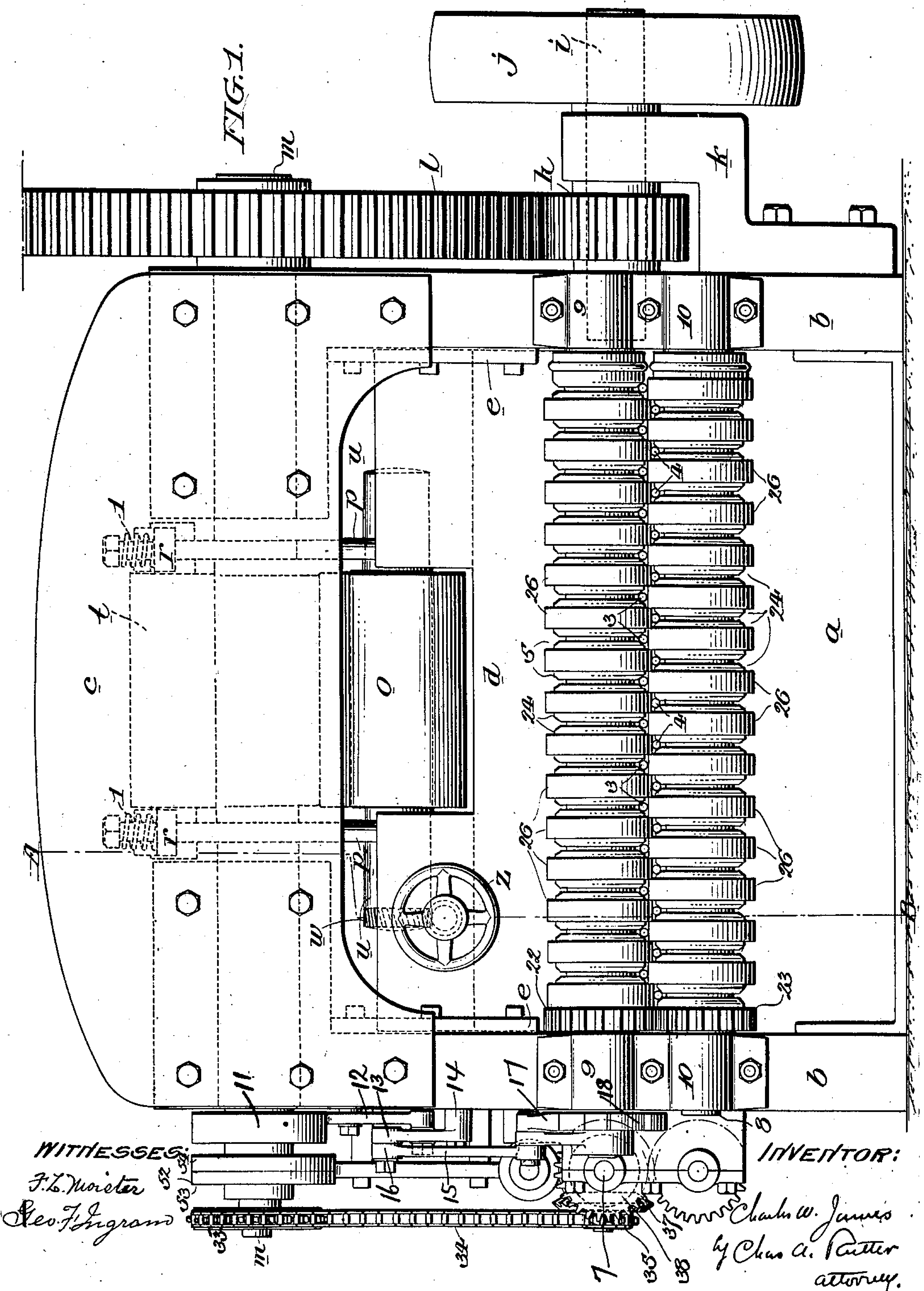
No. 717,207. Patented Dec. 30, 1902.

C. W. JAMES.

WIRE WEAVING MACHINE.

(No Model.) 4 Sheets—Sheet 1.



No. 717,207. | Patented Dec. 30, 1902.

C. W. JAMES.

WIRE WEAVING MACHINE.

(No Model.) | 4 Sheets—Sheet 2.

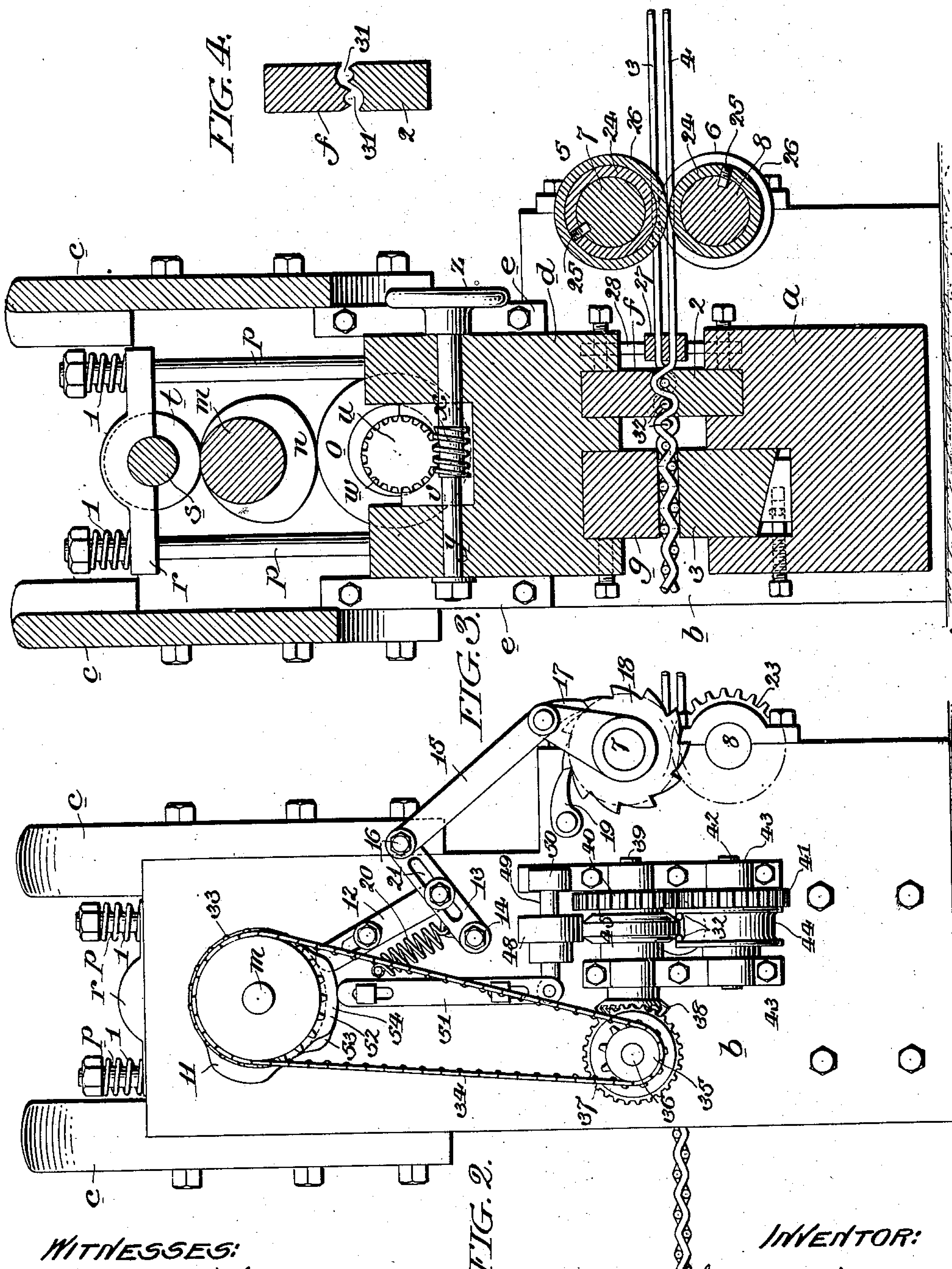


FIG. 2. FIG. 3. FIG. 4.

WITNESSES:
F. L. Moister
Geo. F. Ingram

INVENTOR:
Charles W. James
by Chas A. Putter
attorney.

No. 717,207. Patented Dec. 30, 1902.

C. W. JAMES.

WIRE WEAVING MACHINE.

(No Model.) 4 Sheets—Sheet 3.

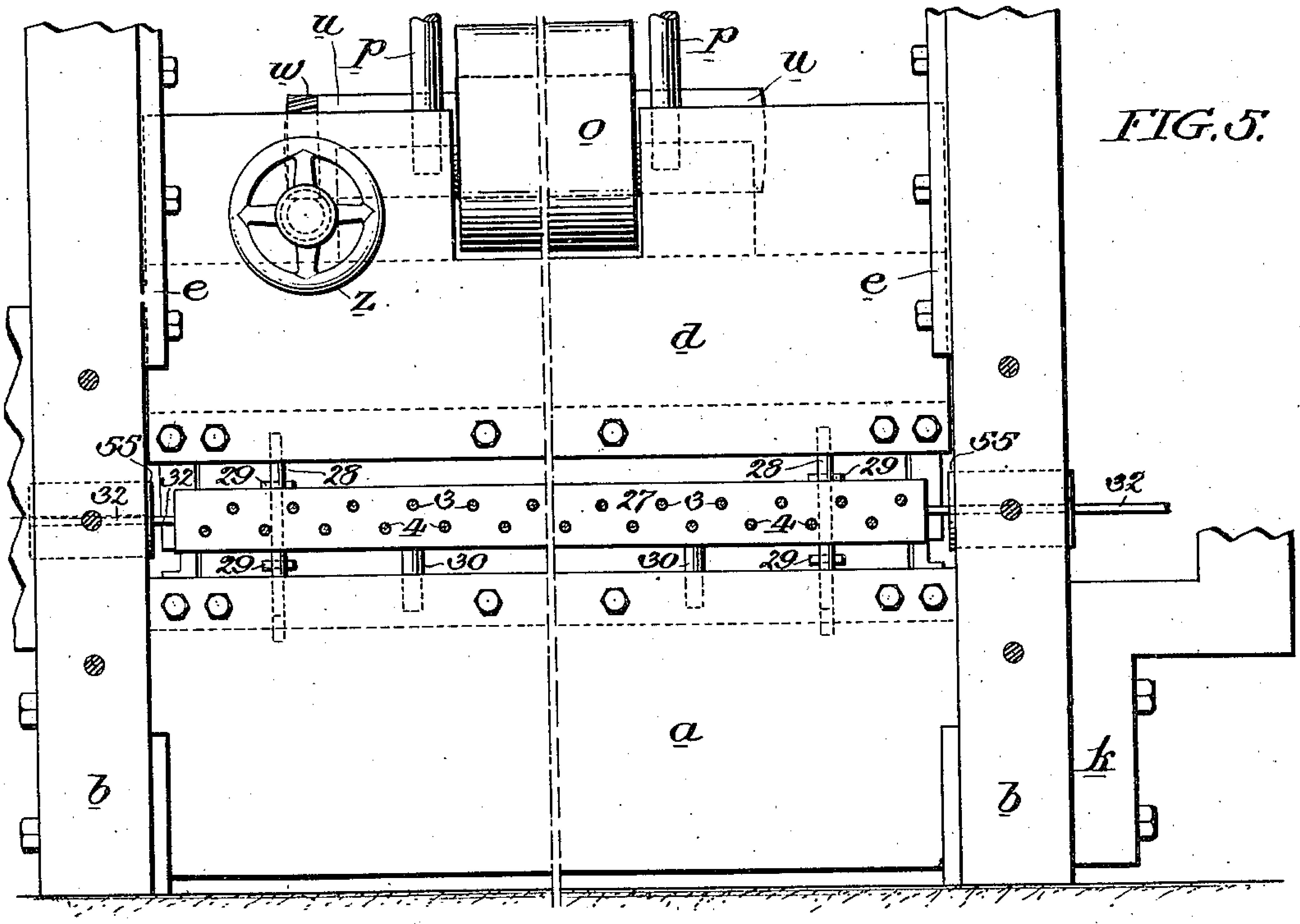


FIG. 5.

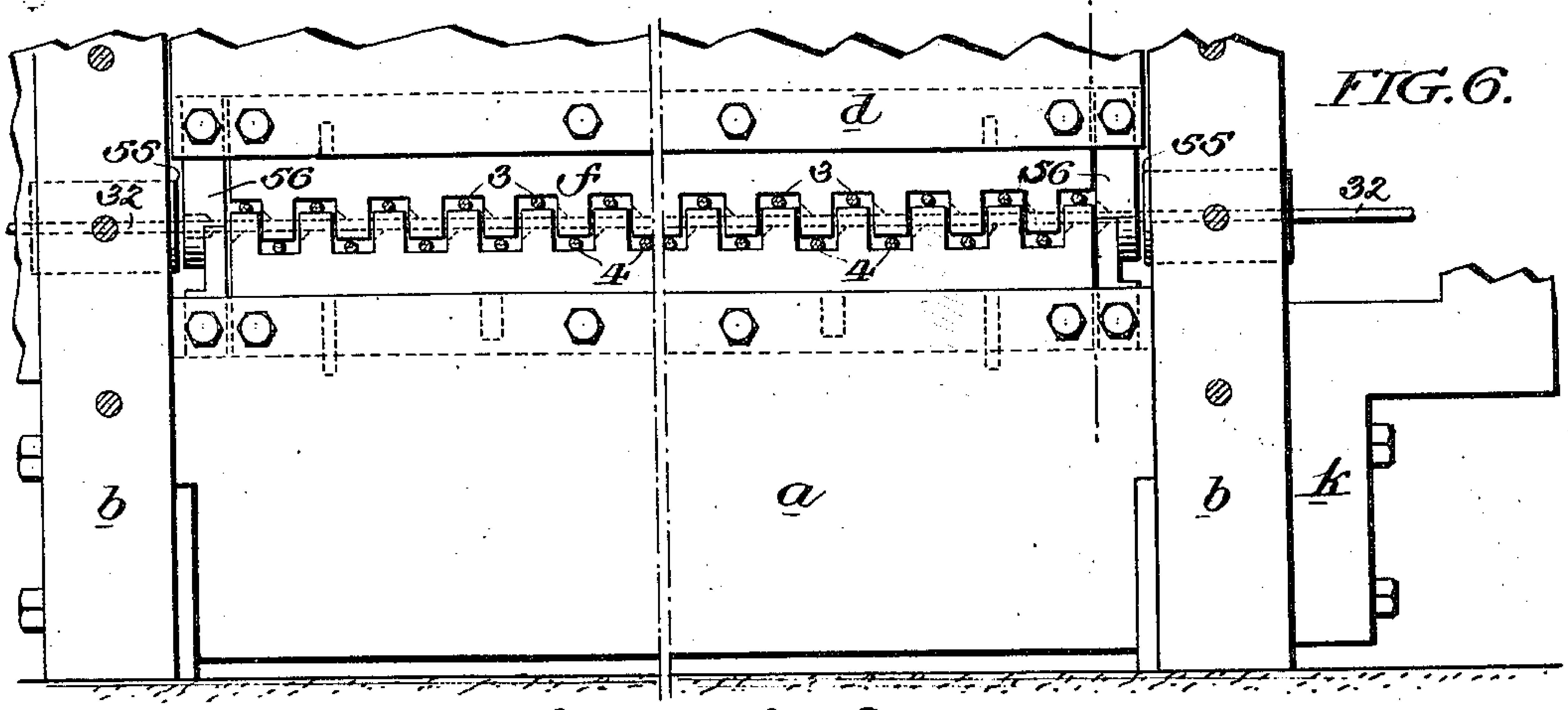


FIG. 6.

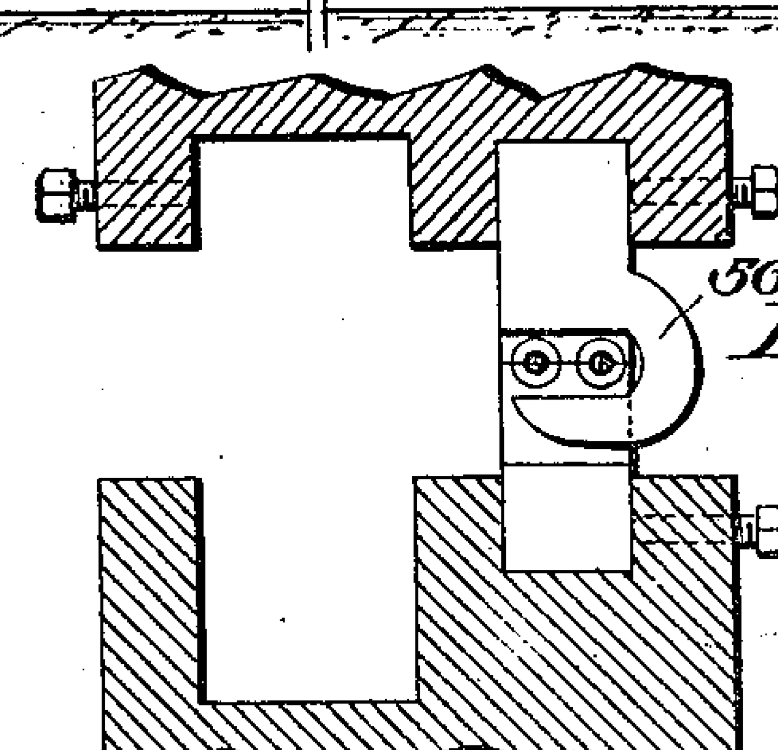


FIG. 7.

WITNESSES:

F. L. Meister

Geo. F. Ingram.

INVENTOR:

Charles W. James

by Chas. G. Potter

attorney.

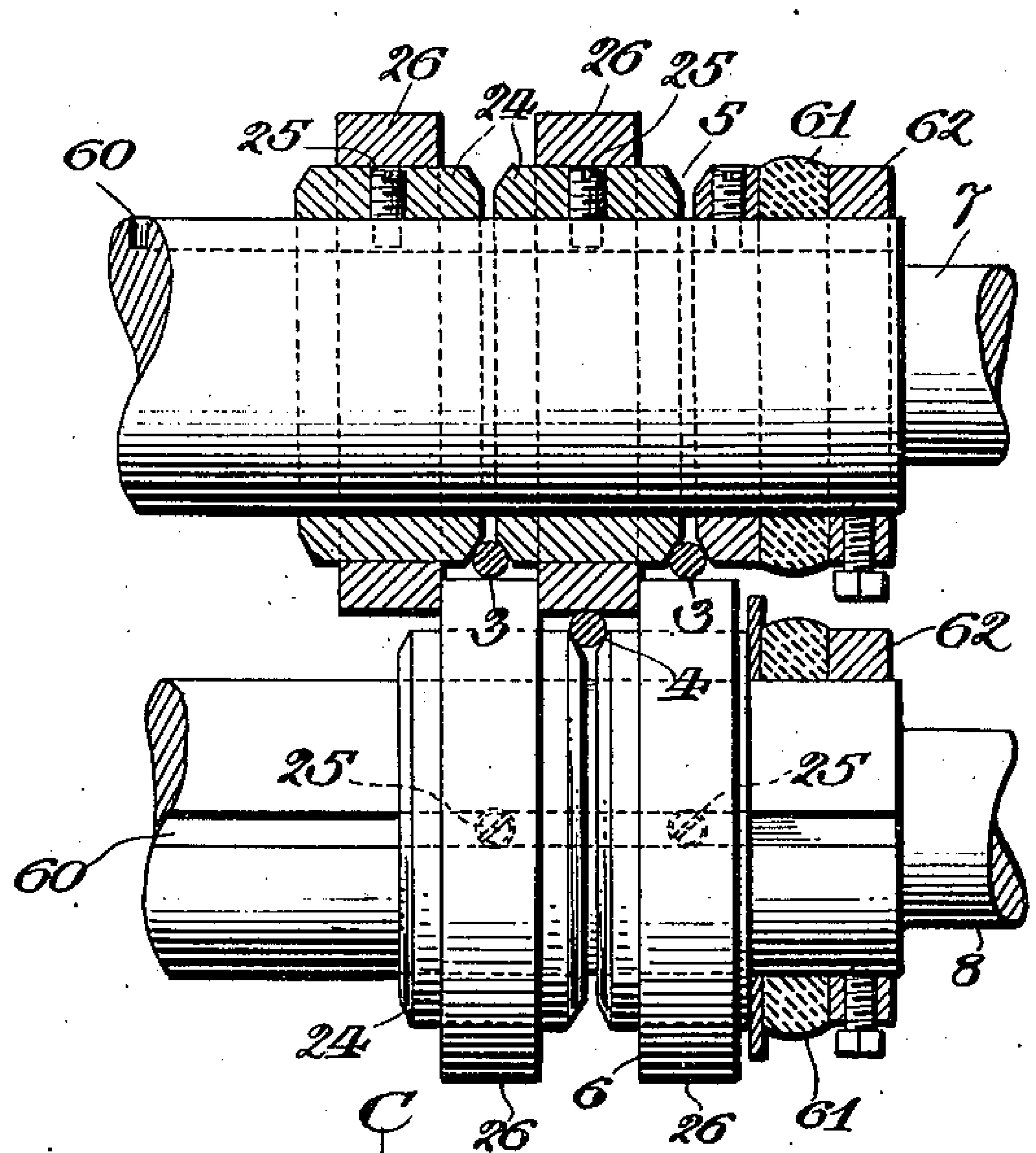
No. 717,207. Patented Dec. 30, 1902.

C. W. JAMES.

WIRE WEAVING MACHINE.

(No Model.) 4 Sheets—Sheet 4.

FIG. 8.



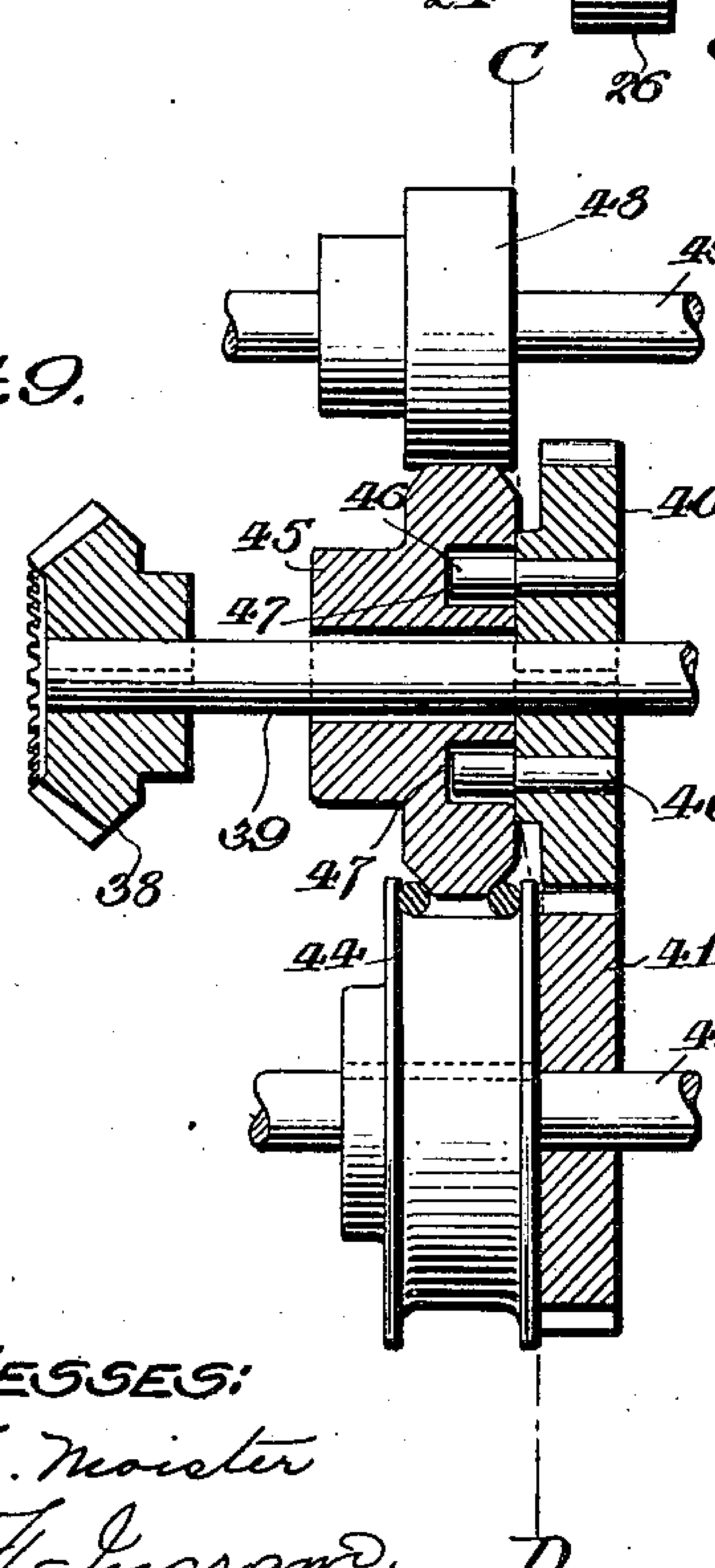


FIG. 9.

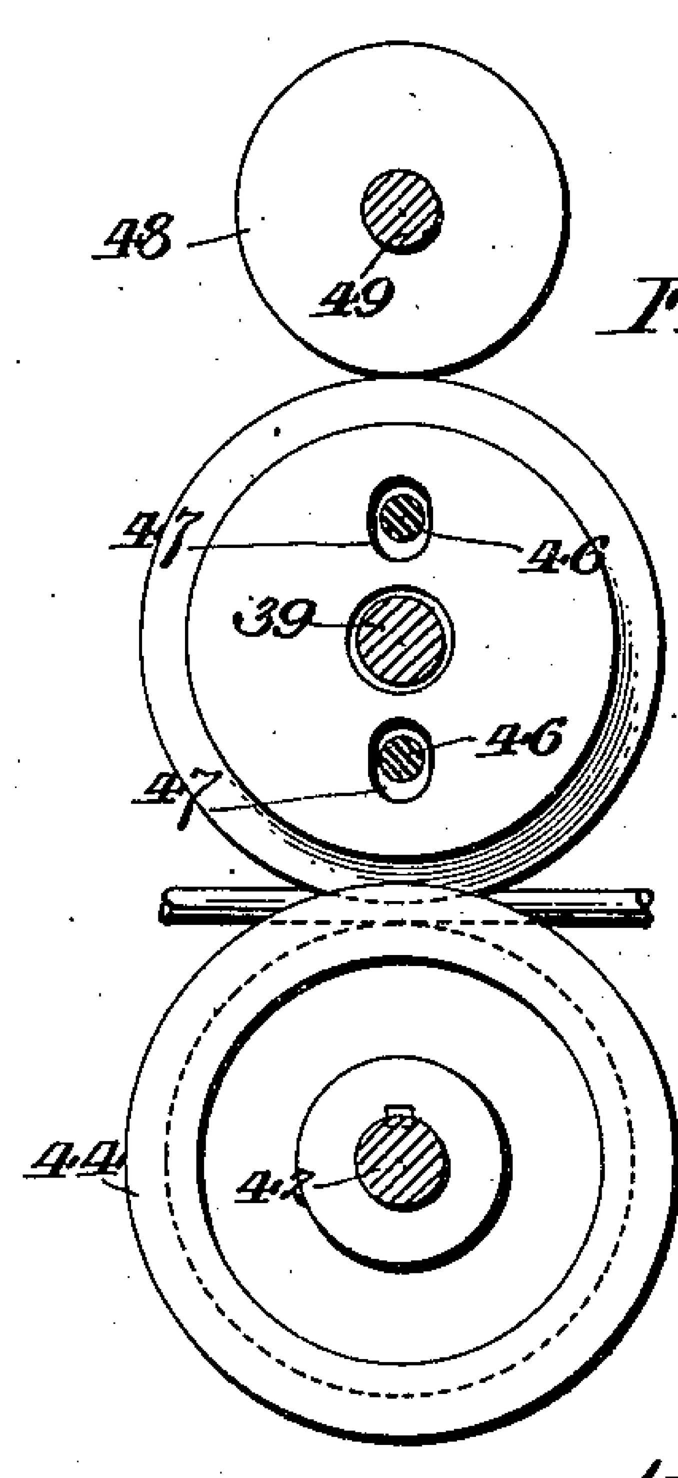


FIG. 10.

WITNESSES:

F. L. Moister

Geo. F. Ingram.

INVENTOR:

Charles W. James

by Chas. A. Rutter

attorney.

UNITED STATES PATENT OFFICE.

CHARLES W. JAMES, OF PHILADELPHIA, PENNSYLVANIA.

WIRE-WEAVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 717,207, dated December 30, 1902.

Application filed March 22, 1902. Serial No. 99,390. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. JAMES, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Wire-Weaving Machines, of which the following is a specification.

My invention relates to improvements in machines for weaving wire, and more particularly to improvements in machines for weaving wire of diameter too great to be woven in the ordinary wire-weaving looms; and the objects of my invention are, first, to furnish a machine which will crimp the consecutive warp-wires in alternately opposite directions and pass through the loops thus formed the weft-wires; second, to furnish means for flattening the warp-wires down upon the weft-wires after the latter have been passed through the loops in the former; third, to furnish automatic means for feeding the warp-wires step by step to the bending and flattening dies; fourth, to furnish means for feeding the weft-wires through the loops formed by the bending-dies in the warp-wires while the warp-wires are still held by the dies; fifth, to furnish means for shearing off the weft-wires after being passed through the warp-wires, and, sixth, to furnish certain other details, which will be hereinafter fully described.

In the accompanying drawings, forming part of this specification, and in which similar characters of reference indicate similar parts throughout the several views, Figure 1 is a front elevation of my wire-weaving machine; Fig. 2, an end elevation of Fig. 1; Fig. 3, a section of Fig. 1 on line A B; Fig. 4, a detached sectional view of the wire-bending dies; Fig. 5, a front elevation of the lower part of the machine, the feeding-rolls being removed; Fig. 6, a front elevation of the machine, the feed-rolls and the lift-bar being removed, showing the looping and cutting-off dies; Fig. 7, an end elevation of the cutting-off dies; Fig. 8, a view of the feed-rolls, some in elevation and some in section; Fig. 9, an enlarged end elevation, partly in section, of the means for feeding in the cross or weft wires; Fig. 10, a section of Fig. 9 on line C D.

a is a bed-plate, forming the stationary head of the machine, to which are bolted the uprights *b b*, forming the sides of the frame or housing of the machine.

c c are braces secured at their ends to the upper parts of the uprights *b b*, joining these ends of the uprights and stiffening the frame.

d is the movable head of the machine, which is carried in guides *e*, carried by the sides *b b* of the frame. The movable head *d* carries the movable portion *f* of the wire-bending dies and the movable portion *g* of the flattening-dies, both of which will be fully described hereinafter.

The movable head *d* is caused to reciprocate as follows: *h*, Fig. 1, is a pinion carried on a shaft *i*, which carries and is driven by a pulley *j*, which is driven by a belt (not shown) from any suitable source of power. *k* is a bracket bolted to bed *a* or frame *b*, which carries shaft *i*. The gear *h* meshes with and drives a gear *l*, which is fast to and drives a shaft *m*, which carries a cam *n*, adapted to engage a friction-roller *o*, carried loosely on shaft *n*, which is carried by movable head *d*. *p* represents uprights carried by head *d*, carrying at their upper ends yokes *r*, which carry a shaft *s*, Fig. 3, parallel with shaft *m*, which carries a friction-roller *t*. As the shaft *m* is revolved the cam *n* alternately engages rollers *o* and *t*. When it engages the former, it depresses head *d*. When it engages the latter, it raises this head. The cam *n* is so shaped that it will after lowering the movable head hold this head for some time in its lowest position and will after raising the head hold it for some time in its highest position to permit other parts of the machine to do their work at these times.

The ends *u* of the shaft upon which roller *o* is carried are arranged eccentrically to the portion which carries the roller and are carried in bearings *v*, carried by the head *d*. One of the ends of the shaft is furnished with teeth *w*, which gear with a worm *x*, carried by a shaft *y*, carried by head *d*.

z is a hand-wheel, by means of which shaft *y* and shaft *u* may be rotated in order to lift or lower the roller *o* to decrease or increase the throw of the head *d*.

As the cam *n* is rotated its irregular form causes the distance between the shafts *u* and *s* to vary, and in order to permit this variation I interpose between the heads of the uprights p and the yokes r springs 1, which cause the upper roller to always bear against the cam and permit it to give when it is moved away by the cam during the movements of the latter.

2 is the stationary part of the wire-bending dies, and 63 the stationary part of the flattening-dies. Both these parts are carried by the base a.

The warp-wires 3 4 are fed through the machine by the feeding-rollers 5 6, which are carried on shafts 7 8, which pass completely across the front of the machine, being carried in bearings 9 10, carried by frame b. The feed-rollers are intermittently rotated, being driven when the bending-dies are separated and being still when these dies are closed.

The means for actuating the feed-rollers are as follows: 11, Figs. 1 and 2, is a cam carried by and rotating with the shaft m, which is adapted to engage and depress a slide 12, which is connected to an arm 13, pivoted at 14 to the frame b. 15 is a link, the upper end of which is connected at 16 with the free end of arm 13 and the lower end of which forms or carries a pawl 17, adapted to engage with a ratchet 18, fast upon the upper feed-roller-carrying shaft 7. As the shaft m revolves the cam 11 engages and depresses arm 13, which depresses link 15, causing the pawl 17 to rotate the ratchet 18 and shaft 7. 19 is a pawl engaging ratchet 18 to prevent a reverse movement thereof. 20 is a spring for returning slide 12, arm 13, link 15, and pawl 17 to their raised positions after the passage of cam 11. 21 is a slot in arm 13, which permits an adjustment of the slide 12 in order to cause the cam 11, through the arms, link, and pawl, to cause a greater or less movement of ratchet 18, as may be desired. 22, Fig. 1, is a gear-wheel fast upon shaft 7, which gears with a gear-wheel 23, of similar pitch, upon the shaft 8, through which the two shafts are caused to be rotated simultaneously.

The feed-rolls (best shown in Figs. 3 and 8) consist of hubs 24, secured to shafts 7 8 by set-screws 25 and of loose collars 26, carried by the hubs, the collars upon the two shafts being staggered, so that each collar upon one shaft is held between two others upon the other shaft, and vice versa, as shown in Figs. 1 and 8. The edges of the hubs 24 are chamfered off, as shown, so as to form a groove to receive the warp-wires 3 4, upon the other sides of which rest the collars 26, as shown. After leaving the feed-rollers and before passing to the bending-dies the warp-wires pass through a lift-plate 27, Figs. 3 and 5, which is carried by guides 28, carried by the movable head d.

29 repesents stops carried by guides 28 for lifting or depressing the lift-plates, and 30 stops carried by base-plate a, upon which the lift-plate rests when fully lowered.

Supposing that the warp-wires have been fed in by the feed-rollers and the movable head d lowered, the dies f^2 will have bent the warp-wires 3 4 one up, the next down, the next up, the next down, and so on, forming in one wire an upward loop and in the next one a downward loop directly opposite the first loop, all the warp-wires being bent in a similar manner. The dies f^2 are furnished with openings or grooves 31, (best shown in Fig. 4,) through which the weft or cross wires 32 are passed while the dies are closed.

When the dies f^2 are closed, the sprocket-wheel 33, Figs. 1 and 2, carried by shaft m through chain 34, drives sprocket 35, upon the shaft 36 of which is a bevel-gear 37, which drives a bevel-gear 38, fast upon the shaft 39 of which is a gear-wheel 40, Figs. 2 and 9, which gears with and drives a gear 41, fast to a shaft 42, carried in bearings 43, carried by the frame b. 44 is a flanged pulley, carried by and turning with shaft 42, 45 a presser-wheel loose upon shaft 39 and driven by pins 46, carried by gear 40. The pins 46 enter holes 47 in the end of the presser-wheel 45, which holes are of somewhat greater diameter than the pins 46.

48 is a movable friction-wheel carried upon a shaft 49, one end of which is loosely pivoted at 50 to the frame b, and the other end of which is carried by a slide 51, the upper end of which is adapted to be engaged and moved downward by a cam 52, Figs. 1 and 2, carried upon and turning with shaft m. When the slide 51 is depressed by cam 52, the roller 48 is caused to bear upon presser-wheel 45, which is lowered so as to bear firmly against the weft-wires 32, which are then by the presser-roll 45 and the pulley 44 driven in through the dies f^2 and between the loops formed on the wires by these dies. The cam 52 is made in two pieces 53 54, which may be shifted around on the shaft so as to increase or decrease its operative face in order to cause the feeding of the weft-wires to be longer or shorter as may be necessary for different widths of cloth.

The general operation of the machine is as follows: Supposing the movable head to be lifted and the dies opened, the warp-wire feed-rolls 5 6 are rotated through the mechanism driven by shaft m through cam 11, as previously described, and the warp-wires which are now lifted clear of the lower dies by the lift-bar 27 and the fabric already woven, are moved the proper distance inward. The movable head d is now moved down, the dies f^2 engaging and bending the warp-wires and the flattening-dies g^3 flattening out that portion of the fabric that is between them. After the warp-wires have been bent the dies are kept closed for some little time, owing to the form of the operating-cam n, and during this interval the cam 52 operates through the mechanism before described the presser-wheel 45, which feeds in the weft or cross wires 32, which pass first through dies 55, carried by frame b, and then through the perforations 31, formed partly in the upper and partly in the lower wire-bending dies f^2, and through the loops formed in the warp-wires by the dies. The cam 52 is set so as to feed the weft-wires across the entire series of warp-wires, which may extend completely across the machine or only part way, depending upon the width of the fabric being woven. After the weft-wires have been passed through the machine the movable head is lifted, and as it rises it carries up with it the cutter 56, Figs. 5, 6, and 7, which shears off the weft-wires at the inner end of the dies or guides 55. As soon as the movable head is fully raised the warp-wire feed-rolls 5 6 are again operated, and the warps are again fed in.

The machine is particularly adapted for weaving heavy wires, which may be of any desired cross-section.

In order that the feeding-rolls for the warp-wires may be self-adjusting for different thicknesses of wire, the screws 25, that secure their hubs 24 to the shafts, pass into longitudinal slots 60 in these latter, (best shown in Fig. 3,) and at one or both ends of the shafts are springs 61, of rubber or other suitable material, which normally tend to close the hubs against one another, but which permit them to move apart to adjust themselves to wires of different diameters. 62 represents collars fast to shafts 7 8, which hold the outer ends of the springs 61 firmly.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a machine for weaving heavy wires, in combination, a frame, a base, a movable head guided by said frame, means for reciprocating said head, bending-dies one part of which is carried by said base and the other by said head, means for feeding the warp-wires step by step in the direction of their length to said bending-dies, and means for inserting between said warp-wires, while held by the bending-dies, the weft-wires.

2. In a machine for weaving heavy wires, in combination, a frame, a base, a movable head guided by said frame, means for reciprocating said head, bending-dies one part of which is carried by said base and the other by said head, flattening-dies, placed to the rear of said bending-dies, one part of which is carried by said base and the other by said head, means for feeding the warp-wires step by step in the direction of their length to said bending and flattening dies, and means for inserting between said warp-wires, while held by the bending-dies, the weft-wires.

3. The combination in a wire-weaving machine of a reciprocating head, means for carrying said head, a friction-wheel carried in bearings in said head, a revolving shaft and means for driving the same, a cam upon said shaft adapted to engage said friction-wheel to depress said head, and means for lifting said head when said friction-wheel is disengaged by said cam.

4. The combination in a wire-weaving machine of a reciprocating head, means for carrying said head, a friction-wheel, a shaft carrying said friction-wheel eccentrically mounted in bearings carried by said head, means whereby said shaft may be rotated in its bearings, a revolving shaft and means for driving the same, a cam upon said shaft adapted to engage said friction-wheel to depress said head, and means for lifting said head when said friction-wheel is disengaged by said cam.

5. The combination in a wire-weaving machine of a reciprocating head, means for carrying said head, a friction-wheel carried by said head, vertical rods carried by said head, yokes carried by said rods, springs normally forcing said yokes downward, a friction-roller carried by said yokes, a shaft passing between and parallel with said friction-roller, a cam carried by said shaft adapted to engage said roller, and means for driving said shaft.

6. The described means for intermittently driving the warp-wire-feeding rolls of a wire-weaving machine, consisting of and in combination with said rolls and their carrying-shafts, a revolving shaft, a cam carried by said shaft, a slide adapted to be depressed by said cam, an arm pivoted at one end to a fixed point to which said slide is adjustably secured, a link pivotally secured to the free end of said arm, a pawl adapted to be depressed by said link, a ratchet-wheel carried by the shaft of one of the feed-rolls, gear-wheels upon the shafts of said rolls meshing one with the other, and means for returning said slide, arm, link, and connected parts to their raised position after the passage of the actuating-cam.

7. The described means for feeding the warp-wires into a wire-weaving machine consisting of parallel shafts fixed hubs carried by said shafts and loose collars carried by said hubs, the hubs and collars upon one shaft being placed so as to stagger one another combined with means for intermittently rotating said shafts.

8. The described means for feeding in the weft-wires consisting, in combination, of a revolving shaft, a shaft constantly rotated by said shaft, means for driving said first shaft, means, driven by said first shaft, for rotating said second shaft, a presser-wheel loose on said second shaft, a gear-wheel fast on said second shaft, pins carried by said gear-wheel for driving said presser-wheel, a gear-wheel driven by said first gear-wheel, a pulley carried and driven by the shaft of said second gear, a cam carried on said first shaft, a slide adapted to be depressed by said cam, a shaft to one end of which said slide is connected and the other end of which is movably carried, and a friction-roller carried by said shaft adapted to engage the top of said presser-wheel.

9. The combination with the bending-dies, the feeding-rolls for the warp-wires, and means for reciprocating one of the bending-

dies, of a lift-bar for lifting said wires from the stationary bending-die before the feed-rolls are brought into operation.

10. The combination with the reciprocating head and the stationary frame of a wire-weaving machine as described, of means carried by said frame through which the weft-wires pass and a knife carried by said reciprocating head for shearing off said wires upon one movement of said head.

CHARLES W. JAMES.

Witnesses:

GEORGE W. SELTZER,

CHARLES A. RUTTER.