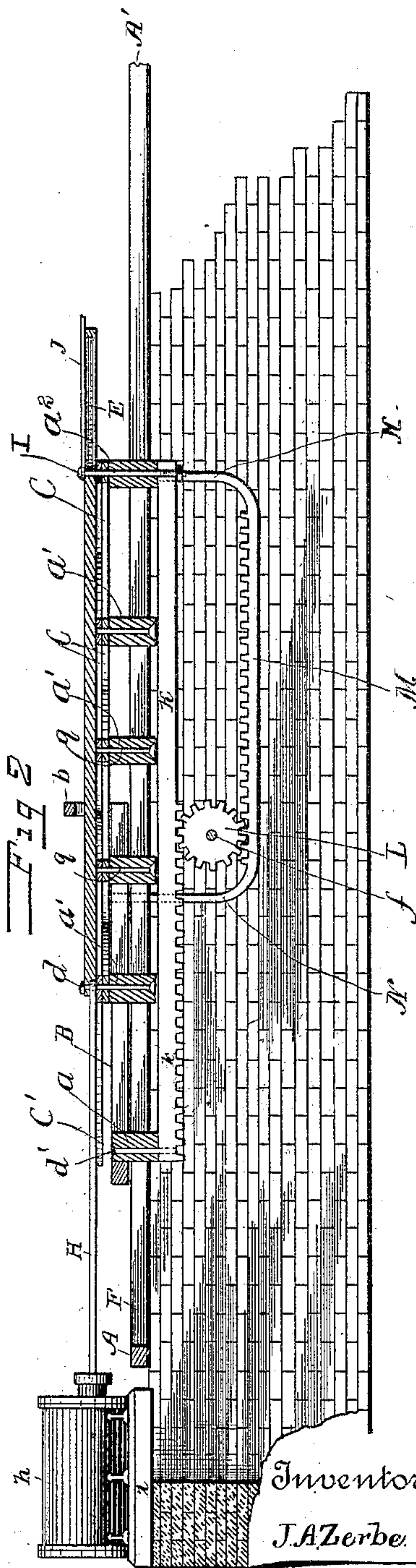
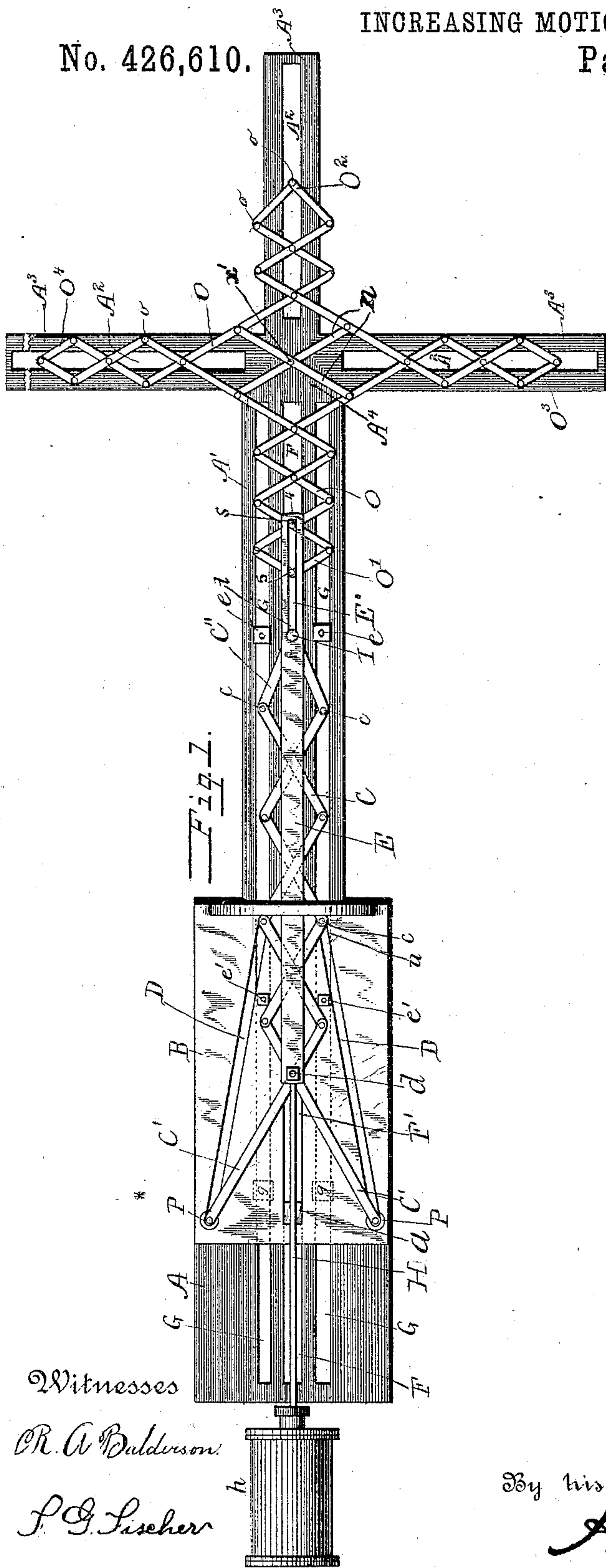


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MULTIPLE MOVEMENT DEVICE FOR TRANSMITTING AND  
INCREASING MOTION.

No. 426,610.

Patented Apr. 29, 1890.



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J. G. Lischer

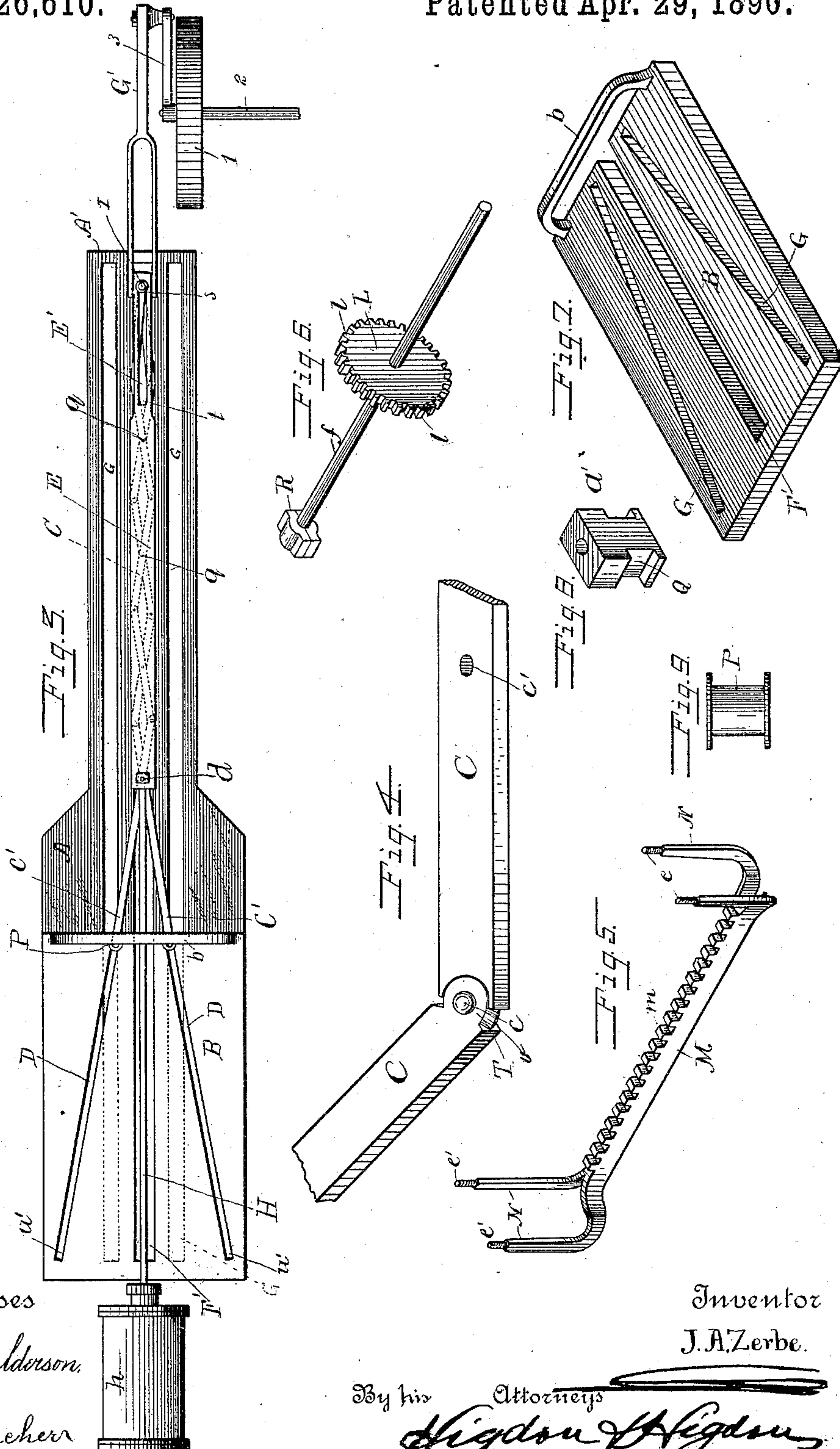
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(No Model.)

4 Sheets—Sheet 3.

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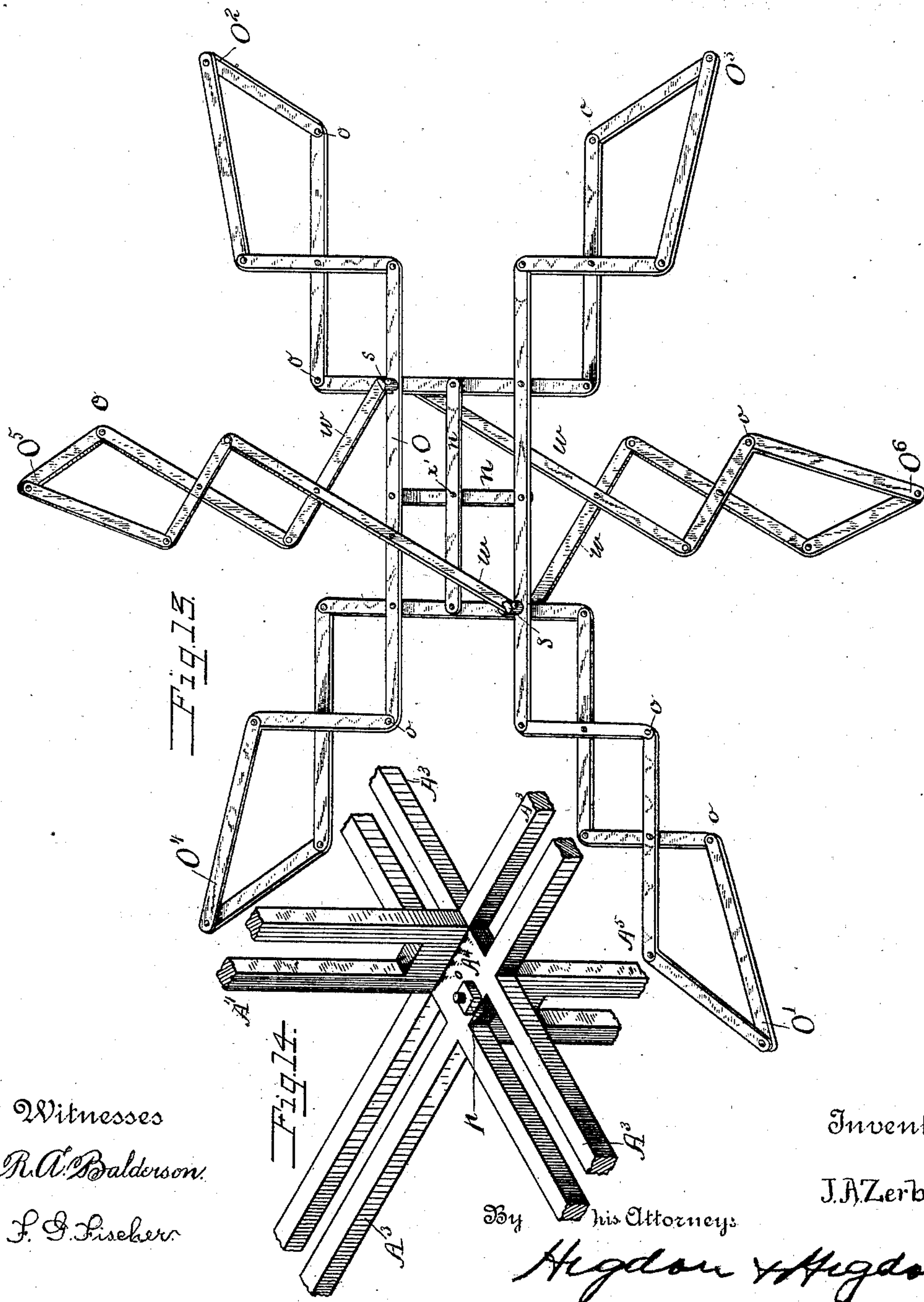
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# UNITED STATES PATENT OFFICE.

JOHN A. ZERBE, OF DODGE CITY, KANSAS.

MULTIPLE-MOVEMENT DEVICE FOR TRANSMITTING AND INCREASING MOTION.

SPECIFICATION forming part of Letters Patent No. 426,610, dated April 29, 1890.

Application filed August 16, 1889. Serial No. 321,016. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. ZERBE, of Dodge City, Ford county, Kansas, have invented certain new and useful Improvements in Multiple-Movement Devices for Transmitting and Increasing Motion, of which the following is a full, clear, and exact description, reference being had to the accompany drawings, forming a part hereof.

My invention relates to a device for transmitting power, having for its object to increase the length of the stroke of a piston-rod, drive-rod, the lifting-rod of a pump, or any other reciprocating rod; and, furthermore, the object of my invention is to enable the power of such reciprocating rod to be transmitted in any desired direction or directions.

In the drawings which illustrate the manner of constructing and applying my invention, Figure 1 is a top plan view showing the position of the parts before the stroke is made. Fig. 2 is a central longitudinal section showing the parts in the same position as in Fig.

Fig. 3 is a plan view showing my device connected to a crank-wheel, with the parts as seen when the stroke is completed. Fig. 4 is a detail perspective view showing the construction of the elbow-joint which is employed to connect the members of the extension motor-rod. Fig. 5 is a detail view of the rack-bar M. Fig. 6 is a similar view of the gear-wheel and the shaft through which it is secured. Fig. 7 is a similar view of the movable guide-plate. Fig. 8 is a similar view of one of the guide-blocks. Fig. 9 is a view of one of the flanged guide-rollers. Fig. 10 is a plan view of the improved motor-bar connected directly to a crank-wheel, as in Fig. 3, as seen when about to commence a new stroke. Fig. 11 is a perspective view of the stationary slotted bed-plate. Fig. 12 is a detail view of the guide-plate B, having shorter guide-slots to adapt it to be secured permanently to the bed-plate. Fig. 13 is a detail view of the distributing-spider which is employed to transmit the power in various directions; and Fig. 14 is a similar view, partly broken away, of the slotted guide for said spider.

The extension motor device is composed of

a series of intersecting bars C, which are pivoted together at their extremities, as seen at c, and at their centers, as seen at c', and from the last-named intersections depend guide-blocks a', which operate in the central guide-slots F of the bed-plate A. The bars C'' at one end of the motor device do not intersect at their centers, but are connected at their ends by the vertical bolt I, which also passes through and secures in place a guide-block a'', which travels in the guide-slot F, and the intersecting bars at the opposite end of the motor device are extended to form the power-arms C', which are provided at their extremities with flanged guide-rollers P, which operate in the diverging guide-slots D D of the movable guide-plate B.

In the drawings I have shown my improved extension motor device connected to the piston-rod H, which operates in the cylinder h, in order to illustrate the manner of using the same, and I have also shown the same, as in Figs. 3 and 10, connected to a crank-wheel 1, mounted on the shaft 2 by means of crank 3 and pitman G'; but these parts form no element of my invention. The piston-rod is connected to the fulcrum-pin d, upon which the power-arms are pivoted, said pin being also employed to secure a guide-block a' in place. A slack or connecting bar E is arranged above the motor device and is secured thereto at one end by the fulcrum-pin d, the opposite end of said bar being slotted, as seen at E', to receive the bolt I, whereby when said motor device is extended the bolt I travels in the slot E'.

Beneath the bed-plate is arranged a rack-bar K, which is secured at one end to the motor device by the pin d', and is secured at its opposite end to the guide-block a'' by means of bolt I. This rack-bar meshes with a pinion L, mounted on a horizontal shaft f, and the pinion in turn meshes with a rack M, which is secured at one end to the guide-plate B by means of the threaded extensions e', which slide in the parallel guide-slots G G of the bed-plate, the front end of said rack being also provided with threaded extensions e, engaged with suitable nuts and operating in slots G G. It will be seen that the forward



motion of the piston being communicated through the motor device to the rack-bar K will cause a rotation of the pinion L, thereby moving the rack M in the opposite direction, thereby sliding the guide-plate B rearwardly and causing its divergent slots D to draw the free ends of the power-arms C' toward each other, thus extending the motor device. Obviously the forward end of the motor device will by this combined motion travel a greater distance than the piston-rod, said distance being limited by the length of the slot E'. The bolt I travels during one stroke from *t* to *s* or from *s* to *t*, said distance being the difference between the stroke of the motor-rod and the stroke of the piston.

The spider, which is connected to the end of the motor-rod to distribute the motion in various directions, consists of a series of intersecting bars connected in the same manner as those of the motor device, its arm O' being connected to the end of the motor-rod by means of the slack-bar E, and its other arms O<sup>2</sup>, O<sup>3</sup>, and O<sup>4</sup> being connected together by the intersecting bars *n n*, which, intersecting at *x'*, convey power to all of said arms. A frame A<sup>3</sup> is employed to guide the movements of the arms, the same being provided with slots A<sup>2</sup> to receive guide-blocks, as illustrated in connection with the motor device. The arm O' is provided at its extremity with pins 4 5, Fig. 1, which operate in the slot E', and the bolt I, coming in contact with the end of the arm O', contracts the spider, while the end of the slot E' on the return-stroke, coming in contact with the pin 4 on the arm O', extends the same by drawing pin 4 away from pin *x'*. The spider is permanently pivoted at its center to the central portion A<sup>4</sup> of the guide-frame by means of the pivot *x'*.

When only a moderate extension of the motor device is required, the rack-bars and pinion are dispensed with and the slotted plate B is permanently fixed to the bed-plate in such a position as to guide the movements of the free ends of the power-arms, and as in this case the movement of the motor device is less the slots D of the plate B are made much shorter, as shown in Fig. 12 of the drawings.

The joint which I prefer to employ to connect the members of the motor device is shown clearly in Fig. 4, and it consists, essentially, in rounding and halving the adjacent ends of the adjoining members and connecting them by a pivot *c*, the outer edges of the rounded ends T being chamfered or beveled, as seen at *v*, to fit in correspondingly-shaped shoulders of the adjoining member. With this joint there is less liability to spring away from the bed-plate and the device operates with greater trueness and certainty.

The operation of the invention will now be seen: As the piston-rod advances, the slack-bar and the extension motor device are forced

forwardly, the guide-plate is carried rearwardly, and the flanged guide-rollers P, operating in the divergent slots D D, are drawn toward each other, thereby extending the motor device and increasing the stroke, which is communicated directly to the pitman, as shown in Figs. 3 and 10, or is communicated to a distributing-spider, the various arms of which may be connected to as many pitmen or other bars, rods, or cranks in a manner to be determined by the object to be attained.

In Fig. 13 is shown a spider, which, in addition to the four arms shown in Fig. 1, is provided with an upper arm O<sup>5</sup> and a lower arm O<sup>6</sup>, the inner ends of which are connected by means of the arms *w w* to slotted lugs *s s*. The operation of this form of spider is the same as that described in connection with the spider shown in Fig. 1.

The guide-blocks *a'* are secured to the motor device by means of vertical pins or rivets *q q*, and said blocks are flanged to work in the slot F, and thereby hold the motor-bar in its proper position.

The object of the slack-bar is to take up all slack or lost motion caused by the wear of the pin I in the slot E', and also to strengthen the motor device.

Small guide-blocks *g g* on the under side of the movable guide-plate B operate in the parallel guide-slots G G of the bed-plate, as shown in dotted lines in Figs. 1 and 10.

Having thus described my invention, I claim—

1. The combination of an extension motor device adapted to be connected to a piston-rod or other reciprocating bar and provided with power-arms, and the guide-plate provided with divergent slots to receive guide-rollers on the extremities of said power-arms to extend and contract the motor device, substantially as specified.

2. The combination of an extensible motor device consisting of intersecting bars pivoted together, the movable guide-plate geared thereto to move in the opposite direction, and the power-arms on the motor device, provided with guide-rollers to operate in divergent slots in said guide-plate, substantially as specified.

3. The combination of the extension motor device consisting of a series of intersecting pivoted bars, the rack-bar K, carried by said motor device, the pinion, the slotted guide-plate connected to a rack-bar M, which meshes with the said pinion, and the power-arms on the motor device, provided with guide-rollers to operate in divergent guide-slots in the said plate, substantially as specified.

4. The combination of the motor device consisting of a series of intersecting pivoted bars C and carrying depending guide-blocks *a'*, the slotted bed-plate, the movable guide-plate provided with divergent slots D and geared to said motor device, said guide-plate being provided with lugs to operate in slots of the



bed-plate, and the power-arms-provided with guide-rollers to operate in said slots D, substantially as specified.

5 5. The combination of the extension motor device, as described, and provided with power-arms C', the slack-bar connected to the motor device and slotted to receive a rod I on the same, and the guide-plate geared to the motor-rod and provided with slots to receive  
10 guide-rollers on the extremities of the power-arms, substantially as specified.

6. The combination of the extension motor device, slack-bar E, provided with slot E', and spider having a series of divergent arms  
15 consisting of intersecting bars and provided with pins to operate in the slot E', substantially as specified.

7. The combination of the extension motor device provided with power-arms C', the sliding slotted guide-plate connected to said arms  
20 and geared to the motor device to operate in the opposite direction thereto, the slotted slack-bar E, the slotted guide-frame A<sup>3</sup>, and

the spider mounted on said frame, having divergent arms and connected to the motor device, substantially as specified. 25

8. The combination of the bed-plate A, provided with parallel guide-slots G G F, the sliding guide-plate provided with divergent slots D D and having lugs g g to operate in  
30 said slots G G, the motor device consisting of intersecting pivoted bars and provided with guide-blocks a' to operate in the slot F, said motor device being geared to said guide-plate and provided with power-arms having guide-  
35 rollers to operate in the slots D thereof, and a slack-bar connected to the motor device and provided at one end with a slot to receive a guide-bolt I, substantially as specified.

In testimony whereof I affix my signature in  
40 presence of two witnesses.

JOHN A. ZERBE.

Witnesses:

F. G. FISCHER,

R. A. BALDERSON.