

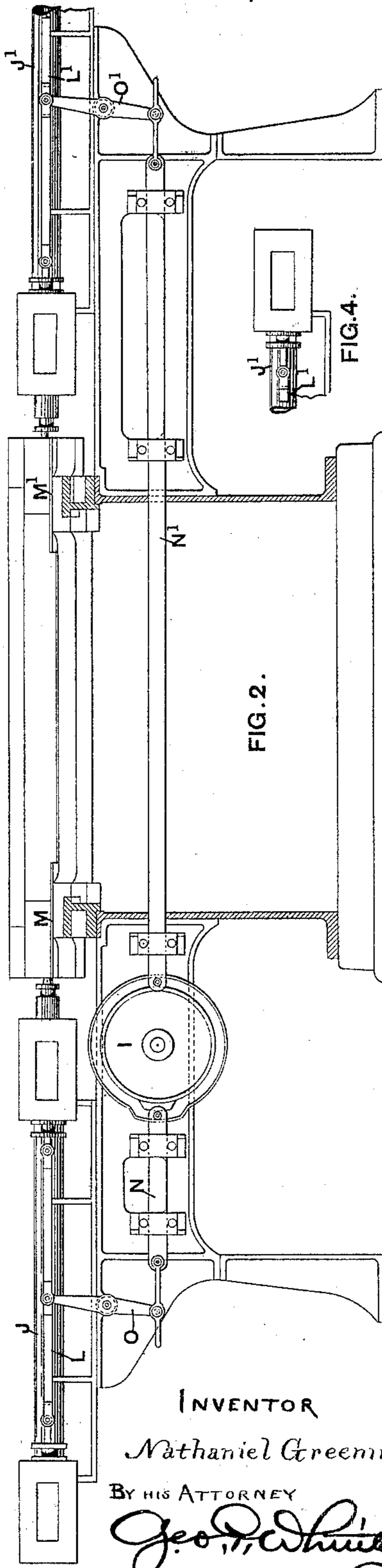
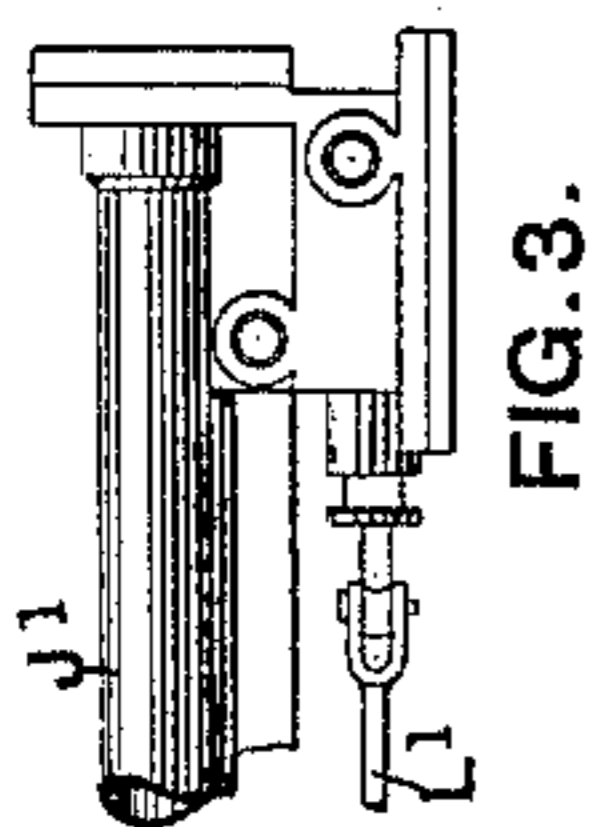
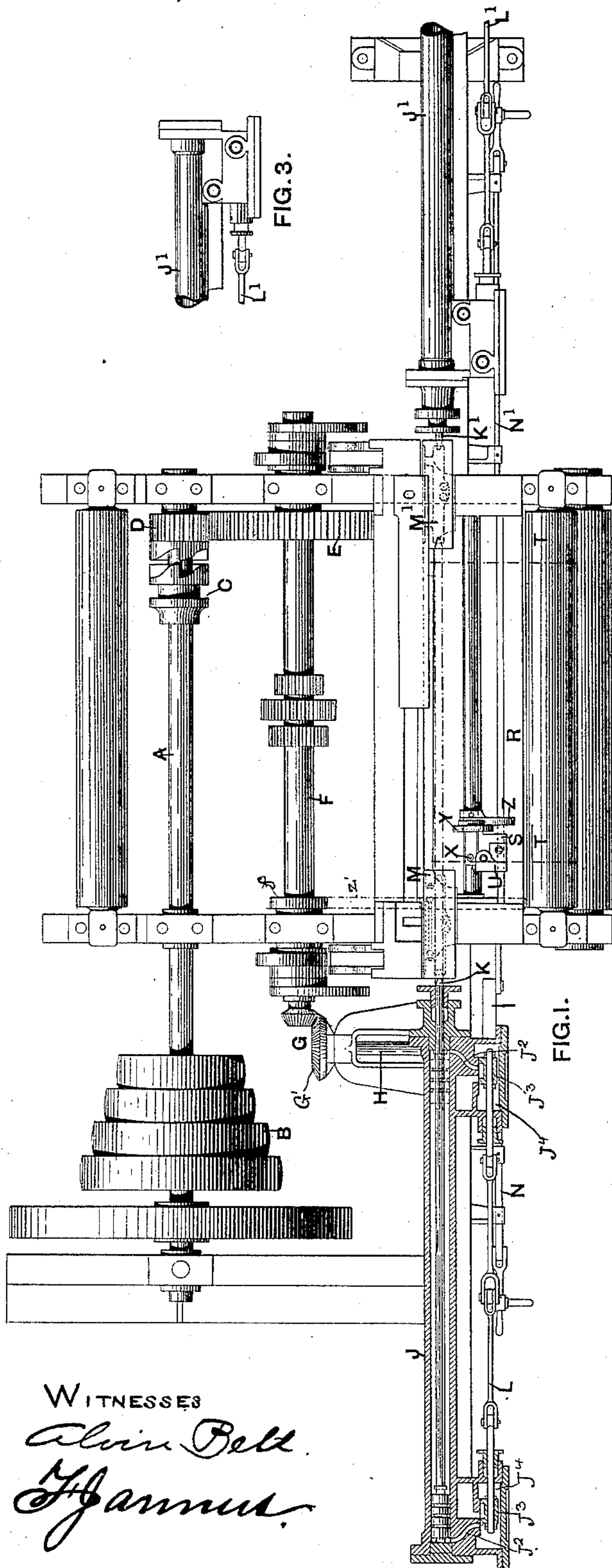
(No Model.)

2 Sheets—Sheet 1.

N. GREENING.
LOOM FOR WEAVING WIRE CLOTH.

No. 462,002.

Patented Oct. 27, 1891.



WITNESSES

Alvin Bell
James

INVENTOR

Nathaniel Greening,
BY HIS ATTORNEY
Geo. P. Whitney

(No Model.)

2 Sheets—Sheet 2.

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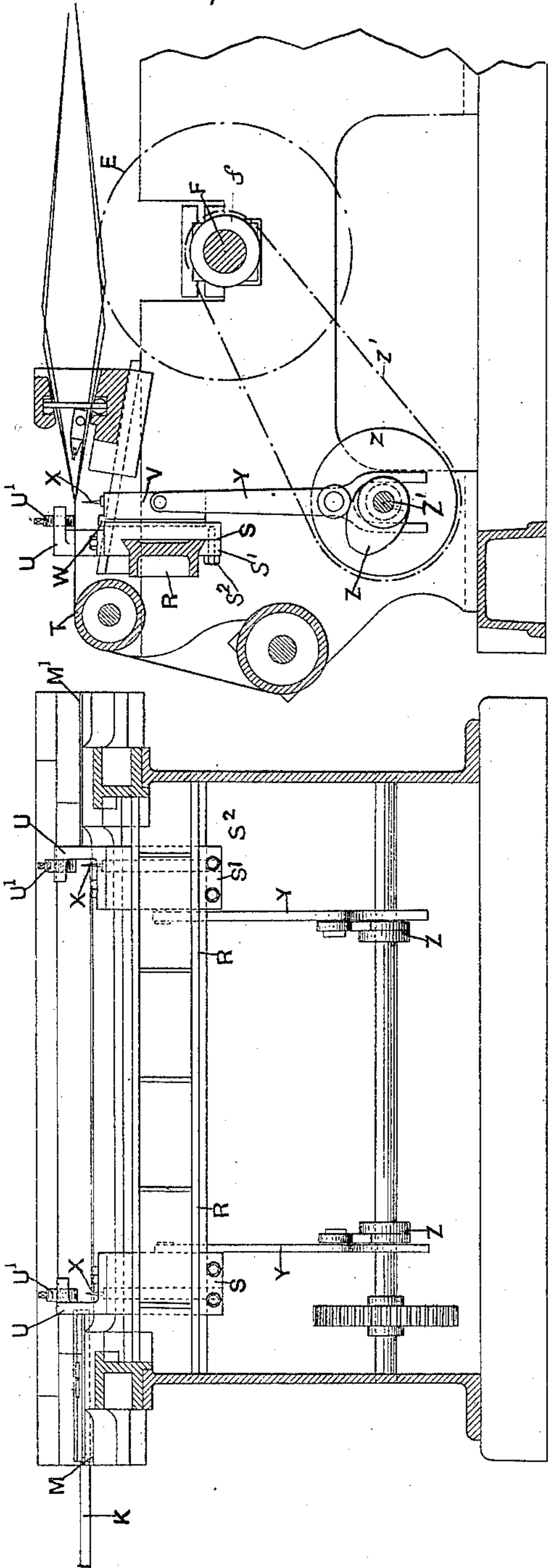


FIG. 6.

FIG. 5.

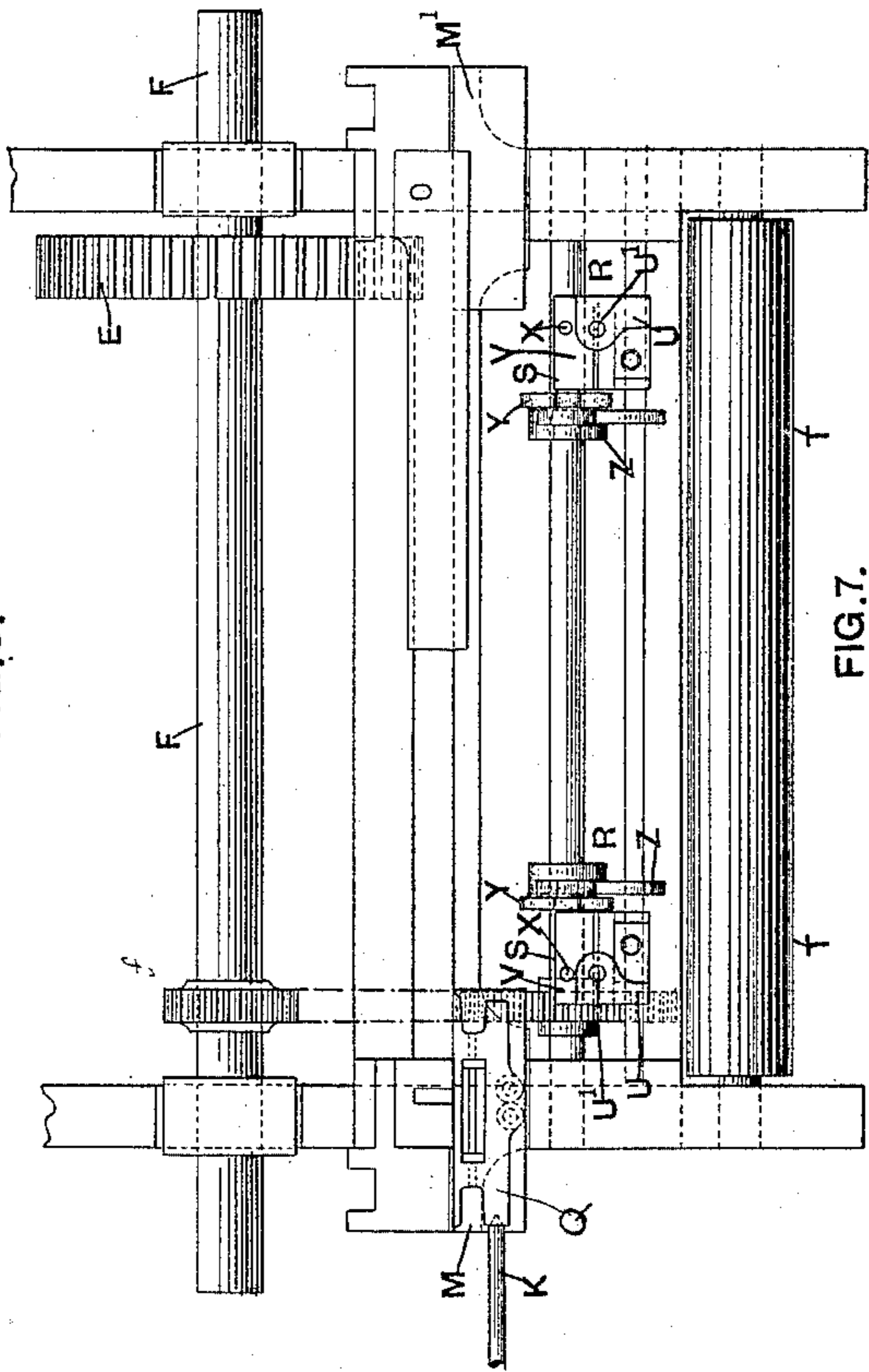


FIG. 7.

Witnesses:
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UNITED STATES PATENT OFFICE.

NATHANIEL GREENING, OF WARRINGTON, ENGLAND.

LOOM FOR WEAVING WIRE-CLOTH.

SPECIFICATION forming part of Letters Patent No. 462,002, dated October 27, 1891.

Application filed January 2, 1890. Serial No. 335,649. (No model.) Patented in England March 29, 1889, No. 5,410, and in Switzerland January 7, 1890, No. 1,714.

To all whom it may concern:

Be it known that I, NATHANIEL GREENING, a citizen of the United Kingdom of Great Britain and Ireland, and a resident of Warrington, in the county of Lancaster, England, have invented certain new and useful Improvements in Looms for Weaving Wire-Cloth, (patented in England March 29, 1889, No. 5,410, and in Switzerland, No. 1,714, January 7, 1890,) of which the following is a specification.

In the looms which are generally employed in weaving wire fabrics the weft is usually inserted by hand. This method compels the loom to be driven at a slow speed and intermittently, since the operation is very exhausting to the operative, who is therefore compelled to take frequent periods of rest, during which the loom must be stopped and production cease. These improvements have for their object to insert the weft by mechanical means, and thus to obviate the exhausting labor for the operative and to enable the loom to be run at a higher speed and without intervals for rest. According to these improvements the weft is inserted from a shuttle, which is operated by means of two horizontal reciprocating rods, one of which is placed at each end of the shuttle-race. These rods are arranged in line or so that the projected axis of either rod will form the axis of the other rod and they reciprocate alternately—that is to say, one rod makes a double stroke and then rests while the other rod makes a double stroke, so that each rod is at rest while the other is in motion. The shed is reversed in the ordinary manner after every double stroke of the rods and while both of them are at rest. During the forward stroke of each rod its point or end pushes the shuttle through the shed to the opposite side of the loom. The rod then retreats, leaving the shuttle behind, the shed is reversed, and the other rod now pushes the shuttle through the shed to the first position. The shed is again reversed and the cycle of operations is repeated. The shedding, beating-up, letting-off, and taking-up motions may be constructed, arranged, and operated in the usual or any convenient manner.

The shuttle which I employ is similar in construction to the large shuttles which are used in weaving heavy woolen and jute goods; but it is preferably constructed of metal. The weft is contained in the shuttles in bobbins or reels, which are preferably constructed of wood or similar light material and it is arranged so that one or both of the flanges of the bobbin are in contact with the body of the shuttle, so as to set up just sufficient friction to prevent the bobbin overrunning at the end of the stroke. If the bobbins are made of metal, I prefer for the same purpose to insert a disk or washer of leather, felt, or similar material at one or both ends of the bobbin. The amount of pressure between the bobbin and the washer or washers may be regulated by means of a screw or spring. The reciprocation of the horizontal rods may be effected by a variety of means; but, although cranks or cams and connecting-rods and other mechanical devices may be employed for the purpose, I prefer, because of its more positive and certain action and greater simplicity, to employ fluid-pressure through the intermediary of suitable pistons, cylinders, and valves. I will therefore proceed to more particularly describe my invention in the first place, with reference to the accompanying drawings, which illustrate in what manner this invention may be carried into practical effect by the aid of fluid-pressure.

In the drawings, Figure 1 is a top plan view, partly in section, and Fig. 2 is a sectional elevation, of a loom having these improvements applied thereto. Fig. 3 is a continuation to the right of Fig. 1, and Fig. 4 is a similar continuation of Fig. 2. Fig. 5 is an elevation of the selvage-pressing motion. Fig. 6 is a longitudinal section, and Fig. 7 is a plan of the same.

In each of the figures similar parts where they are represented are denoted by similar letters of reference.

In order to secure greater clearness in the drawings, those details of the loom to which these improvements do not relate and the representation of which is not necessary for their explanation are omitted, it being un-

derstood that they may be of the ordinary and well-known construction and arrangement.

A is the first-motion shaft, driven by the step-pulleys B and carrying the clutch C, by means of which the picking, shedding, and beating-up motions may be put into and out of gear. On the end of the first-motion shaft there is mounted the pinion D, gearing with the spur-wheel E, mounted on the second-motion shaft F. At the opposite end of the second-motion shaft there is mounted the bevel-pinion G, gearing with a bevel-wheel G', secured on the end of the shaft H, which carries at its other end the grooved cam I, Fig. 2, the function of which is to operate the valve-motion by means of which the motion of the reciprocating rods is controlled.

J and J' are cylinders in which are contained the pistons to which the rods K and K' are secured. A port J² is constructed at each end of each cylinder for the inlet and exhaust of the operating-fluid, and these ports are controlled by slide-valves J³ in a similar manner to that adopted in ordinary double-acting fluid-pressure engines, with the exception that because of the greater length of the cylinders two separate valves and valve-chests J⁴ are preferred to be used, as represented in the drawings; but the two valves on each cylinder being rigidly connected by means of the rods L L' the result is precisely the same. The forward end of each cylinder J J' (through the cover of which the rod passes) is next to the end of the shuttle-race on each side of the loom and in line therewith, so that the end of the rod when at the end of its back-stroke is about in contact with the tip of the shuttle Q, which is then resting on the table or support M or M' at the end of the shuttle-race, as shown in Figs. 5 and 7.

The action of the apparatus is as follows: The shuttle Q being on the support M and both pistons being at the ends of their back-strokes, the fluid under pressure is admitted behind the piston in cylinder J, and it, with the rod attached thereto, is consequently pushed forward, and the point of the rod pushes the shuttle before it until the shuttle has arrived on the support M', as indicated in the dotted lines in Fig. 1 of the drawings, the dotted lines in Fig. 1 representing the two extreme positions of the shuttle. The rod L is then reversed, and the consequent motion of the valves closes the inlet and opens the exhaust at the back end of the cylinder and opens the inlet and closes the exhaust at the front end. In consequence of this reversal of the valves the motion of the reciprocating rod K is reversed and it retreats to its starting-point, leaving the shuttle behind and leaving the shed free for its reversal, which now takes place. After the shedding and beating-up motions have taken place the same cycle of operations is repeated at the opposite side of the loom, and the cycles are repeated with successive insertions of the weft from opposite sides of the loom as long as may be de-

sired or until the exigencies of the work demand a stoppage.

The fluid-pressure may be derived, in the case of steam, from a boiler or steam-generator; in the case of compressed air, direct from an air-compressor, and in the case of water from a pump or hydraulic accumulator. In either case the construction and arrangement of the sources of fluid-pressure need not differ from those of a like kind used for other or for analogous purposes, and as they are well known and understood it is not necessary to describe them.

The valves may be conveniently operated by the devices represented in the drawings. These devices are actuated by the channeled cam I, in the groove of which are two friction-bowls connected, respectively, to the two opposite connecting-rods N N'. To these connecting-rods are pivoted the levers O O', through which the motion of the connecting-rods is transmitted alternately to the valve-rods L L'. The groove in the cam is annular, except at one point, where there is an increase of diameter followed by a dwell, which is succeeded by a reduction to the original diameter. The friction-bowls connected with the connecting-rods N N' are respectively at opposite diameters of the groove in the cam, and consequently the cam operates the valves at each side of the loom once in every revolution, and a half-revolution of the cam takes place between operating those to the right and those to the left. The cam is therefore timed by the gearing by means of which it is driven to rotate once for every two picks.

The pipes connecting the valve-chests with the source of fluid-pressure are not represented in the drawings, as their arrangement is well understood and their introduction in the drawings would only tend to confuse.

To enable a good selvage to be formed and to prevent the drag thereon by the weft issuing from the shuttle in its passage across the loom, the arrangement illustrated in Figs. 1, 5, 6, and 7 may be employed, only one of said selvage-forming devices being shown in Fig. 1, while in Figs. 5, 6, and 7 they are shown in duplicate. In this arrangement a saddle S is mounted upon a cross-girder R just in front of the breast-roller T. The upper part of the saddle carries the fixing U, which projects upon one side so as to come over the selvage of the cloth in the loom, and for this purpose, also, the saddle is adjustable upon the cross-girder by means of a loose strip S', secured to the body of the saddle by set-screws S², which are loosened and tightened for the adjustment. Within the saddle there slides vertically a carriage V, upon the upper part of which there are fixed the presser W and the pricker X. The saddle is reciprocated vertically by means of the link Y and the cam Z, which is mounted upon a shaft Z', provided with a belt-pulley z, connected by belt z' with a pulley f on the shaft F, the pulleys being so proportioned that the cam rotates once for

each alternate pick, so that the carriage is at the top of its stroke when the shuttle is at that end of the loom. By the motion of the shuttle the weft issuing therefrom passes
 5 around the pricker X and is held thereby so long as the effective pull by the shuttle continues. The strain of the weft is therefore taken up by the pricker instead of by the outside warp-threads and the even width of
 10 the fabric is insured. At the top of the stroke of the carriage the presser W compresses the selvage between its upper surface and the lower surface of the projecting part of the fixing U, which is by preference provided
 15 with the screw U', the lower end of which is formed to a plane and forms an adjustable abutment for the presser W.

It will be understood that one of the apparatus illustrated in Fig. 6 is provided for each
 20 selvage of the cloth in the loom.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

25 1. The combination, with a loom-frame, of two cylinders rigidly mounted upon opposite sides thereof, with their axes in line, a piston and piston-rod in each cylinder, valves for controlling the admission of fluid-pressure to
 30 the cylinders, a shaft H, connections between the shaft and power, and suitable connections between the shaft H and the valves for actuating the latter alternately, whereby through the piston-rods the shuttle is recip-
 35 roated back and forth through the shed, substantially as described.

2. The combination, with a loom-frame, of two cylinders rigidly mounted upon opposite sides thereof, with their axes in line, a piston
 40 and piston-rod in each cylinder, valves for controlling the admission of fluid-pressure to the cylinders, a shaft H, connections between the shaft and power, a cam I on the shaft, and connections between the cam and
 45 the valves for actuating the latter alternately,

whereby through the piston-rods the shuttle is reciprocated back and forth through the shed, substantially as described.

3. The combination, with a loom-frame, of the two cylinders J J', in line with each other, 50 a piston and piston-rod in each cylinder, valves for controlling the admission of fluid-pressure to the cylinders, valve-rods L L', a shaft H, connections between the shaft and the power, a cam I, mounted on the shaft, and 55 followers N N', engaging the cam and connected with the valve-rods L L', substantially as described.

4. The combination, with the shaft F, having the pulley f, of the shaft Z', having cams 60 Z and pulley z, the belt z', uniting the pulleys, the cross-girder R, the saddles S, adjustably mounted thereon, the carriages V, adapted to be moved vertically on the saddles by the cams Z, the selvage-pins X and 65 pressers W, projecting vertically from the carriages, and the fixings U, secured to the saddle and having the abutments U' for the pressers, substantially as described.

5. A loom for wire-weaving, having two ad- 70 justable saddles S mounted upon its frame, a vertically-moving carriage V on each saddle, a pricker X and presser W on each carriage, both on the line of the selvage, an abutment U' above the presser, means for re- 75 ciprocating the shuttle back and forth across the shed, prickers K, and cams Z for lifting the prickers alternately to enter behind the weft on the forward movement of the sley and at the same time compress the selvage, 80 substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 28th day of November, 1889.

NATHANIEL GREENING.

Witnesses:

WILLIAM E. HEYS,
 W. GEORGE HEYS.