar of brass or other material.

Seventhly, in a method of alternately knitting web, and narrowing or widening the same, or making changes in the knitting by moving endwise in the direction of their axes the set of cams or levers employed in effecting the narrowing, widening, or changes in the knitting.

Eighthly, in a method of producing, by a self-acting motion, (in which cams, inclines, or levers, can be used,) the before-mentioned endwise movements of the cams or levers, which said self-acting motion can be (without arresting the revolution of the cams) brought into operation by hand, or by tappets or holes in an endless chain, belt, drum, or pulley.

The following description having reference to the accompanying sheets of drawings, and to the letters and figures marked thereon, will enable competent persons conversant with knitting machinery to fully understand, make, and use the before-mentioned several parts of my invention.

In this machine there are five primary parts employed in producing the fabric, the remaining parts being for the purpose of actuating the said five primary ones. These are, first, the needle A, which is of the ordinary kind, and of which there are as many as the wales required in the fabric; secondly, the thread-layer B; thirdly, the sinkers C, the number of which is one more than that of the needles; fourthly, the presser D; and fifthly, the knocking-over bar E.

In order to render this explanation more distinct, I will first describe how the five primary parts act upon the thread so as to produce the fabric, and afterwards describe the particular parts in which my invention consists.

To make the fabric, a piece of work, *x*, is run on to the needles A, Figure 6, drawing No. 2, and pushed back on their stems to behind the sinkers C. A thread, *y*, is threaded through the thread-layer B and attached to the end needle; the presser-bar D is cleared of the needles; the knocking-over bar E is stationary, and has in its upper edge a series of grooves in which slide the needles A; the thread-layer B traverses along the needles

laying the thread under the nebs of the sinkers C in the ordinary manner. The sinkers are then successively brought down or sunk to the required distance to sink the loop, (the descent of each sinker being completed before the next one touches the thread, to insure the loops being drawn as freely as possible.) Each sinker having sunk its loop, the needles all together slide back in the grooves in E until the points of the needle-beards are under the presser-bar D. When the needles slide back the work on the needle-stems slides back with them until stopped by the face of the knocking-over bar E, where it remains. When the points of the needle-beards have come under the presser-bar D, it descends and presses the beards of the needles into the eyes. The needles continue to retire and the points of the needle-beards enter the loops of the work on the needle-stems; the presser-bar D then descends clear of the needles, which still continue to retire, and the sinkers all together ascend until the lower ends are clear of the needles, leaving the row of loops they have last sunk at the heads of the needles under the beards. The needles still continue to retire and draw the last row of loops through the loops of the work, drawing them against the knocking-over pieces in the knocking-over bar E, thereby knocking over the work and leaving it hanging by the last row of loops at the heads of the needles under the beards. E is the knocking-over bar, which has in its front surface grooves in which are secured plates or knocking-over pieces, E', (fig. 6,) of steel or other hard metal. (A weight is also attached to the work to insure its passing well over the heads of the needles.) The sinkers now all together descend to the position they were in at the commencement of the course, and the needles advance, the work advancing with them until stopped by the back of the nebs of the sinkers. The needles continue to advance until they reach the position they were in at the commencement of the course, leaving the work on the needle-stems at the back of the sinkers. The thread-layer B now traverses in the opposite direction, and the sinkers are sunk successively, beginning from the opposite end of the machine, and then the course is completed in the same manner as before.

Having now described the movements of the five primary parts which effect the knitting of the fabric, I will proceed to describe more particularly those parts of which my invention consists.

C is the sinker, which is supported at its upper end in a groove in the front sinker-bar C¹, and also in a groove in the back sinker-bar C², but free to slide up or down. The two bars C¹ and C² are both attached to the framing of the machine. The sinker C is also supported at its lower end in a groove in the presser-bar D, and prevented from coming forwards by the sinker-lowering bar C³, which is attached to the presser-bar D. C⁴ is the sinker incline, which is attached to the slide C⁷, which slides along the bar C³, which is attached to the framing of the machine, and as C⁴ passes between the two sinker-supporting bars, it causes each sinker to descend in succession and sink its loop, each sinker being sunk to its full depth before the next to it touches the thread. The spring C⁵ has at its lower end a hook which takes into the notch near the top of the back of the sinker C, and which hook acts as a latch or detent to support the weight of the sinker and so to retain it in position until the sinker incline C⁴ causes it to descend, and it will further be seen that the spring C⁵ will assist the incline C⁴ in causing the sinker to descend, by pressing against the top inclined or rounded portion of the sinker during the time when the sinker is sinking its loop of thread, thereby relieving the incline of a portion of its work. The springs C⁵ are secured to the spring-bar C⁶ by solder or cement, (by preference with solder,) but any ordinary method can be used, and the spring-bar C⁶ is secured to the framing of the machine.

D is the presser-bar, with grooves in its front surface, in which grooves slide the sinkers C. The presser-bar D is attached by rods or slides *a* to the framing of the machine in such a manner as to leave it free to be caused to slide up or down, but not to move endwise, or backwards, or forwards, and it will be seen that when caused to descend by a cam, incline, or other suitable mechanical equivalent, the under surface of the walls of the grooves or gaits will press on the top of the needle-beards, and so cause the point of the beard to enter into the eye, groove, or chase of the needle.

When required the sinkers are simultaneously depressed by the action of the sinker-lowering bar C³ as it descends. D¹ is the sinker-raising bar, which is behind the sinkers and below the projecting portions *w* of the same, so that when the bar is raised by a cam-lever or otherwise, it will be brought against the sinkers and raise them all at once. The bar D¹ is secured to rods or slides *a'* *a'*, so that it can move in a vertical direction only.

C¹⁰ is the drawing-across pulley, secured to the shaft Z, and having in its outer periphery two grooves C²¹ and C²²; it has also a portion of its outer periphery cut away rather deeper than the grooves, leaving a notch or indentation. The throwing-out piece C¹⁷ is recessed into C¹⁶, so that the upper surface of the piece is a little below the level of the grooves in the pulley, and is hinged at one end to the pulley C¹⁶, so as to allow its other end to move outwards from the centre of C¹⁶ until the outer or upper surface of C¹⁷ is level with the outer periphery of C¹⁶. C¹⁷ is drawn into its recess by the spring C²², and attached to the pin C²³. On the opposite side of C¹⁷ is a pin, C¹⁸, which at a portion of its revolution comes in contact with the stationary incline C¹⁹, which is secured to the framing of the machine, and causes C¹⁷ to move outwards, as hereinbefore described. When C¹⁸ has passed C¹⁹, the spring C²² draws C¹⁷ into its recess in C¹⁶. One end of the cord C¹¹ is secured to the right-hand end of the slide C⁷, and is conducted over suitable guide-pulleys, or other equivalents, to the groove C²⁵, in which it lies, and has secured to its other end the catch-block and weight C¹², the length of C¹¹ being such that when C⁷ is at the left-hand end of its traverse, C¹² shall be at or near the top portion of the periphery of C¹⁶. The cord C⁹ is secured to the left-hand end of the slide C⁷, and is likewise conducted over suitable guide-pulleys, or other equivalents, to the groove C²¹, in which it lies, and has secured to its other end a catch-block and weight, C¹⁰, the length of C⁹ being such that when C⁷ is at the right-hand end of its traverse, C¹⁰ shall be at the portion of the periphery of C¹⁶ that C¹² is when C⁷ is at the left-hand end of its traverse.

I will now proceed to describe the action of the arrangement for drawing across. I will suppose the slide C⁷ to be at the left-hand end of its traverse. The cords C⁹ C¹¹, and their weights C¹⁰ C¹², being in the position shown in Figure 5, the catch-block C¹² will then be lying in the groove C²¹, at or near the top of the periphery

of C^{16} , while the catch-block or weight C^{10} will be hanging down below the pulley C^{16} by its cord C^9 , which will lie in the groove C^{24} . When the pulley C^{16} revolves, the notch or indentation in its outer periphery will take round with it the catch-block C^{12} , drawing with it the cord C^{11} and the slide C^7 in the direction of the right-hand end of its traverse. The cord C^9 will slide in the groove C^{24} , in the opposite direction to the revolution of C^{16} , and it will be seen that before the catch-block C^{10} reaches the outer periphery of C^{16} , the notch in it will have passed the point where C^{10} comes in contact with C^{12} ; therefore as C^{16} continues its revolution, C^{10} will slide in the groove C^{24} in the opposite direction to the revolution of C^{16} . When the pin C^{13} comes in contact with C^{16} , the throwing-out piece C^{17} will move outwards, as hereinbefore described, and thereby disengage or throw out the catch-block or weight C^{12} from the notch in C^{16} , when C^{12} will by the action of its own weight hang down, as C^{10} did at the commencement of the movements. C^7 will now have been drawn across to the right-hand end of its traverse, and C^{13} be at the same portion of the periphery of C^{16} at which C^{12} was at the commencement of the movements. As C^{16} again makes its revolution, the notch will now take the catch-block C^{10} and the cord C^9 , and draw across C^7 in the direction of the left-hand end of its traverse, (see Figures 1, 2, and 8.) The catch-block C^{12} will now, as before described, miss the notch in C^{16} , and slide in the groove C^{25} to its former position, and when C^7 has reached the right-hand end of its traverse, C^{17} will disengage C^{10} in the manner hereinbefore described. Thus the slide C^7 , with the incline and other parts attached to it, will be drawn across in one direction or the other once during a portion of each revolution of the pulley.

C^{26} is the incline or cam-piece, which may be employed for suspending the action of the drawing-across motion, and is formed upon or secured to the lever C^{21} , having its fulcrum at C^{27} . In the position of the parts as shown in figs. 1 and 2, the drawing-across motion will act in the ordinary manner, that is to say, the catch-block C^{12} will be caught by the notch in the pulley C^{16} , and carried round with the pulley, as hereinbefore explained. When it is desired to suspend the action of the drawing-across motion, the incline or cam-piece C^{26} is moved by means of the lever C^{21} into the position shown in dotted lines in fig. 2. In this position its edge will, during the revolution of the pulley, come in contact with the pin C^{13} , and will thereby raise the hinged throwing-out piece C^{17} , thus lifting the catch-block C^{12} and causing the notch in the drawing-across pulley to pass the catch-block, and thus suspending the action of the drawing-across motion as required. It is evident that as long as C^{26} is retained in this position the action of the drawing-across motion will remain suspended, but when C^{26} is caused to resume its former position, then in the next revolution of C^{16} the drawing-across notch will carry with it the catch-block, as before described.

I will now describe the arrangement and action of the thread-layer and incline actuating it. B is the thread-layer or tube, (provided with suitable holes for the purpose of receiving the thread and delivering it to the needles,) and it is attached to or formed with a slide, B' , which slides vertically in suitable guides or a groove formed in the slide B^3 , supported by and free to move horizontally in either direction along the fixed bar B^4 , which may be part of or secured to the bar for supporting the sinkers, as hereinbefore described, or may be secured to the framing in any other convenient or suitable manner, as is well known to makers of knitting machinery. The slide B^3 may be moved along the bar B^4 by spring-clips I^3 , or any suitable method which will allow C^7 and B^6 to continue their traverse and to pass over and beyond B^3 and B^1 , when B^3 and B^1 shall be stopped by any methods many of which are well known to makers of knitting machinery. The slide C^7 in the present case also carries the thread-layer incline B^5 for the purpose of acting (in its passage across the frame) upon the upper end of the vertical slide B^1 , and thereby pushing it downward and causing the thread-layer B to descend and pass between the needles A , when the horizontal thread-layer slide B^3 has its motion arrested, and the inclines C^4 and B^5 pass it. It is thus evident that a selvage may be produced on each edge of the web, as by the ordinary tubular thread-layers in general use, and the thread-layer B can be lifted to its former position, (after or whilst the course is knocked over and completed,) by a rocking-shaft, I^4 , levers, I^5 , and bar, I^6 , or in any other convenient and suitable manner, as is well understood by makers of knitting machinery. It will also be seen that two, three, or more thread-layers can be put into action in the same manner and on the same bar, and actuated by the same incline, each thread-layer being arrested at such spot as may be required.

Z represents the shaft or axis of the various cams employed respectively for knitting web; and narrowing or making changes in the knitting, and G a tube, fitting upon and revolving with the shaft, but capable of being moved endwise thereon, as hereinafter explained, or by any other convenient or suitable means. The cams G^1 G^2 G^3 G^4 G^5 G^6 and G^7 G^8 G^9 are formed with or secured to the tube G . The series of cams G^2 G^4 and G^5 , (colored red,) actuate the levers G^{11} G^{12} G^{13} and G^{14} for the purpose of knitting web. For narrowing, widening, or otherwise changing the knitting, the tube G may be moved endwise upon the shaft, into the position shown at Figure 10, so as to bring into operation the series of cams G^3 G^5 G^7 and G^9 , colored blue. The cam G^3 will now actuate the lever G^{11} which was previously operated by the cam G^2 , the cam G^5 will operate the lever G^{12} previously actuated by the cam G^4 , and the cams G^7 and G^9 will operate the levers G^{13} and G^{14} , and the cam G^1 will operate the lever G^{10} not previously in motion, the motions of some levers being thus altered while others are thrown out of action.

It may easily be seen that the same result may be attained by the equivalent act of moving all or part of the levers simultaneously endwise, instead of the cams as described; also, that the number and shape of the cams for either the ordinary knitting, or the required narrowing, widening, or changing the knitting, may be varied as the said change may require; and the said levers may be so adapted by rocking-shafts, or other convenient or suitable means, to actuate any kind or arrangement of devices for narrowing or widening, or to actuate a second set of needles for making ribbed work, or any other arrangements for making changes in the knitting, as is well understood by makers of knitting machinery. It will also be seen that a third or more sets of cams and levers may be applied, so as to effect other changes in the knitting, if requisite. It will also be seen that the parts may be so constructed that only one or more cams may be moved endwise at once, if required.

For the purpose of effecting by a self-acting motion the before-mentioned endwise movements of the cams, the following-described devices may be used: H represents an endless chain or belt, passing over the pulley H¹, and having an intermittent or step-by-step motion communicated to it, in the direction of the arrows, by any convenient or suitable means, as is well understood by makers of knitting machinery. To the chain or belt H are secured tappets, H², so as to raise, (when the endwise movement of the cams is required,) the lever H⁴ which has its axis or fulcrum at H³, and at its end the helicoidal or screw-shaped segment or incline H⁶. Another arm or branch of the lever H⁴ has at its end the helicoidal segment or incline H⁷, inclined or screw-shaped in the contrary direction to H⁶, or, (as will perhaps be better understood,) the two inclines being right and left handed. Z represents a portion of the shaft or axis of the cams, and G a portion of the tube carrying the cams and requiring to be moved endwise. The tube G has formed upon or secured to it the arm G¹⁷, the projection G¹⁸ of which passes through a notch or recess formed in the end of the driving-arm G¹⁹, secured to the shaft Z. In the position of the parts, as shown, it is evident that when the arm G¹⁷ and tube G shall be caused to revolve with the shaft Z by the driving-arm G¹⁹, the position endwise of G¹⁷ and G will remain unaffected by either of the inclines H⁶ or H⁷, as neither of them will come in contact with any part of G¹⁷ or its projection G¹⁸. When, however, the lever H⁴ is moved, either by hand or by the action of one of the tappets H², so as to bring the inclines H⁶ and H⁷ into the position shown in fig. 10, the end of the projection G¹⁸ will in its next revolution come in contact with the helicoidal edge of the incline H⁶, and be thereby slid endwise, carrying with it the arm G¹⁷ and tube G, into the position shown in fig. 10. The inclines H⁶ and H⁷ will afterwards, while in this position, continue out of action, and allow the arm G¹⁷ and tube G to revolve without being affected in their position endwise on the shaft Z, but immediately upon the lever H⁴ and inclines H⁶ and H⁷ resuming their original position, the edge of the projection G¹⁸ will be acted upon during its next revolution by the helicoidal edge of the incline H⁷, which will cause G¹⁷, G¹⁸, and G to move endwise to their original position, in which they may continue to revolve clear of both inclines until the lever H⁴ shall be again moved.

It is obvious that a drum having tappets or holes, and caused to revolve in a suitable manner, may be substituted for the endless belt or chain and tappets herein described, and that the arrangements may be otherwise modified in various ways without departing from their distinctive principles.

Having now fully described and ascertained the nature of my said invention, and the manner in which the same may be performed, I would have it understood that without confining or limiting myself to the precise details represented, inasmuch as the same are capable of being variously modified without departing from their distinctive features, I claim—

1. The method of and arrangement for retaining each sinker in position by a spring which also assists the action of the sinker when sinking the thread.
2. The combination of the bars C³ D, and the sinkers C, when the whole are constructed and operate in connection with each other as set forth.
3. The arrangement for drawing across the incline, or other equivalent, first in one direction and then in the other, by a double-grooved pulley revolving with the main shaft, and by cords or chains, and weights or catch-blocks, so arranged as to draw across once during a part of each revolution.
4. The method of suspending the action of the drawing-across motion by the employment of an incline or cam-piece, so arranged that when required it can be made to lift a hinged incline piece, or other mechanical equivalent, and thus prevent the catch-block entering the notch in the drawing-across pulley, by which the said catch-block would otherwise be carried round.
5. The method of producing a selvedge in any part of the width of the frame by the employment of an incline or other mechanical equivalent attached to and traversing with the incline for actuating the sinkers, or their equivalents, by which first-mentioned incline the thread-layer or thread-layers is or are made to descend and pass between the needles at the end of each course.
6. The plates E¹ of steel or other hard metal, in combination with the bar E, as described.
7. The method of alternately knitting web, and narrowing or widening the same, or making changes in the knitting by moving endwise in the direction of their axes the set of cams or levers employed in knitting the web, and another set or sets of cams or levers employed in effecting the narrowing, widening, or changes in the knitting.
8. The method of producing, by a self-acting motion, (in which cams, inclines, or levers can be used,) the before-mentioned endwise movements of the cams or levers, which said self-acting motion can be, (without arresting the revolution of the cams,) brought into operation by hand, or by tappets or holes in an endless chain, belt, drum, or pulley.
9. I further claim as my invention, and desire to secure by Letters Patent, each of the foregoing methods or arrangements, in combination with any or all of the other methods or arrangements.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR PAGET.

Witnesses:

SAM. MAPLES, *Notary Public, Nottingham,*
WILLM. WHITLEY, *his Clerk.*