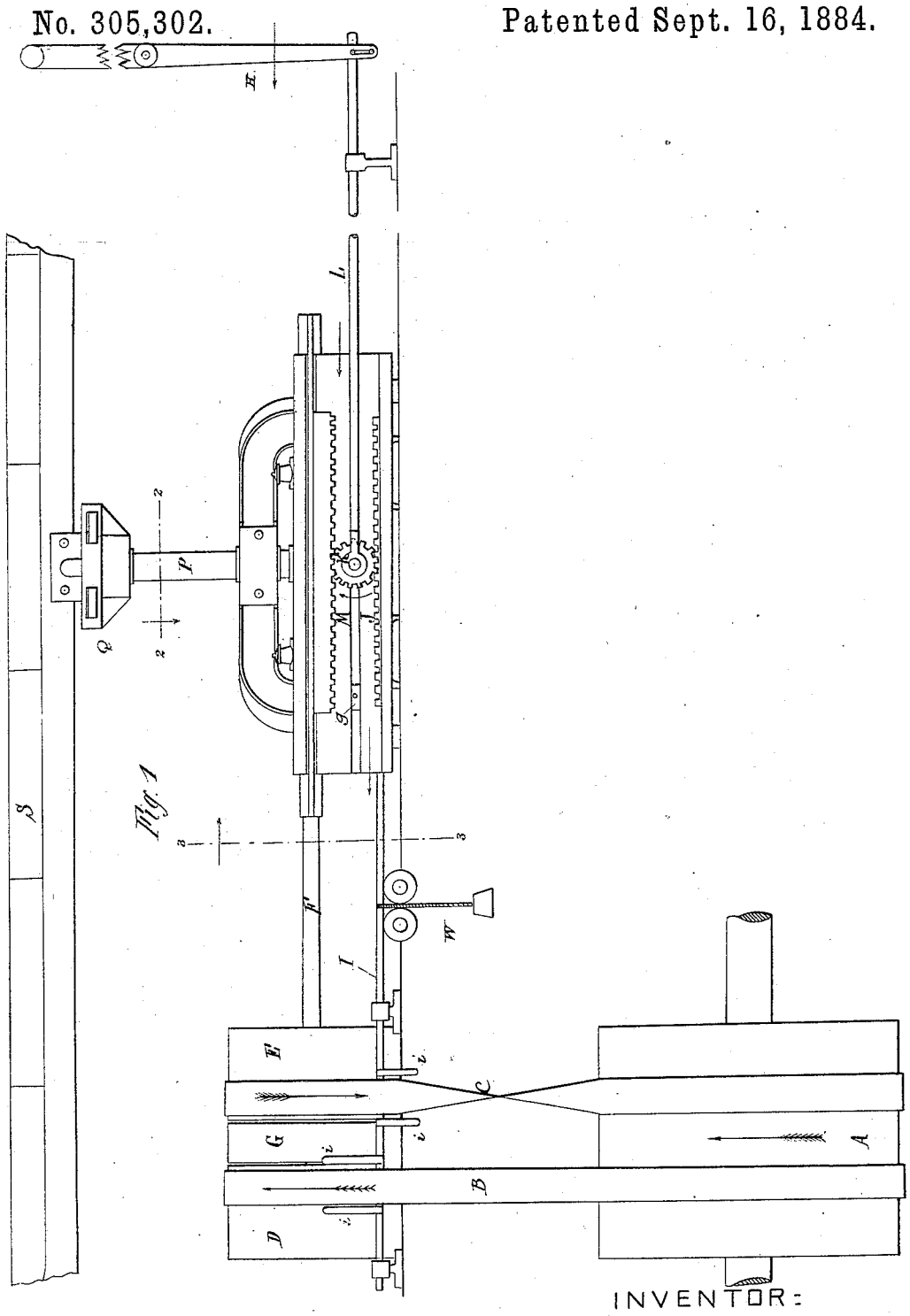
(No Model.) 4 Sheets—Sheet 1.

L. GOURDIAT.

MECHANISM FOR CONTROLLING THE ACTION OF MACHINES.

No. 305,302. Patented Sept. 16, 1884.



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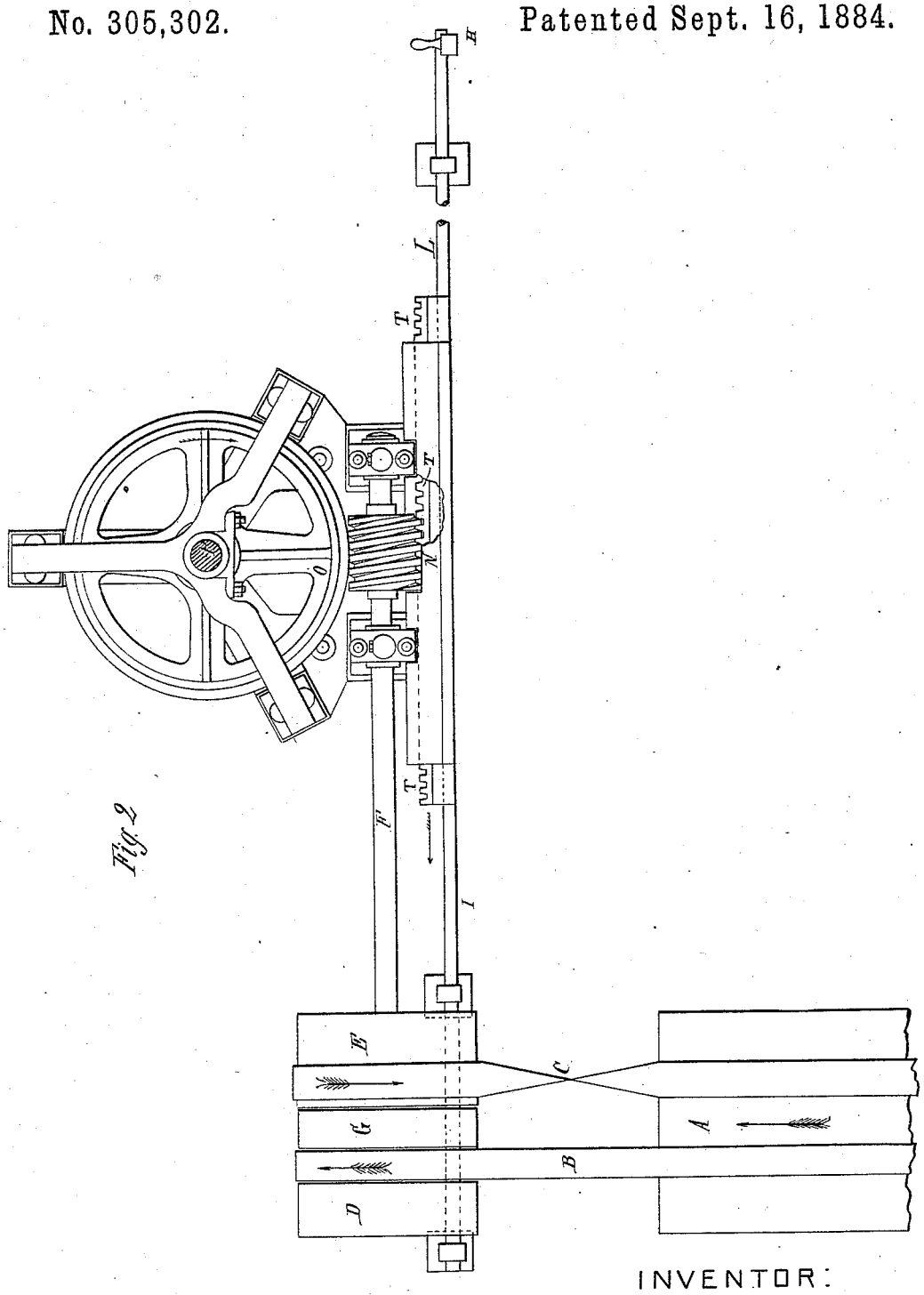

Fig. 2

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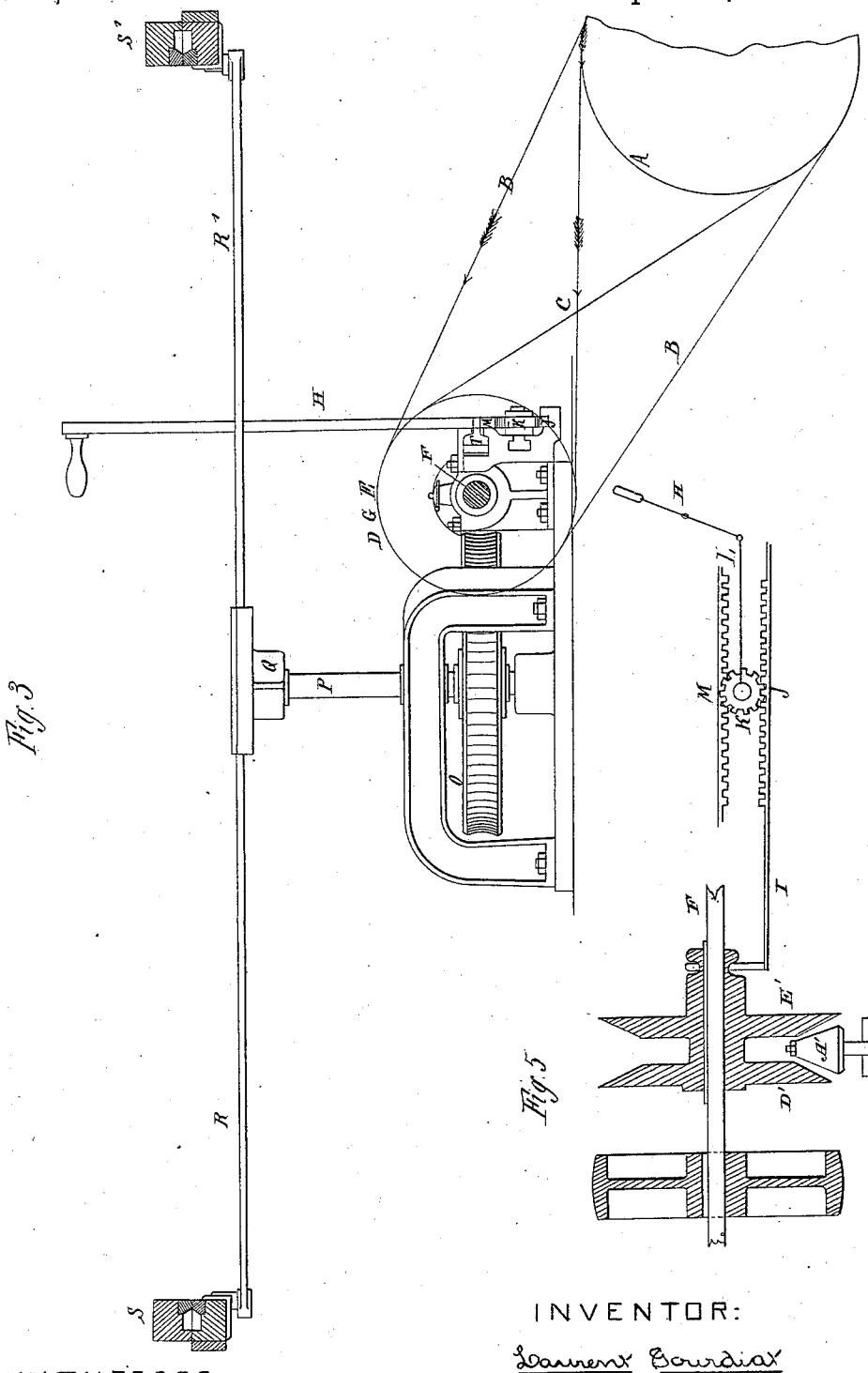

Fig. 3

Fig. 5

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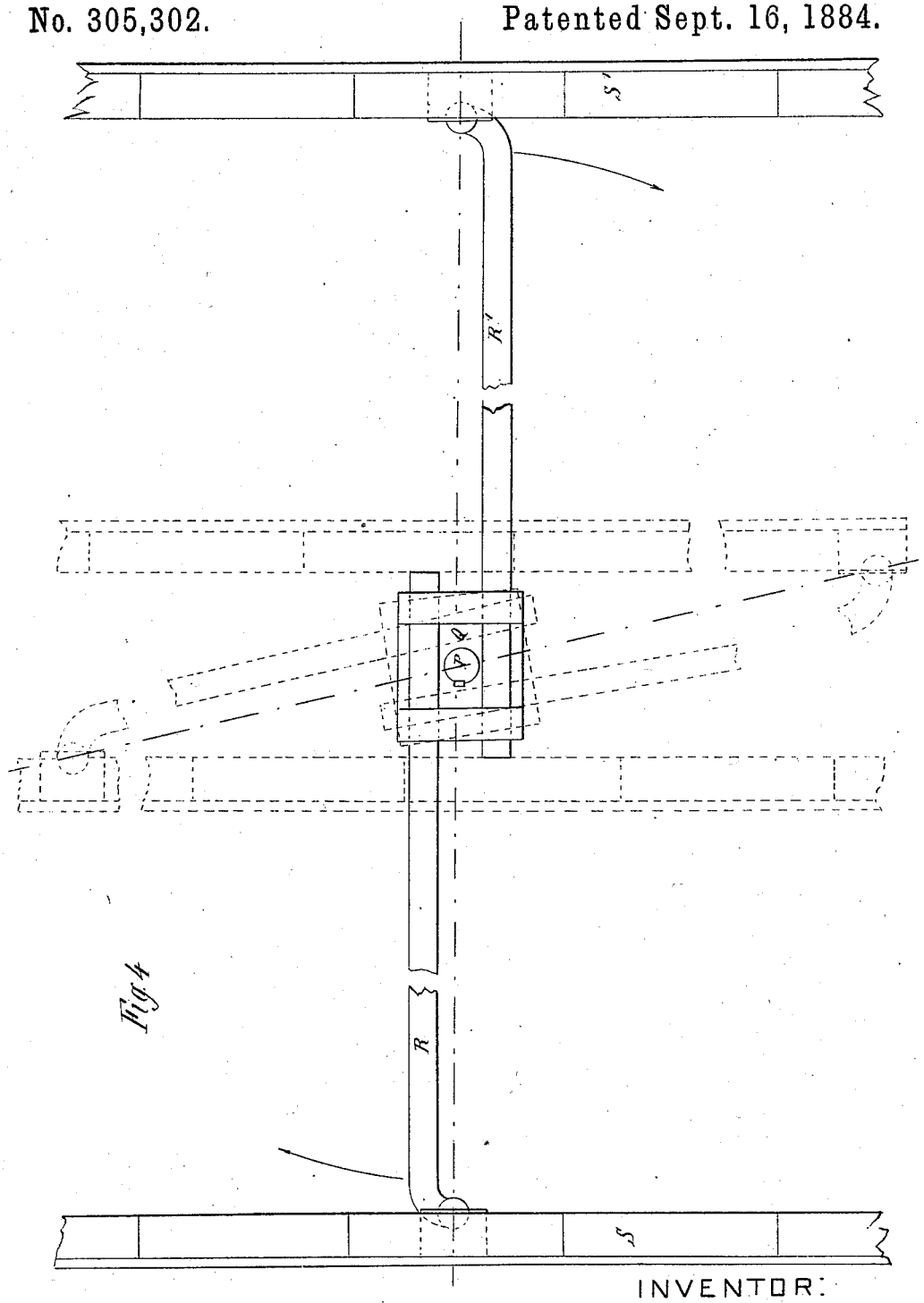

Fig. 4

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UNITED STATES PATENT OFFICE.

LAURENT GOURDIAT, OF TARARE, FRANCE.

MECHANISM FOR CONTROLLING THE ACTION OF MACHINES.

SPECIFICATION forming part of Letters Patent No. 305,302, dated September 16, 1884.

Application filed September 28, 1883. (No model.)

To all whom it may concern:

Be it known that I, LAURENT GOURDIAT, a citizen of the French Republic, residing at Tarare, in the Department of the Rhône, France, have invented a certain new and useful Mechanical Movement, of which the following is a specification.

My invention is applicable to all machines and parts of machines the extent of movement of which in opposite directions requires to be controlled; but in order to fully illustrate it in one of its principal applications, I have herein shown it in the drawings and will describe it as applied to a machine for stretching and tentering woven fabrics, as it is well adapted to machines of this class.

The tentering of woven fabrics is an operation performed in order to render the threads parallel and the fabric soft and supple. It consists in grasping the fabric at opposite points—such as along opposite selvages—and working it repeatedly in opposite directions, so that the crossing warp and weft threads are caused to assume oblique angles to one another, first in one direction and then in the opposite direction, keeping the fabric stretched at the same time. This manipulation, formerly effected by hand, is now commonly performed by machines known as "tentering-machines," which are more or less automatic in their operation. Such machines consist of two opposite parallel tentering bars or rails, which have pins or clamps for engaging the selvages of the fabric, and are mounted pivotally on two or more cross-beams, which are themselves pivoted on intermediate vertical pivots. After the fabric is grasped by the tentering-rails, the latter are separated so as to stretch the fabric, and an oscillating movement is imparted to the jointed frame by the hand of the operator or by mechanical power. The oscillating of the frame by the hand of the operator is heavy work and very fatiguing, while the mechanical means which have been devised to relieve the operator of this labor have the disadvantage of being unvariable in their action, and not under the ready and immediate control of the operator.

My present invention provides an effective means of controlling the operation of machines of this character when driven by power, thus combining the advantages of both the methods heretofore practiced, inasmuch as the work of the operator is lessened and the performance of the machine is as variable and is to the same extent directed by his intelligence as when the oscillating of the frame is performed by his own strength. My invention is also applicable, as before stated, to other machines wherein substantially the same conditions prevail.

Referring to the accompanying drawings, Figure 1 is a side elevation of a portion of a tentering-machine provided with my controlling apparatus. Fig. 2 is a plan of the lower part thereof, being partly in section in the plane of the line 2 2 in Fig. 1. Fig. 3 is a vertical section in the plane of the line 3 3 in Fig. 1. Fig. 4 is a plan of the upper part of the machine, the portions shown in Fig. 2 not being here shown; and Fig. 5 is a fragmentary sectional view, corresponding somewhat to Fig. 1, and showing a modification.

A designates a driving-pulley fixed on a power-shaft, and revolved continuously in one direction by suitable power. Two belts, B and C, are carried over this pulley, and also respectively over loose pulleys D and E, turning on a shaft, F. Between the pulleys D and E is placed a pulley, G, which is keyed fast to the shaft F. The belt B is uncrossed, and the belt C is crossed, so that the pulley D is caused to revolve in the same direction as A, and the pulley E is made to turn in the opposite direction. A belt-shifter consisting of a sliding rod, I, with arms *i i*, is arranged to shift either belt onto the fast pulley G, and so to drive the shaft F in either direction. The shaft F bears on its other end a screw or worm, N, which turns a worm-wheel, O, fixed on a vertical shaft, P. To the upper end of this shaft is fixed a head, Q, in which slide two arms, R R′, which constitute one of the cross-bars of the machine. These arms may slide out or in in the head Q, to vary the length of the cross-bars, and so adapt the machine for different widths of fabric. The tentering bars or rails S and S′ are mounted on pivots on the ends of the arms R R′, and have pins or clamps to catch the selvages of the fabric. The rod I is joined to a sliding rack, J, Fig. 1, which meshes with a pinion, K, and above this pinion is arranged another intermeshing rack, M, which is fastened to a rack, T, which meshes with the worm N. As the shaft F revolves, it turns the shaft P and slides the racks T and M. The pinion K is journaled in the forked end of a rod, L, the other end of which connects with a hand-lever, H.

The operation may now be understood. The parts are shown in the drawings in the position of rest, in which case the arms R R′ extend between the rails S S′ at right angles thereto. If, now, the operator moves the lever H in the direction of the arrow in Fig. 1, the rod L pushes the center of the pinion K in the same direction, and as the rack M is stationary and held from sliding by the engagement of its attached rack T with the worm N, the pinion turns in the direction of the arrow, and so propels the rack J and belt-shifting rod I in the same direction as the rod L, but of course at twice the speed. This movement shifts the belt C onto the fast pulley G, and drives that pulley and the shaft in the direction of the arrow on C in Figs. 1 and 2. The rotation of the worm N in that direction causes the worm-wheel O and rack T to move in the direction of the arrows marked upon them in Fig. 2, and this movement of the wheel O and its shaft P causes the arms R R′ to turn in the direction of the arrows in Fig. 4, thereby moving the frame R R′ S S′ more or less toward the position shown in dotted lines. As soon as this movement commences, the motion of the rack T to the left (in Fig. 1) causes the rack M, which moves with it, to act upon the pinion K, and if the axis of the latter be stationary to rotate it in the opposite direction, causing it to propel the rack J and rod I to the right, and consequently to shift the belt C back upon the loose pulley E and stop the motion. This result occurs immediately after the commencement of the rotation of the pulley G, so that when the operator by a movement of his lever has started the frame to moving obliquely in either direction its movement ceases immediately after he brings the lever H to rest. If he desires to continue the oblique movement of the frame, it is necessary for him to continue the motion of his lever after the movement of the frame has commenced. In this way, by moving the rod L and pinion K at half the speed of the racks T M, the rack J and the belt-shifter are held stationary, the belt continues on the pulley G, and the motion of the apparatus continues in the same direction and at the same speed. When the obliquity of the frame is sufficient, the operator has only to stop the motion of his lever in order to stop the apparatus, whereupon, by moving his lever in the opposite direction, he can throw the other belt onto the pulley G and cause the apparatus to move back to any desired extent. Stops are provided to limit the axial movement of the pinion K in either direction, and so to limit the extent of the oblique motion of the frame. One of these stops is shown at *g* in Fig. 1.

By this apparatus the operator is enabled easily and without fatigue to control the operation of the tentering-frame as accurately as if he were oscillating it by his own strength, and to cause it to vibrate to a greater or less distance to either side of the rectangular position at will, according as in his judgment the fabric needs to be strained diagonally more or less.

The return of the belt-shifter to its position of rest may be facilitated by a cord and weight, W, acting between two sheaves, as shown in Fig. 1, or by oppositely-acting springs, if desired.

Instead of using belts, fast and loose pulleys, and a belt-shifting mechanism, other means of applying power in either of two opposite directions may be employed, such as any of the various well-known reversing clutches or gears. In Fig. 5 I have shown the employment of friction cone-gears. A pinion, A′, is fixed on a power-shaft in stationary bearings, and gears D′ E′ are fixed upon a sleeve which is feathered upon shaft F, and can be slid thereupon by the motion of the rod I. As one or other of the gears D′ E′ is pressed against pinion A′, the shaft F is driven in one direction or the other. By this arrangement the mechanism might be made to respond more quickly to the operation of the lever; but more strength would be required to keep the frictional surfaces in contact with sufficient force to transmit the requisite power.

My invention will be of advantage in all machines where it is desired to impart a motion the extent of which in either direction should be variable at the will of the operator.

I claim as my invention—

1. The combination, with the machine or part, substantially as described, the extent of movement of which in opposite directions requires to be controlled, of a reversing driving mechanism therefor, substantially as described, a reciprocating rack connected to and moving proportionately with said machine or part, a traveling pinion adapted to be operated by hand and meshing with said rack, and a second rack meshing with the opposite side of said pinion and connected to and operating said reversing mechanism, all substantially as set forth.

2. The combination of a reciprocating rack, M, a traveling pinion, K, adapted to be operated by hand and meshing therewith, a rack, J, meshing with the other side of pinion K, and a reversing driving mechanism, substantially as described, controlled by the movement of rack J, and reciprocating the rack M, as and for the purposes set forth.

3. The combination of a reversing driving mechanism, substantially as described, the shaft F, driven forward or backward thereby, the worm N on said shaft, the reciprocating rack M, pinion K, and the rack J, controlling said reversing mechanism, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LAURENT GOURDIAT.

Witnesses:

G. NICOLAS,

I. P. A. MARTIN.