No. 791,579. PATENTED JUNE 6, 1905.

F. F. ROCHE.

LOOM FOR FANCY LENO WEAVING.

APPLICATION FILED FEB. 5, 1903.

2 SHEETS—SHEET 1

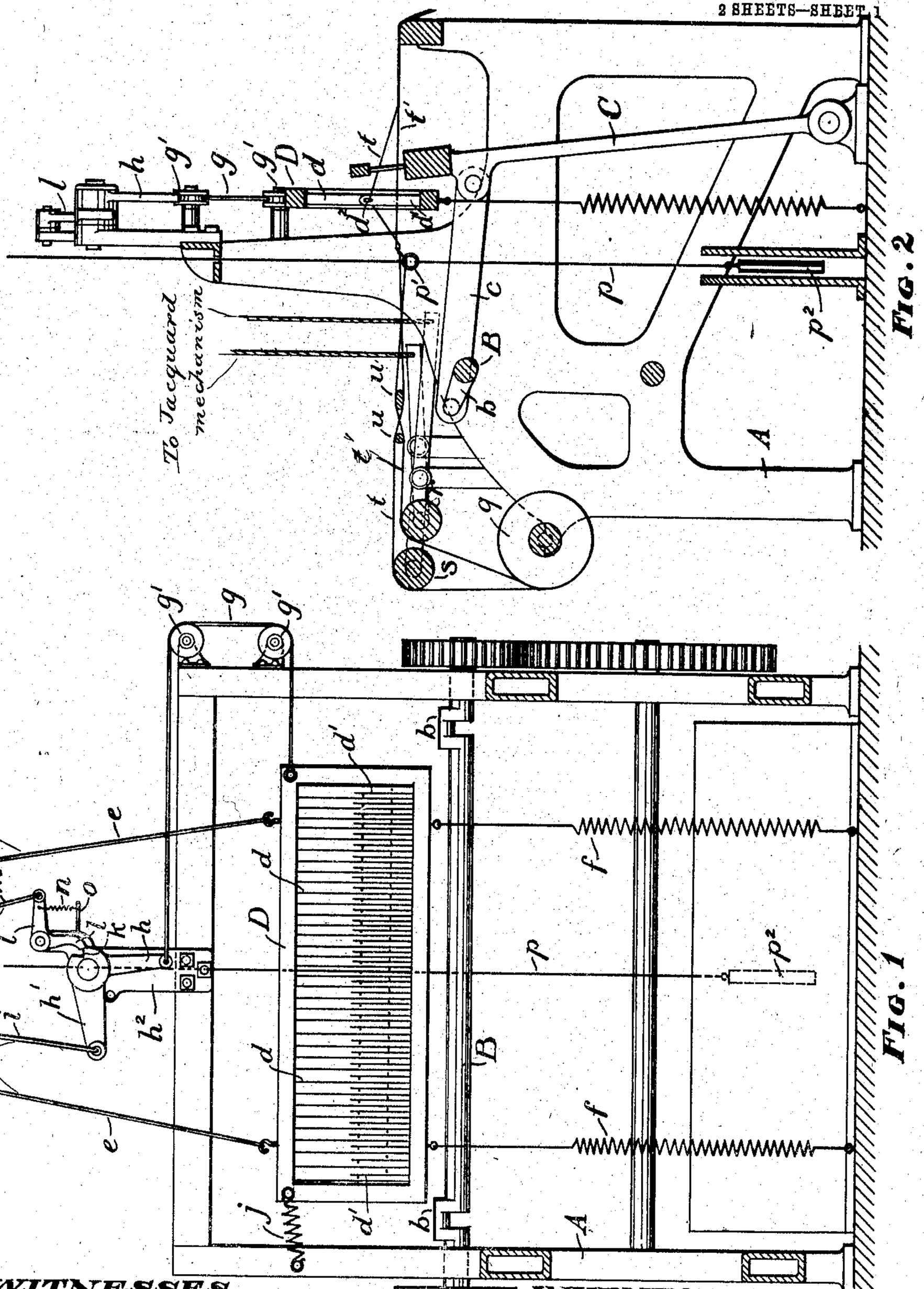

FIG. 2

FIG. 1

WITNESSES

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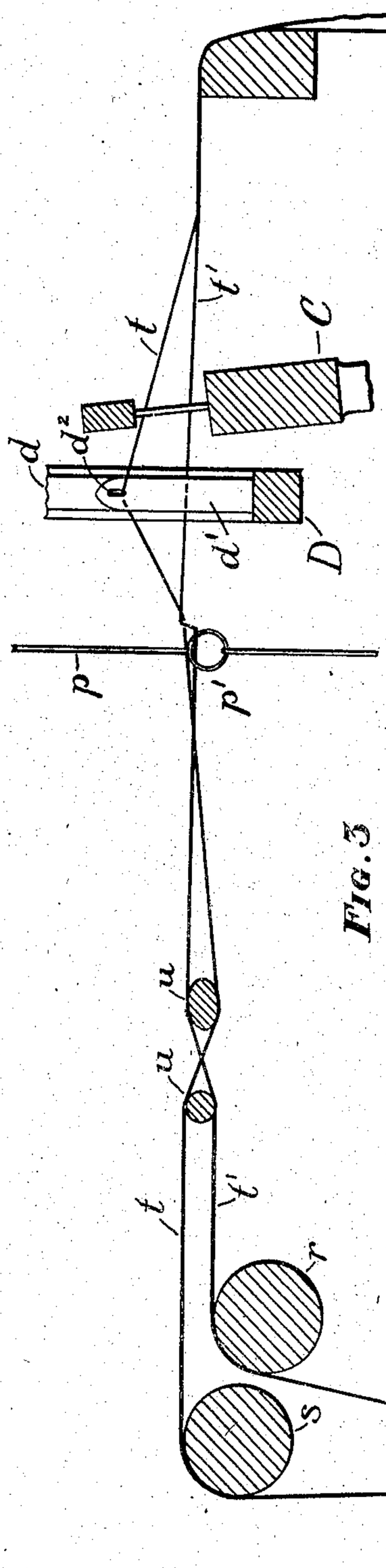

FIG. 3

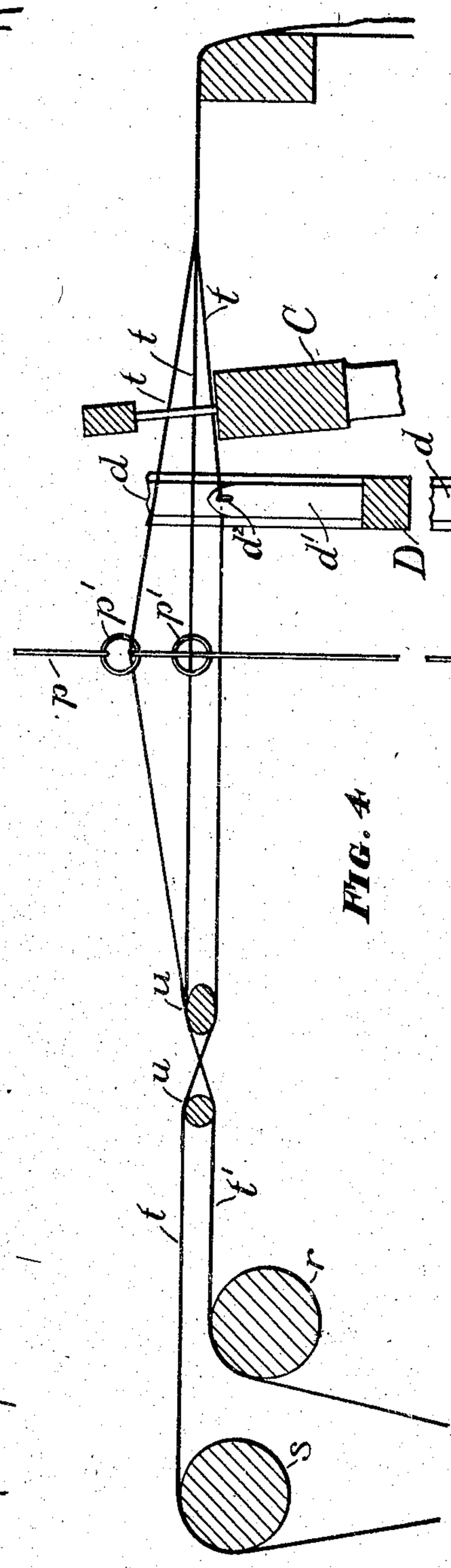

FIG. 4

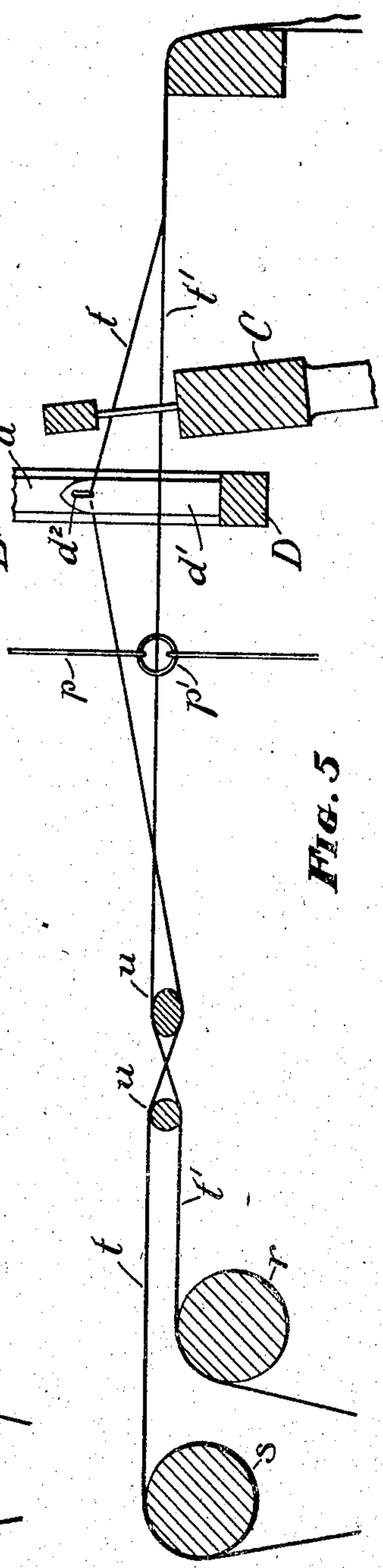

FIG. 5

WITNESSES

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No. 791,579. Patented June 6, 1905.

UNITED STATES PATENT OFFICE.

FREDERICK F. ROCHE, OF LINCOLN, RHODE ISLAND, ASSIGNOR TO MANVILLE COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF NEW JERSEY.

LOOM FOR FANCY-LENO WEAVING.

SPECIFICATION forming part of Letters Patent No. 791,579, dated June 6, 1905.

Application filed February 5, 1903. Serial No. 142,033.

To all whom it may concern:

Be it known that I, FREDERICK F. ROCHE, of Lincoln, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Looms for Fancy-Leno Weaving; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The present invention relates more particularly to looms for weaving fancy leno or gauze fabrics in which the body of the fabric is composed of leno-weaving and in which there are patterns or designs formed by the introduction of a second or additional weft-thread; and the invention has for its object to provide simple and efficient mechanism for producing fabrics of this character.

To that end the invention consists in the combination with the other parts of a Jacquard or fancy loom of a combined comb and reed with mechanism controlled by a suitable pattern device for giving to such combined comb and reed both vertical and lateral movements, whereby both the opening of the shed and the crossing of the threads for the leno-weave will be effected by said combined comb and reed and whereby the location or arrangement of the patterns or designs may be varied at will.

The invention further consists in certain combinations of parts hereinafter described and claimed.

Referring to the drawings, Figure 1 is a front elevation, partly in section, of a portion of a loom embodying my invention. Fig. 2 is a vertical section of the same, and Figs. 3, 4, and 5 are enlarged diagrammatic views showing the positions of the warp-threads at different stages of the weaving.

A represents the frame of an ordinary Jacquard or fancy loom, in which is mounted the main shaft B, provided with fast and loose pulleys *a a*. The shaft B is provided with the usual cranks *b b* for operating the lay C through the connecting-links *c*.

D is the combined comb and reed, which is provided with alternate long dents *d* and short dents *d'*. The long dents *d* extend the full width of the reed and are secured at each end to the frame. The short dents *d'* extend about one-half the width of the reed and are secured to the frame only at their lower ends. These short dents are provided near their upper or free ends with eyes d^2, through which one set of the warp-threads are passed.

The combined comb and reed is connected with the jacquard mechanism so that both vertical and lateral movements will be given to said combined comb and reed through said jacquard mechanism, the times when such movements shall be given to the combined comb and reed being controlled by a suitable pattern.

Connected with the upper side of the frame of the combined comb and reed are two straps *e e*, said straps being connected to two of the uprights of the jacquard mechanism, by means of which the required upward movements are given to the combined comb and reed at the desired times, according to the pattern employed. Connected with the lower side of the frame of the combined comb and reed are two springs *f f*, the other ends of which are secured to the floor or other fixture. The springs *f f* serve to give the required downward movements to the combined comb and reed at the desired times and when permitted to do so by the jacquard mechanism.

To give the required lateral movements to the combined comb and reed in one direction, a cord *g* is connected to one end of the frame, said cord passing around suitable pulleys *g' g'* and being connected to one arm of a bell-crank lever *h*, pivoted on a standard h^2, secured to the frame of the loom. The other arm, *h'*, of the bell-crank lever is connected by a strap *i* with one of the uprights of the jacquard mechanism. To give the required lateral movement to the combined comb and reed in the other direction, a spring *j* is connected to the other end of the frame of the combined comb and reed and to the frame of the loom, the action of said spring being controlled by the pattern mechanism.

In Fig. 1 the combined comb and reed is

shown in the position which it occupies after having been moved to the left by the action of the spring *j*. The next lateral movement of the combined comb and reed will be to the right under the action of the pattern mechanism. When the pattern mechanism has acted to thus move the combined comb and reed to the right, it may be held in that position by a suitable locking device, which is likewise under the control of the pattern mechanism. In the hub of the bell-crank lever *h* is formed a notch *k*. Pivoted to the standard h^2 is a second bell-crank lever, the arm *l* of which is adapted to engage the notch *k*. To the other arm, *l'*, is attached a strap *m*, connected to another upright of the jacquard mechanism. A spring *n* connects the arm *l'* with a fixed pin *o*, projecting from the standard h^2. When the combined comb and reed has been moved to the left under the action of the spring *j*, the position of the parts is as shown in Fig. 1, with the end of the arm *l* bearing against the hub of the bell-crank lever *h* and the spring *n* being under tension and tending to swing the arm *l* to the left. When now the combined comb and reed is moved to the right under the action of the jacquard mechanism, the turning of the bell-crank lever *h* brings the notch *k* into a position where the end of the arm *l* can enter the same under the action of the spring *n*. The engagement of the arm *l* with the wall of the notch serves to hold the bell-crank lever *h* against a return movement, and consequently holds the combined comb and reed in its position to the right until the arm *l* is withdrawn from the notch *k*. When the combined comb and reed is to be again moved to the left and into the position shown in Fig. 1, the bell-crank lever is turned by the action of the jacquard mechanism so as to withdraw the arm *l* from the notch *k*, thereby releasing the bell-crank lever *h* and the combined comb and reed and permitting the latter to be moved to the left by the spring *j*.

The ordinary jacquard-harness *p* is connected with the uprights of the jacquard mechanism and provided with the usual eyes *p'* and weights p^2.

q represents the warp-roll, *r* the whip-roll, and *s* the easer-roll, this easer-roll being connected with the jacquard mechanism, as usual.

One set of the warp-threads *t* are led from the warp-roll over the easer-roll *s*, over and under the lease-rods *u*, and through the eyes d^2 in the short dents of the combined comb and reed, and thence through the reed in the lay. The other set of warp-threads *t'* are led from the warp-roll around the whip-roll *r*, under and over the lease-rods *u*, through the eyes *p'* of the jacquard-harness, and between the long dents and short dents of the combined comb and reed, and thence through the reed in the lay.

The operation of the mechanism above described is as follows: It is to be understood that the body of the fabric is to be produced by leno or cross weaving with the usual warp and weft threads and that the patterns or designs are to be formed by the introduction of a second weft-thread, which is preferably considerably coarser than the weft-thread employed for the leno-weave in order that the patterns may stand out in contrast with the body of the fabric. It is to be further understood that for the picks at which the leno weft-thread is laid the shed is to be opened by the combined comb and reed, while for the picks at which the pattern weft-thread is laid the shed is to be opened by the jacquard-harnesses. It will also be understood that the fabric is not fed forward after the laying of the pattern weft-thread, but only after the laying of the leno weft-thread. In the following description of the operation it will be assumed that a single pattern weft-thread is to be laid after each leno weft-thread and that the shed is to be opened first by the combined comb and reed and then by the jacquard-harnesses alternately. It will be understood, however, that plain-leno weaving may be continued for any desired number of picks without the laying of any pattern weft-thread, in which case the shed will be opened successively the desired number of times by the combined comb and reed. So, also, if desired, several pattern weft-threads may be laid in succession, in which case the shed will be opened successively a corresponding number of times by the jacquard-harnesses.

Referring to Fig. 2 and to the enlarged view Fig. 3, which shows the parts in the same position, the combined comb and reed is shown in its raised position and as having opened the shed by raising the warp-threads *t*. In these figures the lateral position of the combined comb and reed is that shown in Fig. 1—that is, it has been moved to the left. It will be noticed that with the parts in this position the threads *t* have been crossed under the threads *t'* near the eye *p'* of the jacquard-harness, the thread *t'* in Fig. 3 lying back of or behind the short dent *d'*. This crossing of the threads near the eye *p'* is not the crossing of the threads to form the leno-weave, but is only a temporary crossing of the threads at that point due to the change in the normal relation of the threads *t* and *t'* as they come from the warp-roll. This temporary crossing is taken out when the short dent *d'* is lowered and comes up on the other side of the thread *t'*, as shown in Fig. 5.

After the leno weft-thread has been laid the combined comb and reed is depressed and moved laterally to the right in Fig. 1 and a portion of the threads *t'* are raised by the proper jacquard-harnesses to open the shed for the next pick, as shown in said Fig. 4. After being thus depressed and moved laterally to the right the combined comb and reed

is held in this lateral position against the pull of the spring *j* by the latch *l*. As will be seen, the combined comb and reed when depressed is moved to a position to bring the upper ends of the short dents *d'* below the lower threads *t'* of the shed and so that in moving laterally the short dents may pass by said threads. This gives the appearance in Fig. 4 of there being three sets of warp-threads, which is not the case, the warp-threads *t'* being separated by the jacquard-harnesses to form the shed, and the threads *t*, which form a portion of the lower side of the shed, being carried by the short dents to a plane below the lower threads *t'*.

The pattern weft-thread having been carried through the shed opened by the jacquard-harnesses the combined comb and reed is then raised to lift the threads *t* and open the shed for the next pick, the jacquard-harnesses being at the same time operated to bring all the threads *t'* into the same plane and the parts being brought into the position shown in Fig. 5. The short dents *d'* rise this time on the other side of the warp-threads *t'*, thereby completing the crossing of the threads *t* and *t'*, which crossing takes place at or near the woven fabric and serves to hold the leno weft-thread and the pattern weft-thread in place. The thread *t'* now lies on the front side of the short dent *d'*, as shown in said Fig. 5. It will be observed that when the short dent comes up on this side of the thread *t'* there is no crossing of the threads adjacent to the eye *p'* of the jacquard-harness, the reason for this being that the threads *t* and *t'* have now been brought back to their normal relation as delivered from the warp-roll.

When the leno weft-thread has been carried through the shed thus formed, the combined comb and reed is again depressed and moved laterally to the left, the latch *l* being released at the proper time to permit such lateral movement, and the shed for the next pick is opened by the jacquard-harnesses and the pattern weft-thread laid. The combined comb and reed is then again raised to open the shed for the next pick, and so on.

By reason of the temporary crossing of the threads near the eye of the jacquard-harness, which takes place when the short dent comes up on the far side of the thread *t'*, as shown in Fig. 3, the shed formed by the combined comb and reed at this pick is much shorter than the shed formed by the jacquard-harness and much shorter than the shed formed by the combined comb and reed when the short dent comes up on the front side of the thread *t'*, as shown in the drawings. Because of the shortness of the shed at this pick it is desirable that the threads *t* should be eased up, so as to give an amount of slack sufficient to permit the requisite upward movement of the combined comb and reed to form the shed. It is for this reason that the easer-roll *s* is employed and the threads *t* led over such easer-roll, said easer-roll being moved forward at the proper times by the jacquard mechanism in the usual manner and so as to give up the necessary amount of slack. If desired, the easer-roll may be operated for every pick at which the shed is opened by the combined comb and reed; but this is not necessary, because with the threads in the position shown in Fig. 5 the shed opened by the combined comb and reed extends back nearly to the forward lease-rod and is nearly as long as the shed formed by the jacquard-harness.

With the construction and operation of parts above described it will be seen that the combined comb and reed not only serves to effect the crossing of the threads, but also serves to open the shed for the pick at which the leno weft-thread is laid, said combined comb and reed being given both lateral and vertical movements to perform these functions. It will be further seen that the movements of the combined comb and reed, both vertical and lateral, are effected or controlled by pattern mechanism, and that thus the times of these movements may be varied as desired. Thus the shed may be opened by the combined comb and reed and by the jacquard-harnesses alternately and the leno weft-thread and the pattern weft-thread laid at alternate picks, or the shed may be opened and closed successively by the combined comb and reed and a succession of leno weft-threads laid to produce plain-leno weaving and without the laying of any pattern weft-threads, or the combined comb and reed may be held out of operation while the shed is opened a number of times by the jacquard-harnesses and a number of pattern weft-threads laid in succession before the shed is again opened by the combined comb and reed for the laying of the next leno weft-thread. In the latter case by the opening of different sheds for the successive pattern weft-threads the character and arrangement of the patterns may be varied. If desired, the successive pattern weft-threads may be of different or varying colors.

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

1. In a loom, the combination, with pattern mechanism, of a combined comb and reed comprising long dents and short dents, the short dents being provided with eyes to receive one set of the warp-threads, said combined comb and reed being given both a vertical and a lateral movement under the control of said pattern mechanism, substantially as described.

2. In a loom, the combination, with pattern mechanism, of a combined comb and reed comprising long dents and short dents, the short dents being provided with eyes to receive one set of the warp-threads, said combined comb and reed being given a lateral movement to cross the warp-threads, and then an upward movement to open the shed for the next pick,

said movements of the combined comb and reed being controlled by the pattern mechanism, substantially as described.

3. In a loom, the combination of harnesses for operating one set of warp-threads, a combined comb and reed for operating the other set of warp-threads, pattern mechanism for controlling said harnesses to open the shed for certain picks and for controlling said combined comb and reed to cross the threads and to open the shed for certain other picks, substantially as described.

4. In a loom, the combination of harnesses for operating one set of warp-threads, a combined comb and reed for operating the other set of warp-threads, an easer-roll over which said second set of warp-threads are passed, pattern mechanism for controlling said harnesses to open the shed for certain picks and for controlling said combined comb and reed to cross the threads and to open the shed for certain other picks, and also for controlling the operation of said easer-roll at the proper times, substantially as described.

5. In a loom, the combination, with pattern mechanism, of a combined comb and reed comprising long dents and short dents, the short dents being provided with eyes to receive one set of the warp-threads, said combined comb and reed being given both vertical and lateral movements under the control of said pattern mechanism, and a locking device also under the control of said pattern mechanism for locking the combined comb and reed at the end of one of its lateral movements, substantially as described.

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Witnesses:
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