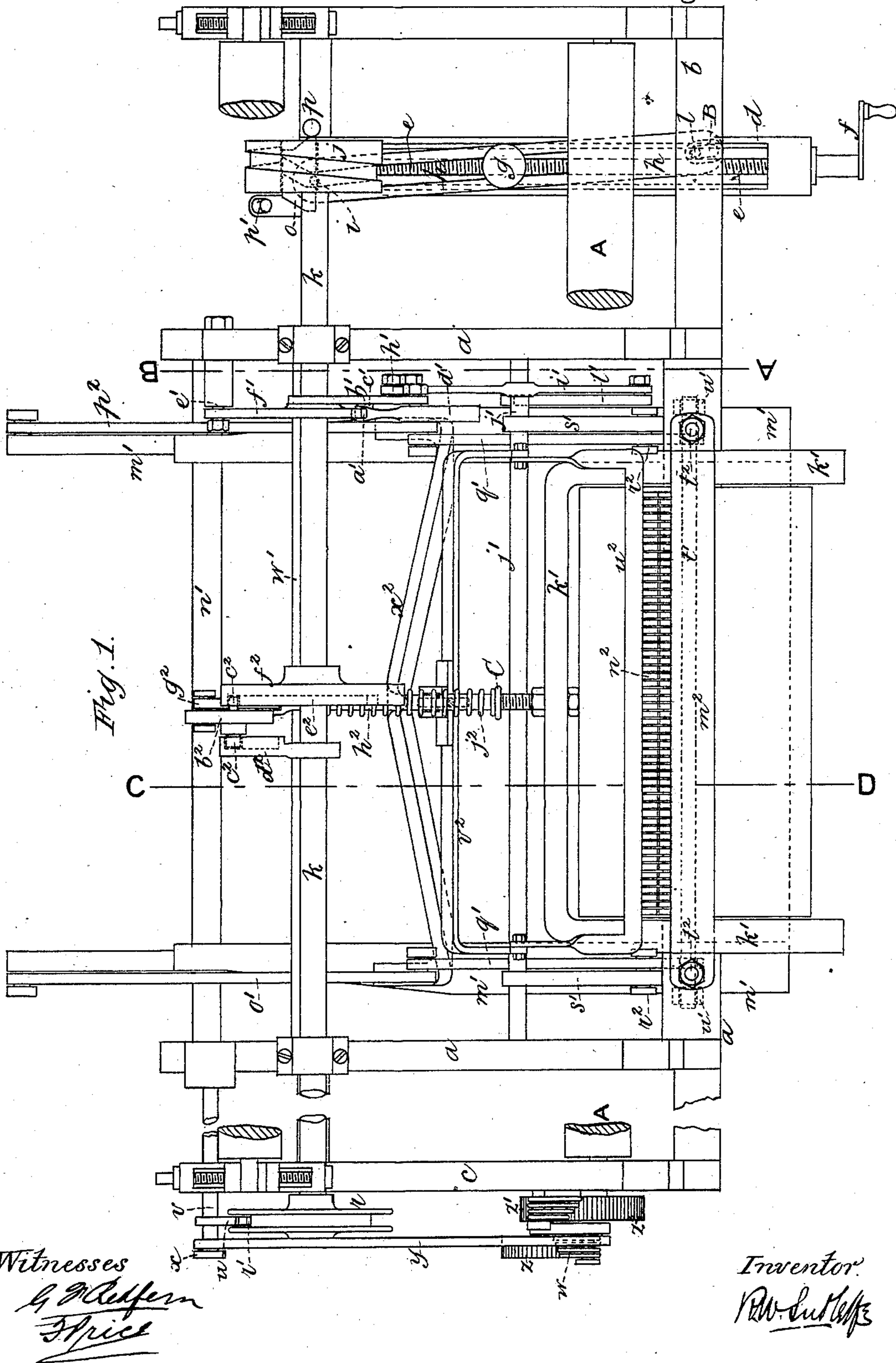


R. W. SUTLEFFE.

SELF ACTING READER FOR JACQUARD CARDS.

No. 303,681.

Patented Aug. 19, 1884.



Witnesses
G. M. Redfern
J. Price

Inventor
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(No Model.)

5 Sheets—Sheet 2.

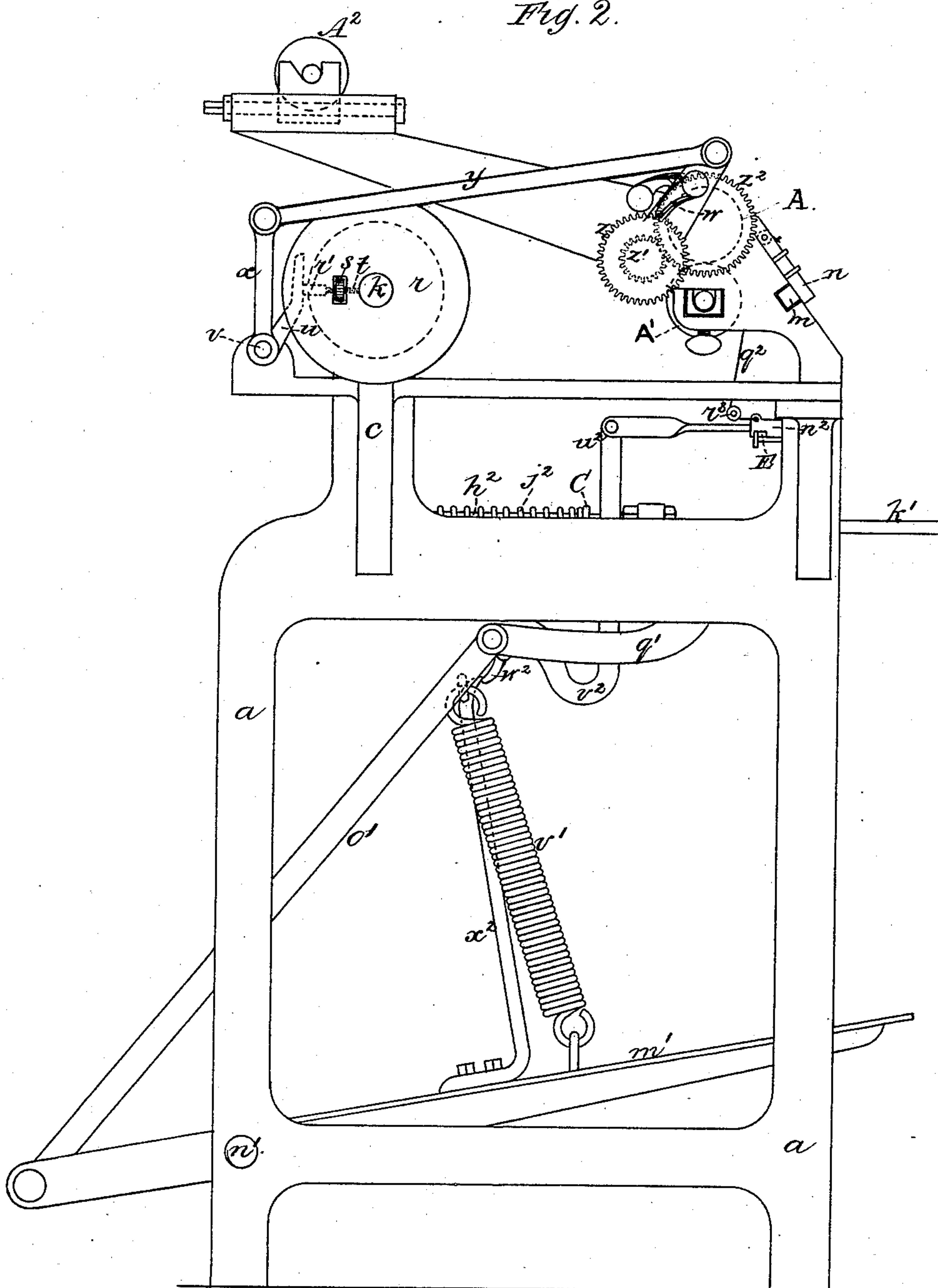
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Fig. 2.



Witnesses.
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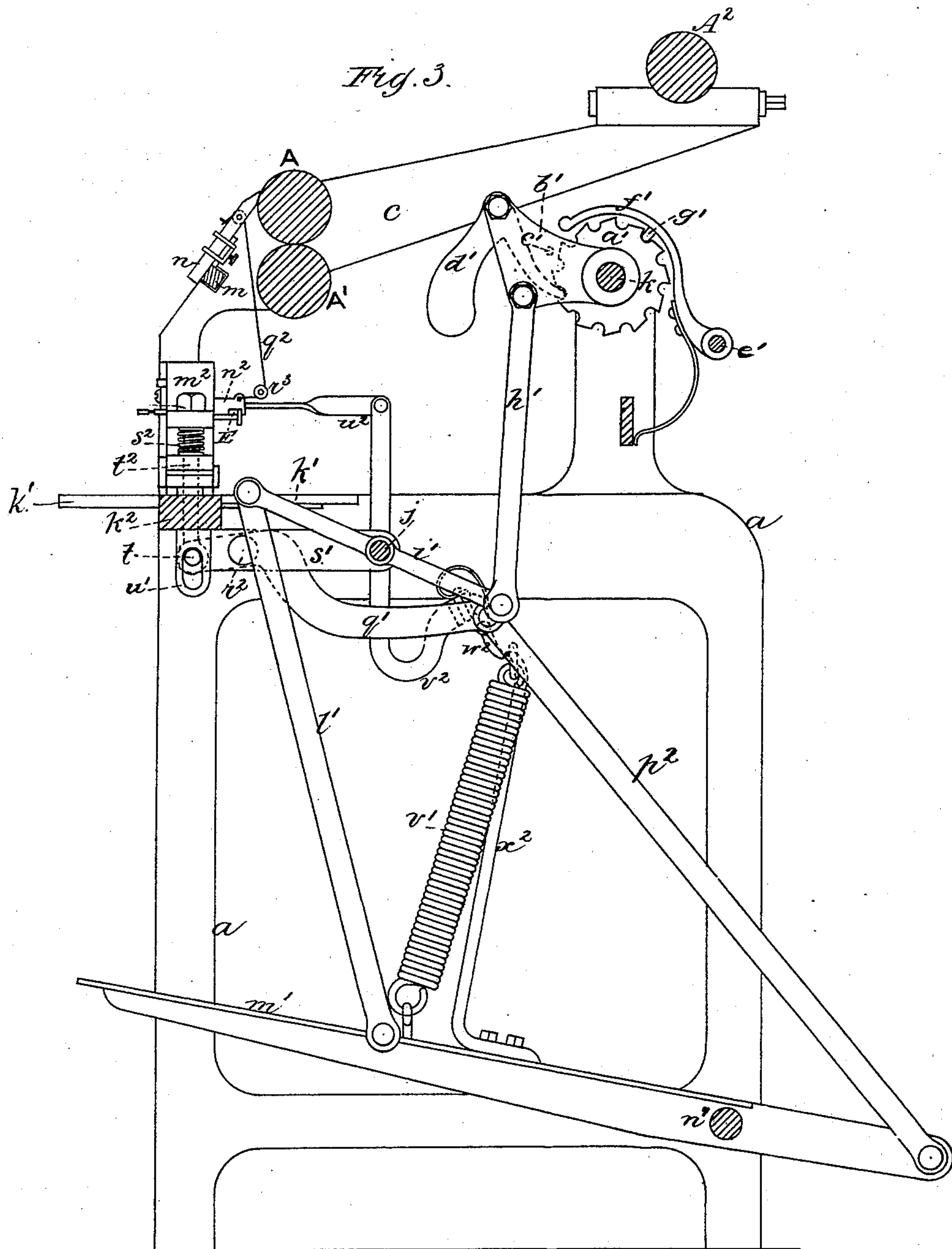
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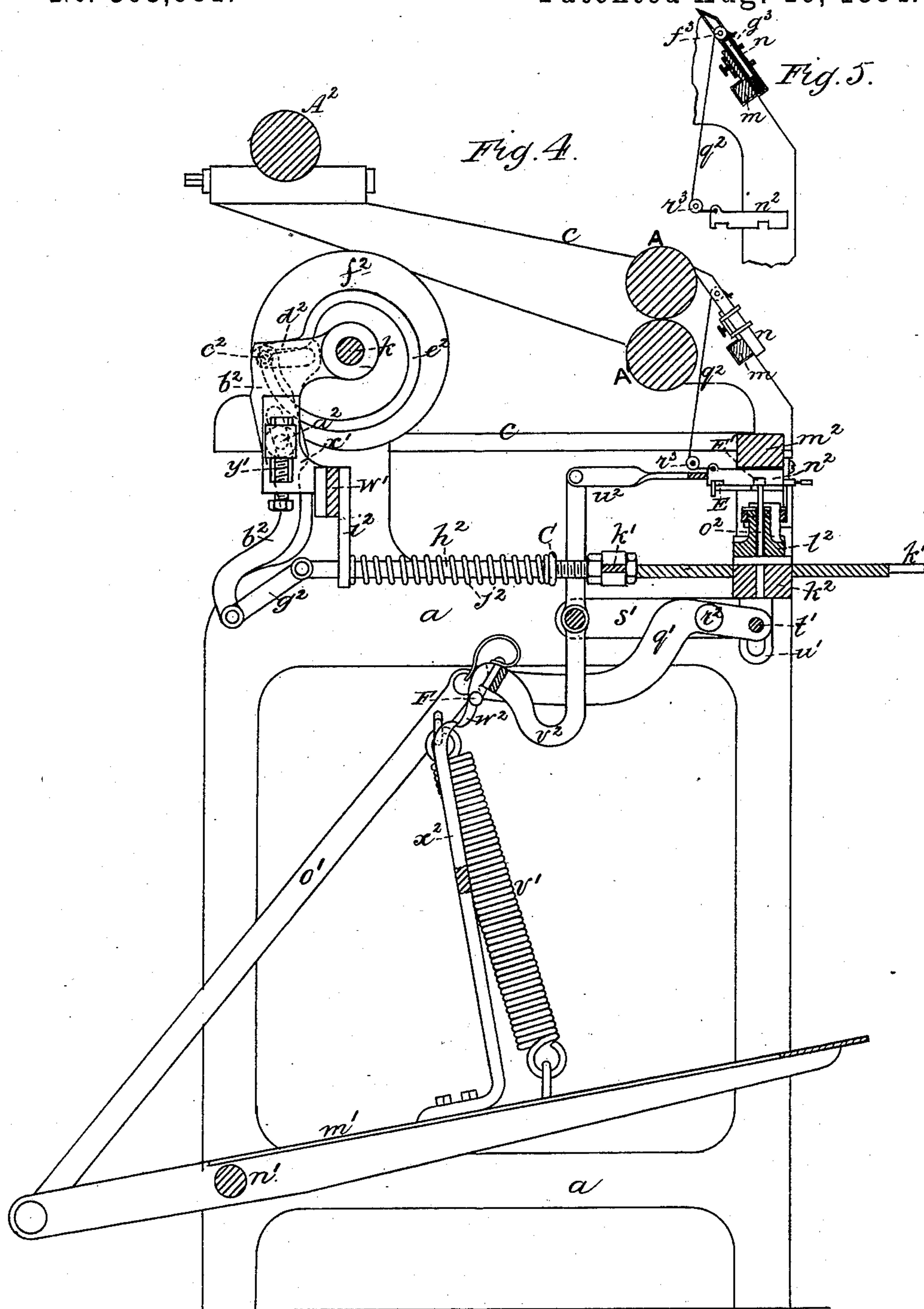
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Witnesses

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(No Model.)

5 Sheets—Sheet 5.

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Fig. 7.

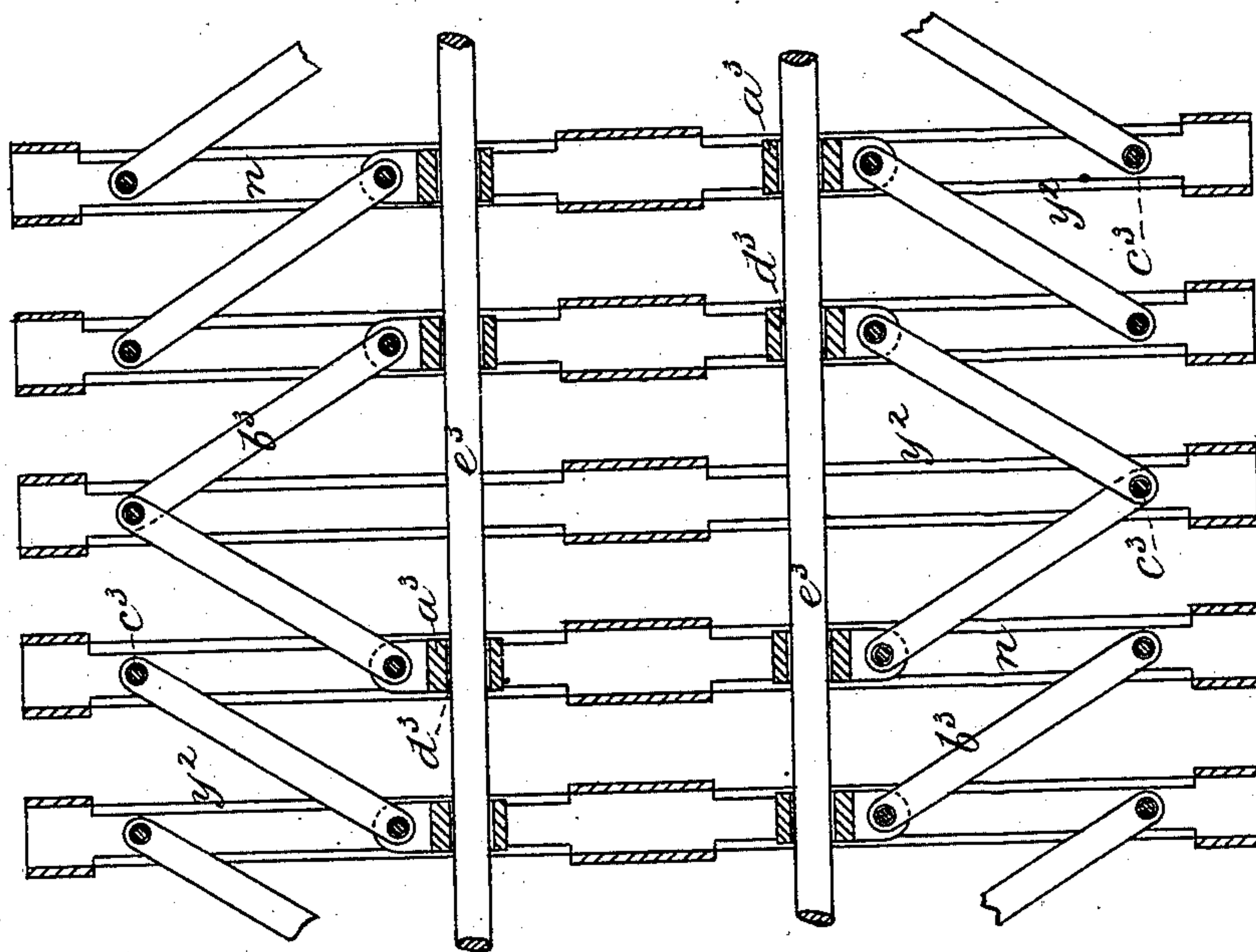
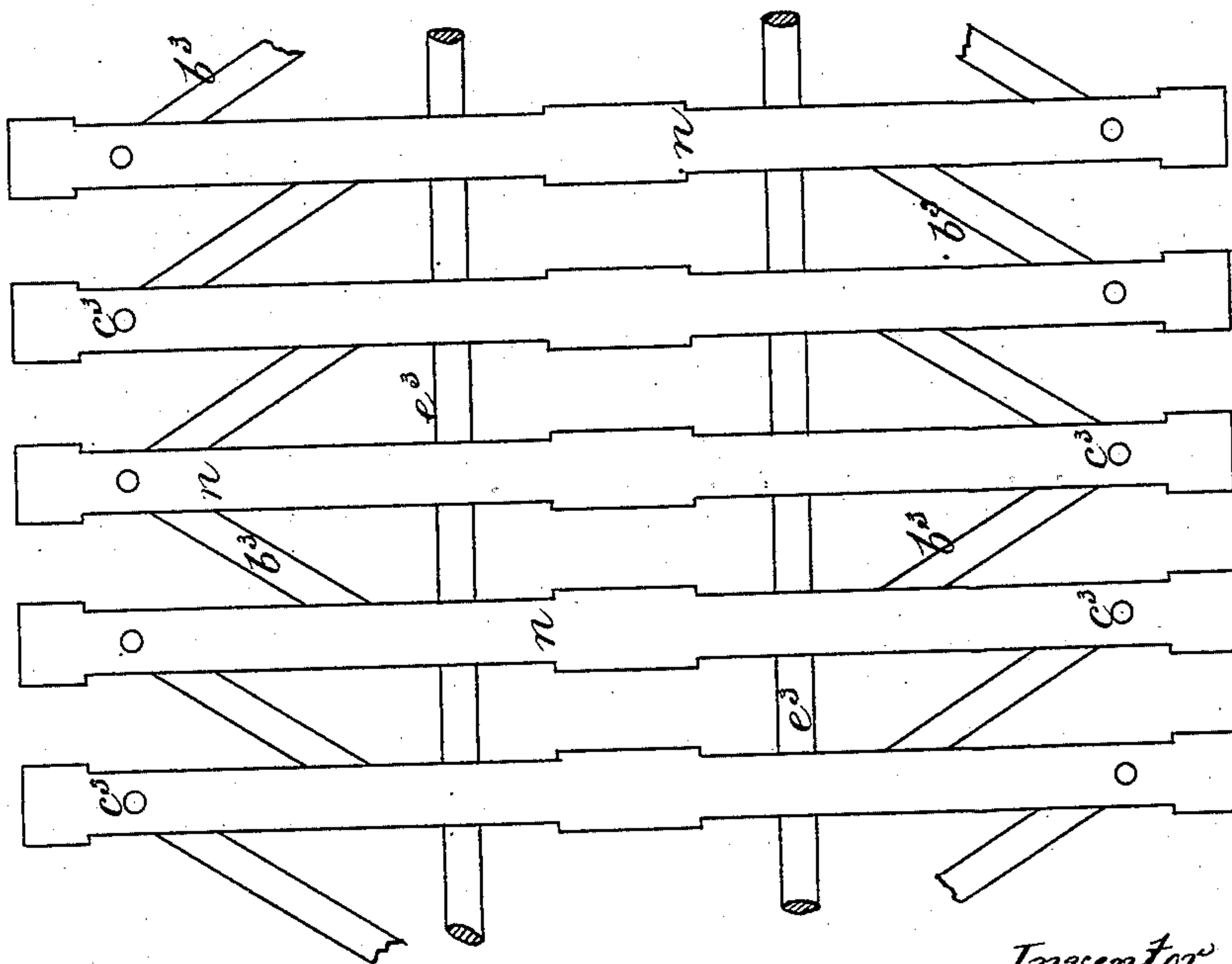


Fig. 6.



Witnesses.

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J. Price

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UNITED STATES PATENT OFFICE.

ROBERT WOLFE SUTLEFFE, OF LONDON, ENGLAND.

SELF-ACTING READER FOR JACQUARD CARDS.

SPECIFICATION forming part of Letters Patent No. 303,681, dated August 19, 1884.

Application filed May 22, 1883. (No model.) Patented in England May 9, 1883, No. 2,356; in France May 12, 1883, No. 155,434; in Belgium May 16, 1883, No. 61,398; in Germany May 19, 1883, No. 27,348; in Austria-Hungary July 26, 1883, No. 19,904 and No. 31,511, and in Italy September 30, 1883, XVII, 15,684, and XXXI, 176.

To all whom it may concern:

Be it known that I, ROBERT WOLFE SUTLEFFE, a subject of the Queen of Great Britain, residing at London, England, have invented new and useful Improvements in Self-Acting Readers for Jacquard Cards, of which the following is a specification.

My invention relates to improvements in self-acting readers for Jacquard cards, the object of the improvements being to simplify the construction and manipulation of the reader and to render its construction less costly.

In order to enable my invention to be fully understood, I will proceed to describe the same by reference to the accompanying drawings, in which—

Figure 1 represents a plan of a self-acting reader for the Jacquard constructed according to my improvements, the pointers or indices being removed for the sake of clearness. Fig. 2 is an end view of the same, and Figs. 3 and 4 are sections on the lines A B and C D, respectively, of Fig. 1. Fig. 5 is a detached sectional view of the arrangement I employ for setting the punching-levers. Figs. 6 and 7 full-sized elevation and section, showing an arrangement of pointers or indices which I can employ with my improved reader.

Similar letters in all the figures represent similar parts.

In carrying out my invention I employ a suitable frame, *a*, on each side of which a bracket is provided, such brackets being marked *b* and *c*, respectively. On the bracket *b* is a slotted frame, *d*, fastened to it at right angles. In the slotted frame *d* is placed a screw, *e*, having a fine thread. This screw *e* is provided with a handle, *f*, in front, and a washer and nut at the back end, and passes through a tapped nut, *g*, the end of which forms an adjustable fulcrum for a slotted lever, *h*, through which it passes. The lever *h* carries a stud, *i*, at one end. This stud takes into the helical groove of a cam-wheel, *j*, of special construction, hereinafter described, fixed at the right-hand end of a main cross-shaft, *k*. The other end of the lever *h* has a slot, *B*, to receive the rod *l*, which depends from the horizontal bar *m*, carrying the point-

ers *n*, hereinafter described. The helical cam-wheel *j* is provided with a sliding piece, *o*, which, when the punching of one card has been completed, allows of the return of the pointers *n* and slotted lever *h* to the position which they occupy when commencing to punch a card, and prevents any possibility of the pin *i* binding at this point in its course, as has hitherto been the case when a solid cam has been employed.

p and *p'* are pins on either side of the helical cam-wheel *j*, for shifting the sliding piece *o* at the required moments as the cam-wheel rotates. In the bracket *c*, and on the left hand end of the main shaft *k*, I mount a grooved wheel, *r*, provided with a projection, *r'*, capable of adjustment radially by means of a nut, *s*, and screw *t*. This projection *r'* actuates a short bent lever, *u*, on a rocking shaft, *v*, at each revolution of the main shaft *k*, and thereby operates the pawls *w* by means of the connecting-rods *x* and *y*, and thus moves the toothed wheels *z z' z''* and front rollers, *A A'*, forward to the required extent, which extent is regulated by adjusting the projection *r'* by means of the hereinbefore-described nut *s* and screw *t*. By this arrangement I dispense with the slotted lever and cam-wheel hitherto employed for this purpose in self-acting readers, and thus considerably simplify the construction of the machine at this part and diminish the cost of its manufacture.

At a suitable point on the main shaft *k* is keyed a ratchet-wheel, *a'*. On the boss of this wheel is a triangular-shaped plate, *b'*, to which is fixed a pin or stud, *c'*, and on which is pivoted a weighted pawl, *d'*. This pawl takes into the teeth of the ratchet-wheel *a'*. At the back of the ratchet-wheel *a'*, and working on a pin, *e'*, screwed into a projection cast on the frame *a* is a spring-catch, *f*, formed with a tooth or projection, *g'*, which also takes into the teeth of the ratchet-wheel *a'*. This catch *f* is of a semicircular form, following part of the circumference of the ratchet-wheel *a'*. The pin *c'* serves to raise the tooth or projection *d'* free of the teeth of the ratchet-wheel *a'* when the ratchet-wheel is to be moved forward by the pawl *d'*.

To the lower angle of the plate b' is jointed a connecting-rod, h' . The lower end of this connecting-rod is jointed to an oscillating lever, i' , which has its bearing or fulcrum on a small shaft, j' , fixed to the two side frames, a , and just behind and below the card-frame k' . The other end of the oscillating lever i' is jointed to a rod, l' , the lower end of which is jointed to the treadle m' , which works on the shaft n' . The back end of the treadle is continued beyond the shaft n' , and to the end at each side are jointed connecting-rods o' and p^2 , which are jointed at their upper ends to two levers, q' , pivoting at r^2 on the brackets s' , and provided at their free ends with a bar, t' , the ends of which work in the guide-plates u' and receive the lower ends of rods or bolts t^2 , which operate the punches. The connecting-rods o' and p^2 have each a strong spiral spring, $v' v'$, fastened to them, and serving to raise the treadle when it is released from the pressure of the foot. The lower ends of these springs are fastened to each side of the treadle m' a short distance from the front of the machine. Below the main shaft k is a bar, w' , fixed to each side of the frame a , and near the center of this bar is bolted a slotted bracket, x' , in which works a vertical screw, y' , having a fine thread. This screw carries a pin, a^2 , at its upper end, which pin forms the fulcrum of a slotted vertical lever b^2 , the said fulcrum being capable of adjustment vertically by turning the vertical screw y' either to the right or to the left, as required. This arrangement allows of the fulcrum of the lever b^2 being adjusted to regulate the extent of travel of the card-frame k' . Through the top end of the lever b^2 is fixed a pin, c^2 , one end of which works in a slotted plate, d^2 , having its lower end bolted or cast on the bracket x' , and the other end having a loose bearing on the main cross-shaft k . The other end of the pin c^2 works in the groove e^2 of a cam-wheel, f^2 , keyed on the main shaft k . The lower end of the lever b^2 is jointed to a rod, g^2 , which is jointed to a rod, h^2 , working in a bearing, i^2 , bolted to the horizontal cross bar w' . This rod is provided with a spiral spring, j^2 , one end of which bears on the bearing i^2 , and the other end on a collar, C , formed on the rod h^2 . This spring is for assisting to carry the card-frame k' back to its starting-point as each card is punched, the front end of the rod being fastened to the card-frame k' . k^2 is the perforated die-plate bolted to the front of the frame a . Immediately above is what is called the "stock-plate" l^2 , with corresponding perforations, and holding the row of punches o^2 . Above the stock-plate l^2 is the punching-plate m^2 , below which is a row of sliding rods or bars, n^2 , having parts of their surfaces cut away on their under side at E and E' , these levers corresponding in number with the punches o^2 . q^2 are cords or chains fastened to the bars n^2 , and passing round pulleys r^3 at the rear

end of the same, and connected with the indices or pointers n . The said cords or chains, as shown in Fig. 5, pass over the pulleys f^3 in the pointers n , and are attached to a spring-rod, g^3 , sliding within the pointer n . The cords or chains q^2 serve to draw backward the punching-bars n^2 , for the purpose hereinafter described, the spring carrying the rod g^3 back so as to slacken the cords or chains q^2 when it is released.

s^2 are springs which cause the punching-plate m^2 and punches o^2 to return to their normal position after each motion of the treadle. The bolts t^2 are fixed to the punching-plate m^2 , and pass through the die-plate k^2 , the lower ends being jointed to the rod or bar t' on the levers q' , as hereinbefore described. On the shaft j' works an oscillating double crank $u^2 v^2$. The top crank, u^2 , fits accurately along the whole line of punching-bars n^2 , and serves to return them to their normal position after each punching operation, in the following manner: The lower crank, v^2 , is forced backward at the return of the treadle by a triangular-shaped frame, x^2 , bolted at its base to each side of the treadle, which frame presses against a spring-tongue, w^2 , fitted on the crank v^2 , and forces the crank u^2 against the punching-bars n^2 . The spring-tongue w^2 works on a joint at F , which allows the tongue to give way and the frame x^2 to pass it when the treadle is depressed, but to remain rigid when the frame x^2 meets it on the upward movement of the treadle.

I can effect the regulation and adjustment of the pointers n laterally in the following manner, reference being had to Figs. 6 and 7: I form each of the pointers hollow and with a slot, y^2 , on each side throughout nearly its entire length. The center pointer is fixed to the index-frame. Within the other pointers slide two short rods, a^3 , to each of which is jointed a rod, b^3 , the other end of the rods b^3 being jointed at c^3 to the end of the next pointer. The center pointer receives the ends of the rods b^3 of the pointers on both sides, as shown. The sliding rods a^3 are each provided with a hole, d^3 , through which holes are passed rods e^3 , capable of being moved toward or away from each other by any suitable means, such as by right and left handed screws at their ends.

The operation of the improved self-acting reader is as follows: The pattern or design to be read off having been placed on the rollers $A A' A^2$ in the usual manner, the projection r' on the grooved wheel r is adjustable by means of the nut s and screw t , so as to regulate the travel of the pattern on the rollers, according to the scale of the divisions of the pattern-paper. The pointers n are then adjusted laterally to the scale of the divisions of the pattern by means of the right and left handed screws at the ends of the rods e^3 , which will be caused to approach or move away from each other, according to the direction in which the screws are turned. The rods a^3 , sliding in

the pointers n , will thus, by means of the rods b^3 , draw the pointers toward or away from each other, and the pointers, when thus set, will remain rigidly in position and equidistant from each other. The card to be punched is then placed, as usual, on the card-plate k' . The cords q^2 , attached to the pointers, (which indicate the particular color being read in,) are slightly pulled by the operator, and will thereby draw back their corresponding bars, n^2 , into position for punching the holes in the card, and the treadle being now depressed, the bar t' will be lowered by means of the levers o' , p^2 , and q' , and will draw down the rods or bolts t^2 , and with them the punching-plate m^2 , which, pressing on the bars n^2 , will cause such of the said levers as have been drawn backward by the cords q^2 , as hereinbefore described, to force their respective punches o^2 through the card. The remaining punches will enter the cut-away parts E' of the bars n^2 , and will therefore not be subjected to the pressure of the bars n^2 . The cut-away parts E limit the movement of the bars n^2 .

By the hereinbefore-described arrangement of cords and pulleys connecting the pointers with the punching-levers, I avoid the necessity of the operator having to turn his eyes from the pointers to the corresponding keys, which has hitherto been the cause of frequent mistakes, and consequent waste of the cards thus spoiled, and loss of time. The treadle in being depressed will, by means of the rods l' and h' and lever i' , have raised the plate b' , and with it the weighted pawl d' , which will thereby have been raised out of the teeth of the ratchet-wheel a' . The plate b' in rising will raise the tooth or projection g' also out of the teeth of the ratchet-wheel a' by the pin c' , which passes under and raises the spring-catch f' , carrying the tooth g' . The treadle, being now released from the pressure of the foot, will draw down the pawl d' , and thus rotate the ratchet-wheel a' to the extent of one tooth. The main shaft k , being thus rotated to a corresponding extent, will partially rotate the helical cam-wheel j , the groove of which will operate the slotted lever h and the horizontal bar m , carrying the pointers n , so as to move the pointers one single square of the pattern from right to left, as hitherto. The main shaft k in rotating also carries with it the cam-wheel f^2 , which, by means of the pin c^2 , working in the groove of the same and in the slot in the plate d^2 , operates the lever b^2 so as to cause its tail end, by means of the rods g^2 and h^2 , to draw the card-frame k' backward to the required extent after the row of perforations has been punched in the card. When the treadle is released, the punching-plate m^2 and punches o^2 are raised to their normal position by the springs s^2 , and the treadle in rising carries the frame x^2 against the spring-tongue w^2 on the double crank u^2 and presses the levers n^2 back to their original position. The cords q^2 , attached to

the pointers corresponding with the particular color to be next read in, are then pulled, and the treadle is again depressed, and so on, as hereinbefore described, until the perforation of the card is completed. When the perforation of one card has been completed and one line of the pattern read off, the pointers n are brought back to their starting position by the sliding piece o in the helical cam-wheel j (into one end of the groove of which sliding piece the pin i will have entered, as shown by dotted lines in Fig. 1 of the drawings) coming in contact with the pin p' as the helical cam-wheel j revolves, whereby the sliding piece o is pushed into a position such that the other end of the groove therein shall meet the helical groove in the wheel j , into which, as the operation of the machine continues, the pin i will then pass, carrying with it the slotted lever h . The pin p , as the wheel j' continues to rotate, then pushes back the sliding piece o into its former position. The card-frame having now been drawn back to its full extent during one revolution of the main shaft k , it is returned to its starting-point by the pin c^2 on the lever b^2 traveling through the straight portion of the groove e^2 in the cam-wheel f^2 , the backward motion of the lever b^2 being assisted by means of the spring on the rod h^2 . The pattern is moved forward on the rollers A and A' to the extent of one line of squares by the projection r' on the grooved wheel r coming against and moving the lever u outward from the wheel r . This motion operates the pawls w by means of the rods x and y , and the toothed wheels z z' z^2 and rollers A and A' are rotated to the required extent. The perforated card is now withdrawn from the card-frame k' , and a fresh card fixed therein, and the hereinbefore-described operation is repeated, and so on until the whole of the pattern has been read off.

Having thus described my invention and the manner of performing the same, what I claim is—

1. In a self-acting reader for the jacquard, the combination of the pointers and punching-levers with cords or chains and pulleys, substantially as and for the purposes hereinbefore described, and represented in the accompanying drawings.

2. The means, substantially as described, for effecting the adjustment of the pointers, consisting of the combination of the hollow slotted rods n with the rods b^3 , slide blocks or rods a^3 , and rods c^3 , for the purposes set forth, and as illustrated in Figs. 6 and 7 of the drawings.

3. The means, substantially as described, for adjusting the motion of the toothed wheels which carry the rollers, consisting of a grooved wheel, r , provided with an adjustable projection, r' , combined with the intermediate connections which actuate such wheels, as and for the purposes shown and set forth.

4. The combination, with the helical cam

j, of the sliding piece *o* and pins *p p'*, arranged and operating substantially as and for the purpose hereinbefore described, and represented in the accompanying drawings.

- 5 5. The combination of the devices for drawing out and returning the card-frame to its starting-point, consisting of the pin *c*² on the

lever *b*², cam-wheel *f*², having a groove, *e*², and rod *h*², having a spiral spring surrounding it, substantially as shown and described.

ROBERT WOLFE SUTLEFFE.

Witnesses:

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F. PRICE.