5 Sheets—Sheet 1.

G. CROMPTON.

LOOM.

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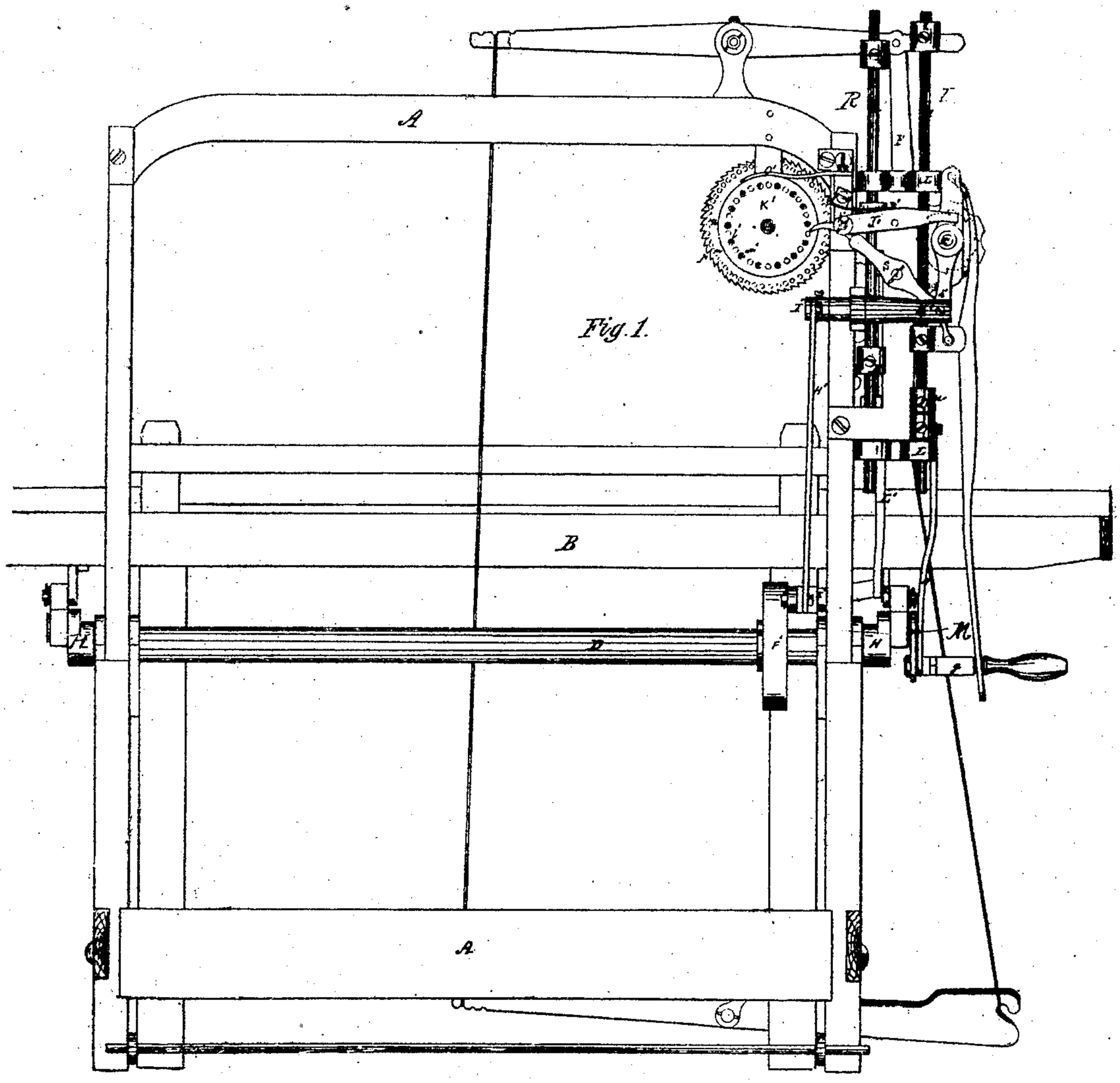

Fig. 1.

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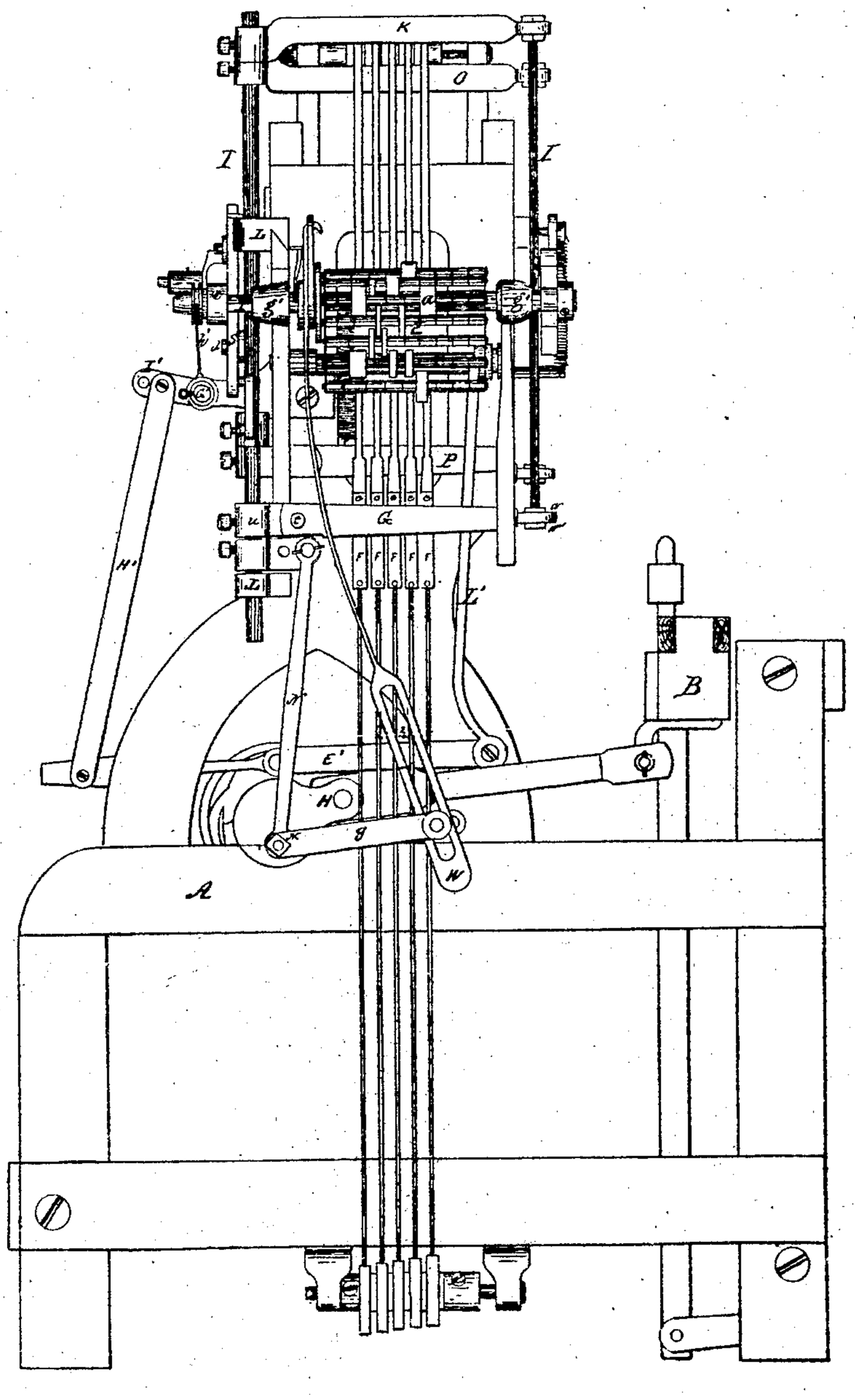
Fig. 2.



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5 Sheets—Sheet 3.

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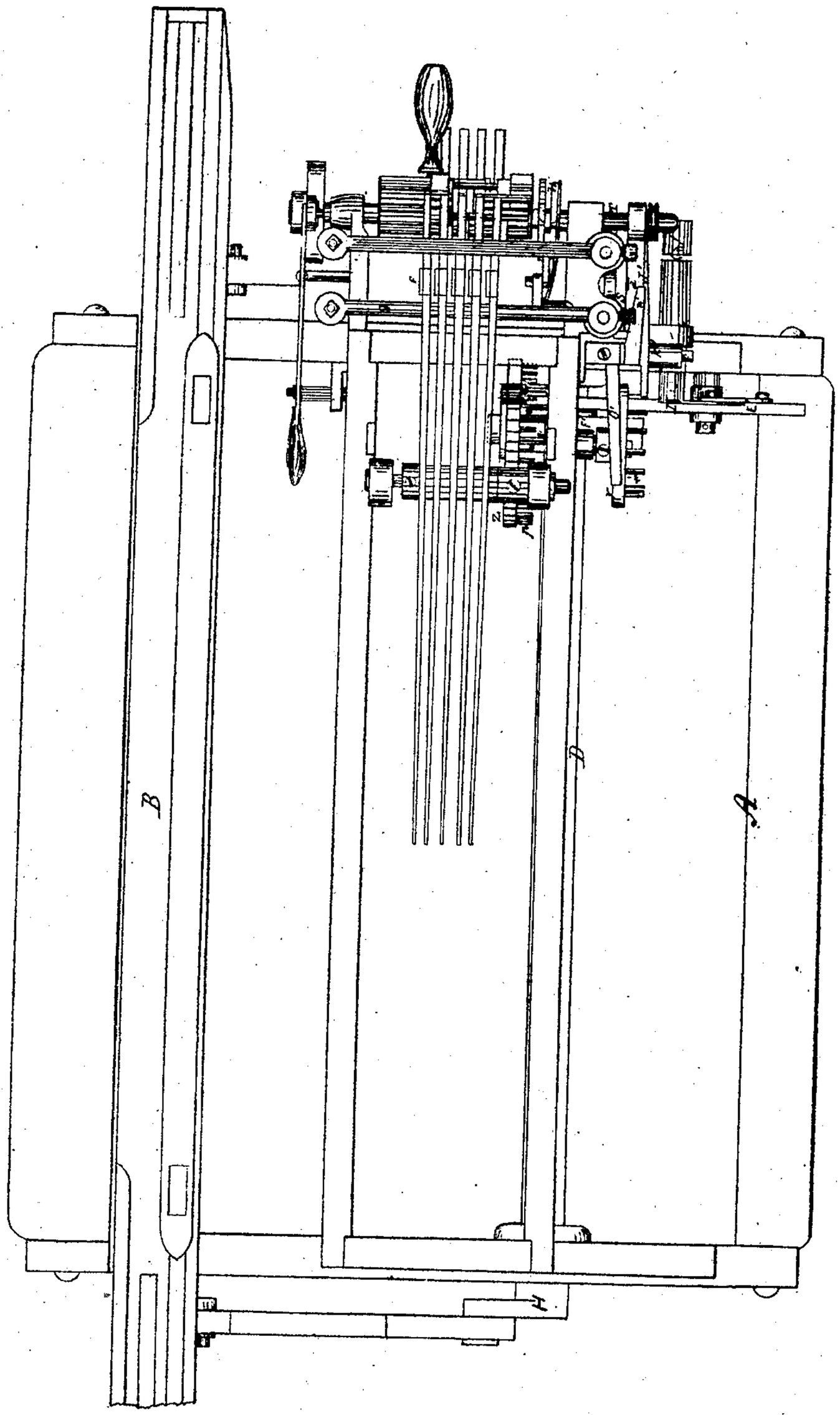

Fig. 3.

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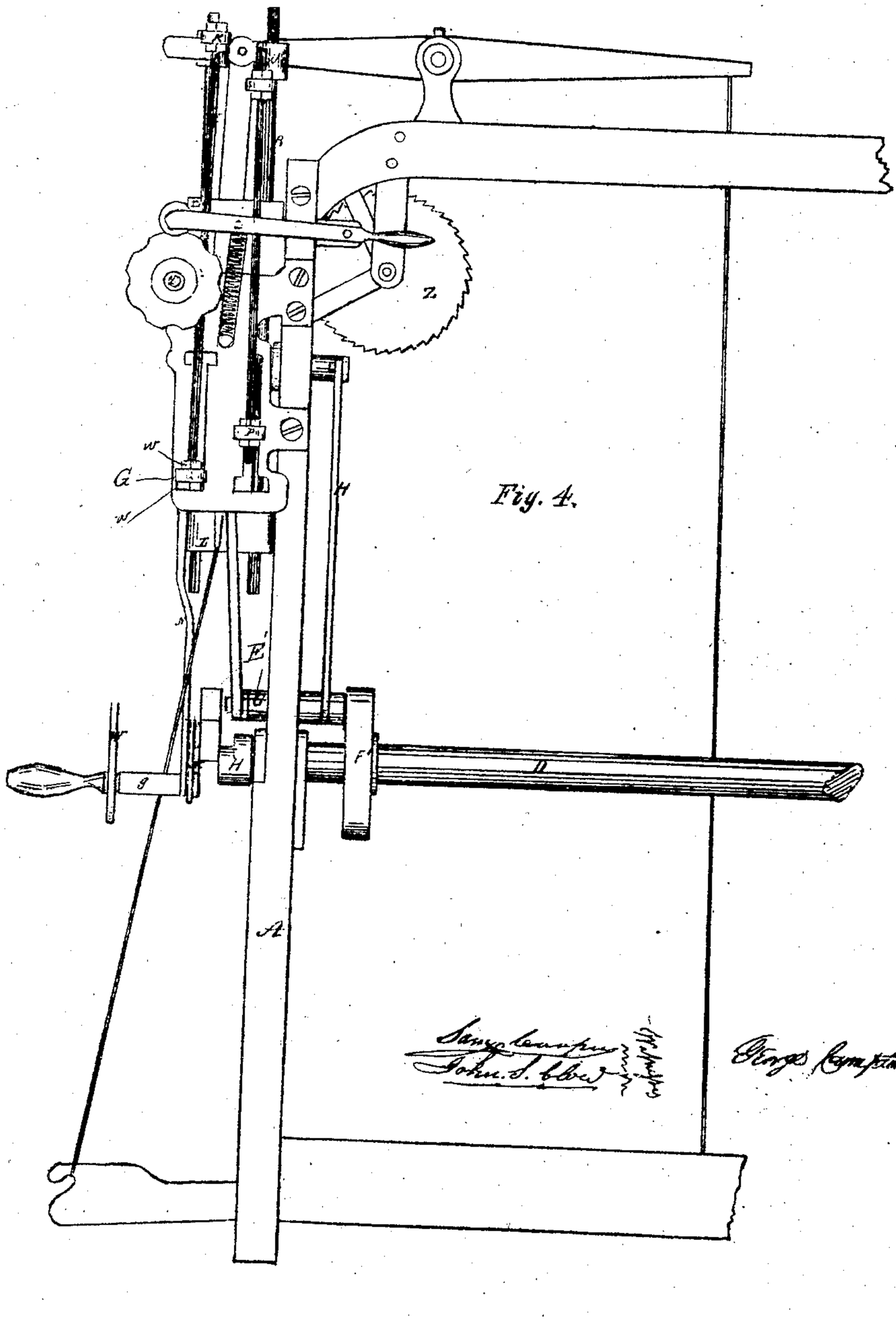

Fig. 4.

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Fig. 6.

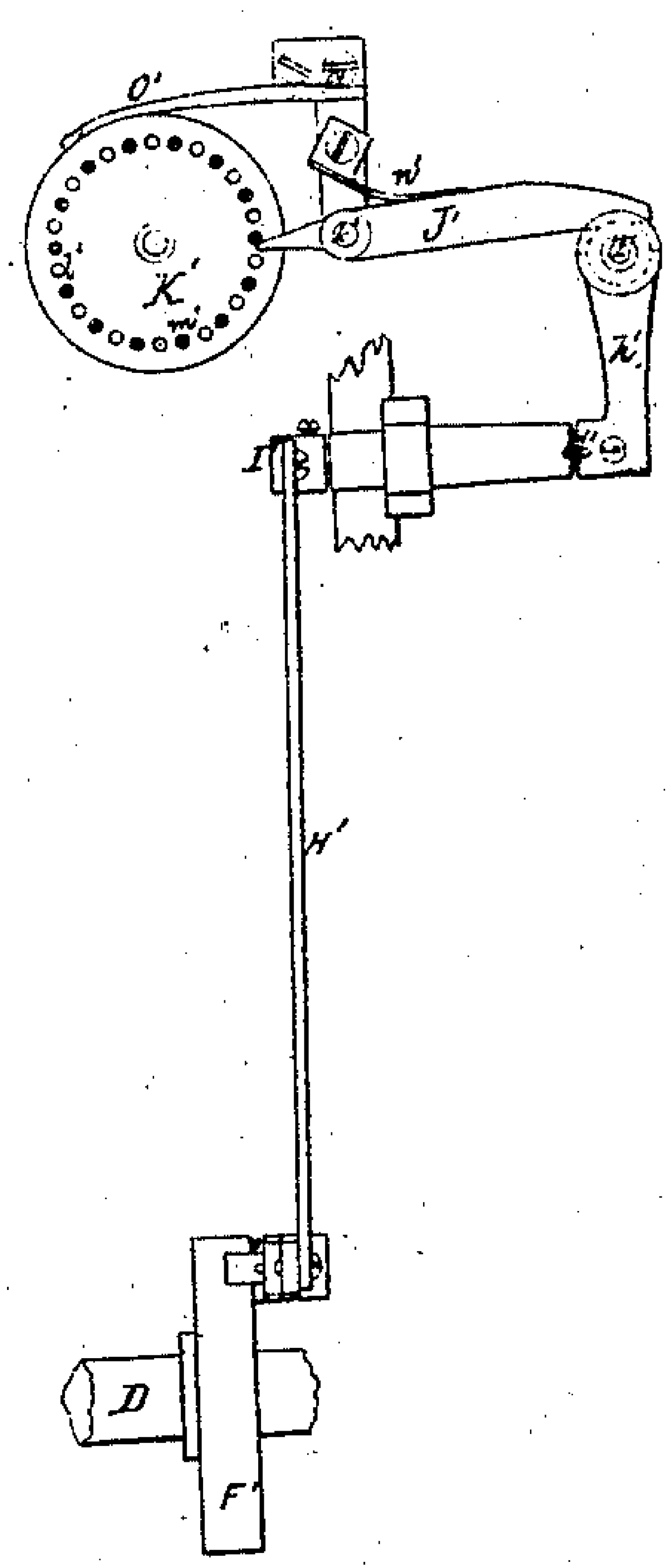


Fig. 5.

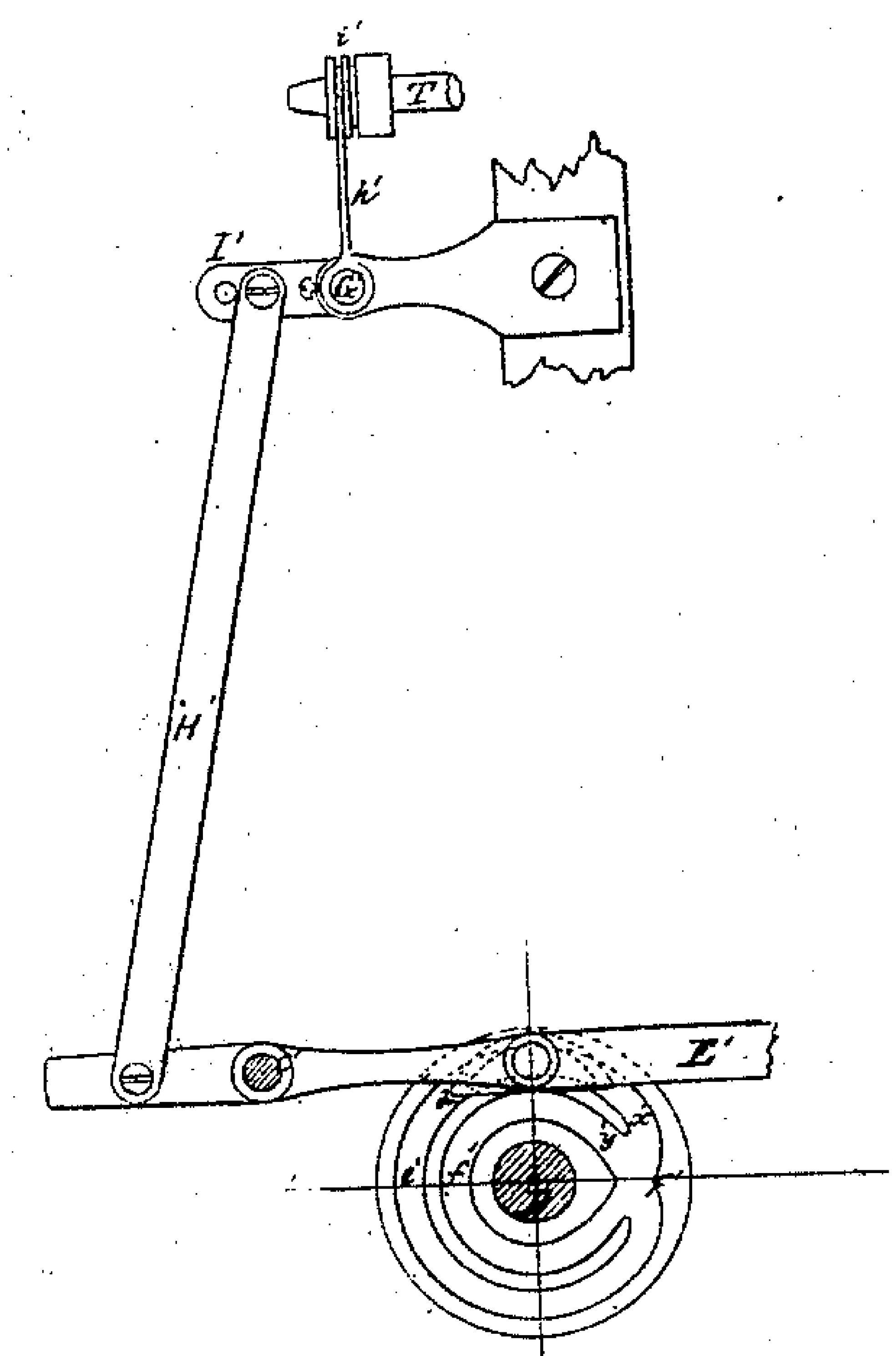


Fig. 7.

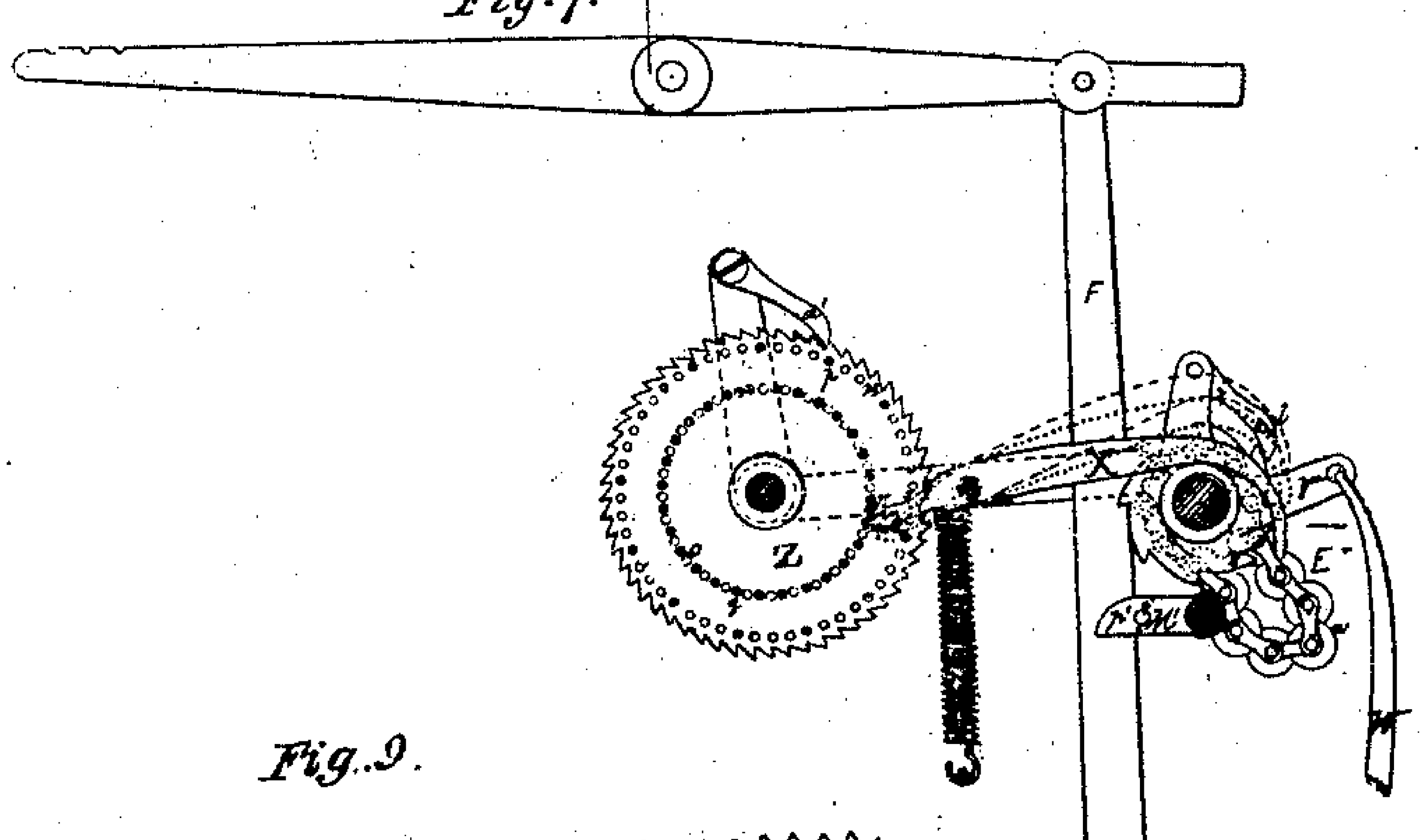


Fig. 8.

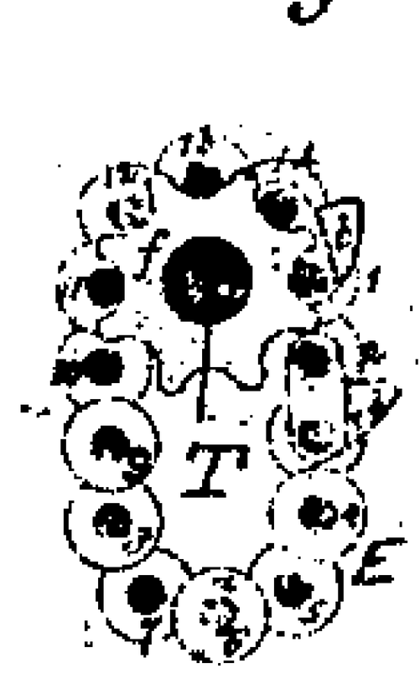


Fig. 9.

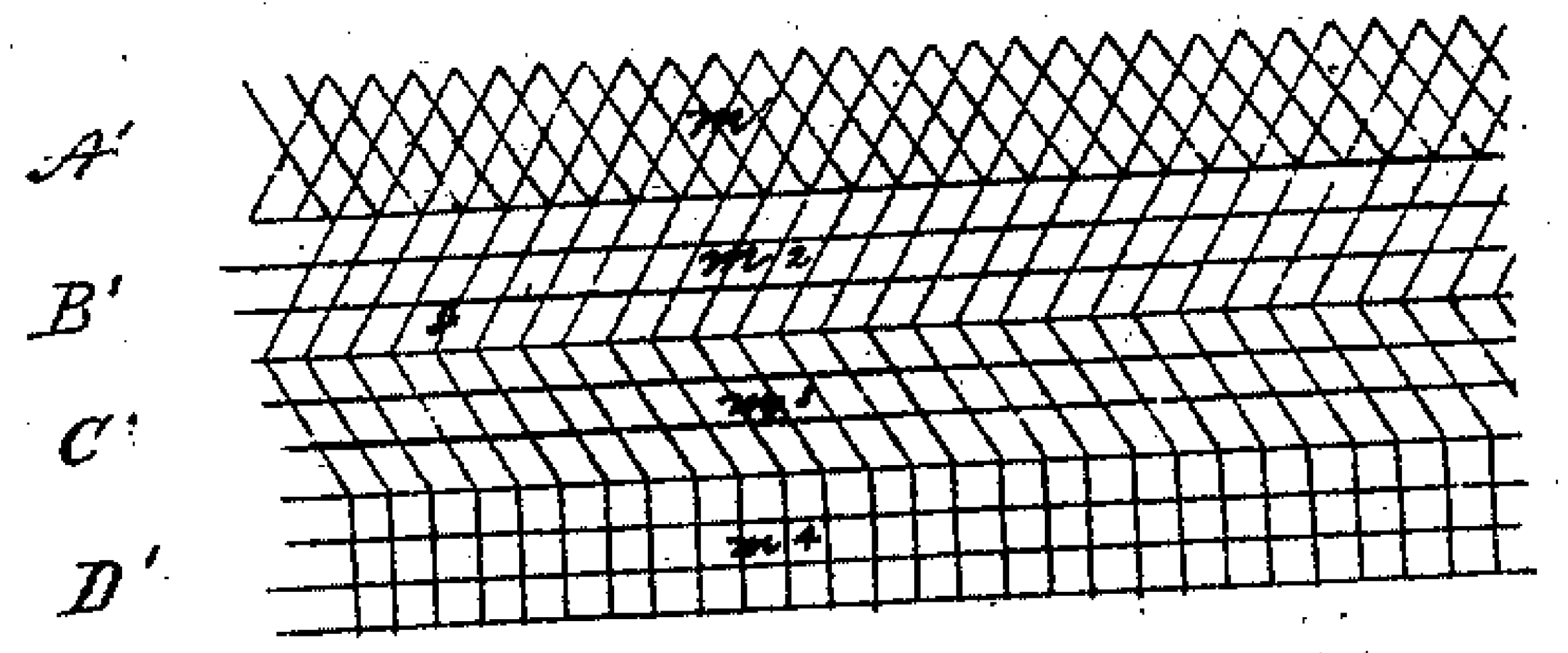
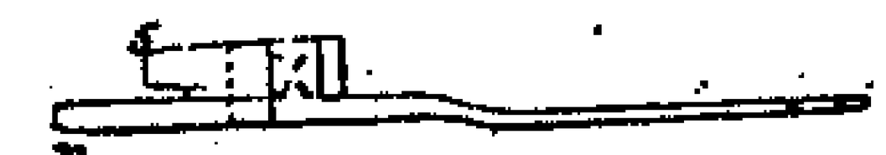


Fig. 10.



UNITED STATES PATENT OFFICE.

GEORGE CROMPTON, OF WORCESTER, MASSACHUSETTS.

LOOM FOR WEAVING FIGURED FABRICS.

Specification forming part of Letters Patent No. 11,933, dated November 14, 1854; Reissued December 28, 1858, No. 639.

To all whom it may concern:

Be it known that I, GEO. CROMPTON, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Looms for Weaving Ornamental Figured Fabrics; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a side view of a loom with my improvements attached; Fig. 2, an end view of the same; Fig. 3, a plan; Fig. 4, a view of the opposite end of the loom, a portion of the frame work being removed. Figs. 5, 6, 7, 8, 9, and 10 are details which will be referred to hereafter.

In weaving ornamental figured goods both colored and plain, it is often desirable to repeat one pattern for a certain distance, and then to follow it by another, which in like manner is repeated as far as required, and so on with four or more separate patterns, the complete series when finished being again repeated in the same order. To weave such goods it has heretofore been necessary to employ two or more pattern chains, which are operated in succession, each one being run a sufficient length of time to complete the desired length of pattern, before it is followed by the next one. By the use of my present invention I am enabled to weave all such goods with a single pattern chain, in which the necessary changes required by the different figures are all automatically made by the loom itself.

To enable others skilled in the art to make and use my invention I will proceed to describe the manner which I have adopted of carrying it out, referring generally to the principal features of the loom wherein they do not differ from those of similar looms as heretofore constructed, and describing particularly only those parts which form the subject of my invention.

A is the frame work of the loom; B, the lathe, which is operated in the usual manner by cranks H upon the crank shaft D, to which the power is applied which sets the loom in motion.

E is the pattern chain, the rollers *a*, upon which govern the motions of the harness in the customary manner.

The rods F are raised for the purpose of operating the heddles by the following means—G is a bar attached to the vertical sliding rods I which are secured at top to the bar or evener K, and slide vertically in bearings L. The frame G, I, K, is vibrated up and down by the arm N and crank M, upon the shaft D. A similar frame composed of the horizontal bars O P and vertical rods R serves the purpose of depressing those rods which require to be carried down, the bar P, taking into the hook, *b* upon the rear of the rods F, and the bar G in the hook, *c* upon the front of the same rods; these two frames are so connected with each other by the lever S, pivoted at *d*, that as one of them rises the other falls, in a manner similar to that employed upon other looms of this kind.

In order that the shed may be evenly and uniformly opened I have adopted the following plan of giving an increased motion to those leaves of the harness which are farthest from the shuttle race. The bar G instead of being connected rigidly with the rods I, is pivoted at *t*, to an adjustable socket *u*, the other end is raised or lowered by the nuts *w*, *w'*, by which means the bar may be set at any desired inclination. One end of the bar P which depresses the rods F is made similarly adjustable and thus the shed is evenly and uniformly opened, which would not be the case were the lifting bar G to be horizontal.

I will now describe the manner in which the pattern chain is operated. It is carried in the usual manner by notched wheels *f*, upon the shaft T, which are caused to revolve by the following means:

U, Fig. 7 is a ratchet wheel upon the shaft T having a number of teeth equal to the number of notches in the carrying wheels *f*.

V is a bent lever which is allowed to move freely upon the shaft T and is vibrated by the rod W which is set in motion by a pin in the crank *g* which plays in the slot *h*. The lever V carries a pawl *i*, which engages with the teeth of the ratchet wheel U, and thus, as the crank *g* revolves, the shaft T, and with it the pattern chain is set in motion.

X is a lever pivoted at *k* of the form represented in Fig. 7, which projects over the shaft T and lies immediately at the side of the ratchet wheel U.

l is a pin projecting from the side of the pawl *i*, which rests upon the top of the lever X. The object of this lever which may be placed in three different positions,

is to regulate the distance which the ratchet wheel is vibrated by the pawl, when in its lowest position as seen in Fig. 7—the pin *l*, does not touch it as the pawl *i* vibrates, and the latter is allowed to revolve the ratchet wheel U a distance equal to the length of three teeth; when the lever is raised into its second position as seen in red in Fig. 7, the pin *l* is raised from out of contact with the ratchet wheel for a portion of its vibration and the latter is moved two teeth, and when the lever X is raised into its third position as seen in blue in Fig. 7, the pawl is thereby raised so high that it is made to pass over two teeth of the ratchet wheel, and the latter is moved a distance equal to the length of but one tooth.

As the number of teeth in the ratchet wheel is the same as the number of the notches in the wheels which carry the pattern chain it is evident that when the ratchet wheel is moved but one tooth the rollers upon each successive rod of the chain are brought to bear upon the rods F. When however the ratchet wheel is moved two teeth the rollers upon every alternate rod are brought into operation, and when the ratchet wheel is moved three teeth the pattern chain is moved a corresponding distance only every third rod of rollers being brought into operation. The object of communicating these different degrees of motion to the pattern chain will now be explained.

Suppose A′ A′, Fig. 9, to be the pattern which is first to be woven for a specified distance and that the pattern for weaving one of the diamonds *m*, be arranged upon the rods 1, 3, 5, 7, 9, 11, 13, of the chain. Let the chain be in such a position that the rollers upon the rod 1 bear upon the rods F, and let the lever X be in such a position that the pawl *i* shall move the ratchet wheel two teeth each time the crank shaft revolves; it is evident now that the pattern upon the rods 1, 3, 5, &c., will be repeated so long as the lever X remains unmoved.

Suppose now that after a certain interval it be required to follow this pattern by another. B′, Fig. 9, the pattern for weaving one of the diamonds m^2 is arranged upon the rods 2, 4, 6, 8, 10, 12, 14. The lever X is then thrown into the position as seen in black in Fig. 7, the pawl *i* being thereby permitted to revolve the ratchet wheel three teeth, and the pattern chain is moved from 13 to 2 or so that the rollers upon the latter rod bear upon the rods F; the lever X is immediately returned to the position which permits the ratchet wheel to be revolved two teeth at a time, and the pattern upon the rods 2, 4, 6, 8, 10, 12, 14 is repeated so long as the lever X continues unmoved. If now it be desired to repeat the pattern A′ after a sufficient quantity of the pattern B′ is woven, it is evident as the former must begin with the rod 1, while the latter ends with the rod 14. In order to make this transition from 14 to 1 the ratchet wheel must be revolved one tooth only; to accomplish this the lever X is raised to its highest position (as seen in blue in Fig. 7) and before the next pick the lever is again returned to its intermediate position, and the pattern upon the rods 1, 3, 5, 7, &c., continues until the lever X is again changed. It now remains to show the manner in which the lever X is thrown into the desired positions at the proper time to govern the motions of the pattern chain; this is accomplished by the pattern wheel Z having two circles of holes *n* and *o*, into which are inserted pins *p*, *q*, the latter being double the length of the former Fig. 3.

The wheel Z is revolved in the following manner:—*a′* is a pawl which engages with teeth upon the periphery of the wheel Z and is operated by dogs *b′* upon the pattern chain. Whenever it is required that the pawl *i* shall move the ratchet wheel U two teeth for the purpose of bringing every alternate rod of the chain into operation, one of the pins *q* is allowed to strike upon the toe *r*, of the lever X and throw the latter into the position represented in red. When it is required to move the ratchet wheel U but one tooth, one of the outer circle of pins *p*, is allowed to bear upon the lever X at *s*, Fig. 10, by which means the latter is raised into the position represented in blue, Fig. 7, and the pawl *i* is held up so that the ratchet wheel U is moved but one tooth. If it be required to pass over two rods of the chain, and to bring the third one into operation the lever X is allowed to drop upon the shaft T, which is accomplished by leaving the holes *n*, *o*, in the wheel Z vacant, which permits the lever X to take the position shown in black in Fig. 7 so as not to interfere with the operation of the pawl *i*. The pins *p* and *q* are so arranged in the holes of the wheel Z as to give the proper succession of figures by governing the motion of the pattern chain as required.

The second part of my invention consists in placing two patterns side by side upon the rods of the pattern chain, the latter being vibrated longitudinally at proper intervals, so as to bring one or other of these patterns into operation at a time, the lateral vibration of the pattern chain being governed by a pin wheel similar to the one described above for the purpose of regulating the revolving motion of the pattern chain.

By a reference to Fig. 2 it will be seen that there are two separate patterns arranged upon the chain, a portion of the rollers being of a sufficient width only to allow them to enter between the rods F. These patterns are so arranged that when the chain

is in one position one only of the patterns is brought into operation, and when it is vibrated slightly to one side, this pattern is thrown out of operation, and the other is brought into use.

The vibration of the pattern chain at the proper time is effected in the following manner: E′ is a lever pivoted to the frame of the loom at *c′* and which is vibrated once for every revolution of the crank shaft in the following manner: *d′* is a shoe attached to this lever by a pin; this shoe runs in a double groove *e′*, *f′*, Fig. 5, of the wheel F′ upon the crank shaft D; this groove is so formed that on the arrival of the shoe at the point *x′* it is switched into the groove of smaller diameter *f′*, and again at the arrival of the shoe at the point *y′* it is switched into the groove of larger diameter *e′;* a vibrating motion is thus communicated to the lever E′ up and down once for every two revolutions of the crank shaft.

The shaft T which carries the pattern chains is vibrated in its bearings *g′* in the following manner—*h′* is a spring fork which is made to play in one of two grooves *i′* on the shaft T,—this spring is attached to the short shatf G′—I′ is an arm projecting from the shaft G′ and connected with the lever E′ by the rod H′; by these connections, it will appear that when the lever E′ is vibrated by the revolution of the cam F′, the shaft G′ will also be vibrated and a longitudinal vibratory motion will be communicated to the shaft T of the pattern chain, except when this shaft is held stationary by means to be presently described, in which case the spring fork *h′*, is allowed to bend as the shaft G′ vibrates and no motion is communicated to the shaft T. This latter is held stationary, when it is not required to be moved in the following manner—J′ is a lever pivoted at *k′* one end of which is allowed to rest in one or other of the grooves *i′*—K′, is a wheel having a circle of holes *l′* near its periphery; into these holes are inserted at suitable intervals pins *m′* which strike upon the rear end of the lever I′, and raise it from out the grooves *i′* of the shaft T,—*n′* is a spring which presses the lever into the grooves *i′* whenever it is not raised by the pins in the wheel K′.—O′ is a spring which presses upon the periphery of the wheel K′, and prevents it as well as the wheel Z from moving except as they are driven by the dogs *b′*, and the pawl *d′* in the manner described.

It has been stated that some of the rollers of the pattern chain project between the rods F, and it becomes necessary before the pattern chain can be moved laterally that these rods should be pressed back out of its way;—this is effected in the following manner. The lever E′ which effects the lateral movement of the patter chain is allowed to extend upon the opposite side of its pivot, and is connected by the rod L′ to a vibrating frame M′ Fig. 7, having fingers *p′* which project between the rods F′; a horizontal rod *q′* passes through these fingers, and as the frame M′ is vibrated in the manner before described these rods are pressed back out of the way of the rollers upon the pattern chain, which latter is thus left free to be moved laterally if required.

Let us suppose now that the requisite amount has been woven of the patterns A′, B′, and that it be desired to follow them by the patterns C′, D′, Fig. 9; the pattern C′ is arranged upon the rods 2, 4, 6, 8, 10, 12, 14, by the side of the pattern B-, and upon the completion of the latter pattern a pin *m′* in the wheel K′ raises the lever J′ from out the grooves *i′* and the rods F, having been pressed back by the rod *q′*, as described, the shaft T is vibrated by the spring *h′* and the next instant the lever I′ falls into the next groove *i′*, and the shaft of the chain is again prevented from being vibrated laterally until a sufficient quantity of the pattern C′ has been woven. The pattern D′ is arranged upon the rods 1, 3, 5, 7, 9, 11, 13, by the side of the pattern A′, and the pattern C′ being completed the chain is shifted so as to bring the rods 1, 3, 5, &c., into operation in the manner already described, each entire revolution of the pattern chain as before, being sufficient to complete one of the squares m^4. On the completion of the requisite amount of this pattern, the pattern chain is moved laterally in the manner before described and the series is again repeated, beginning at A′ as before.

It is evident that the number of patterns which may be arranged upon a single chain, by either of the above methods is not limited to two or four, but that a greater number may be employed, the size and proportions of the parts immediately connected therewith being varied in accordance.

What I claim as my invention and desire to secure by Letters Patent is—

1. Arranging two or more patterns upon a single chain, so that by bringing the rods of the chain into operation in a certain order, one pattern is produced, and by operating them in a different order another pattern is produced in the manner described.

2. I claim placing two or more patterns upon the rods of a pattern chain side by side and operating them in succession by vibrating the chain laterally in the manner described.

3. I claim pivoting the lifting and depressing rods G, P, at one end, the other end being made adjustable in the manner and for the purpose set forth.

GEORGE CROMPTON.

Witnesses:

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JOHN S. CLOW.

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