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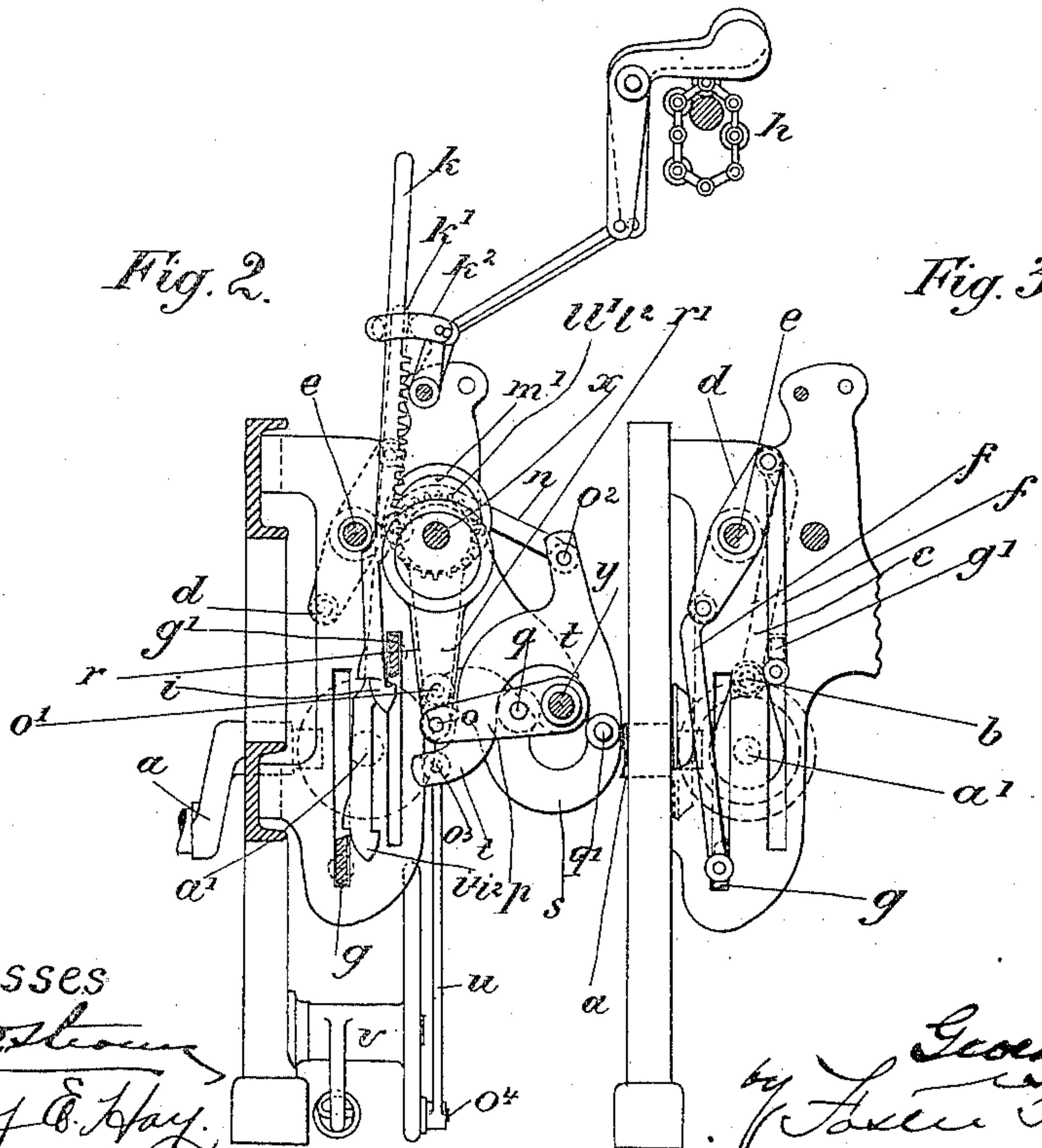
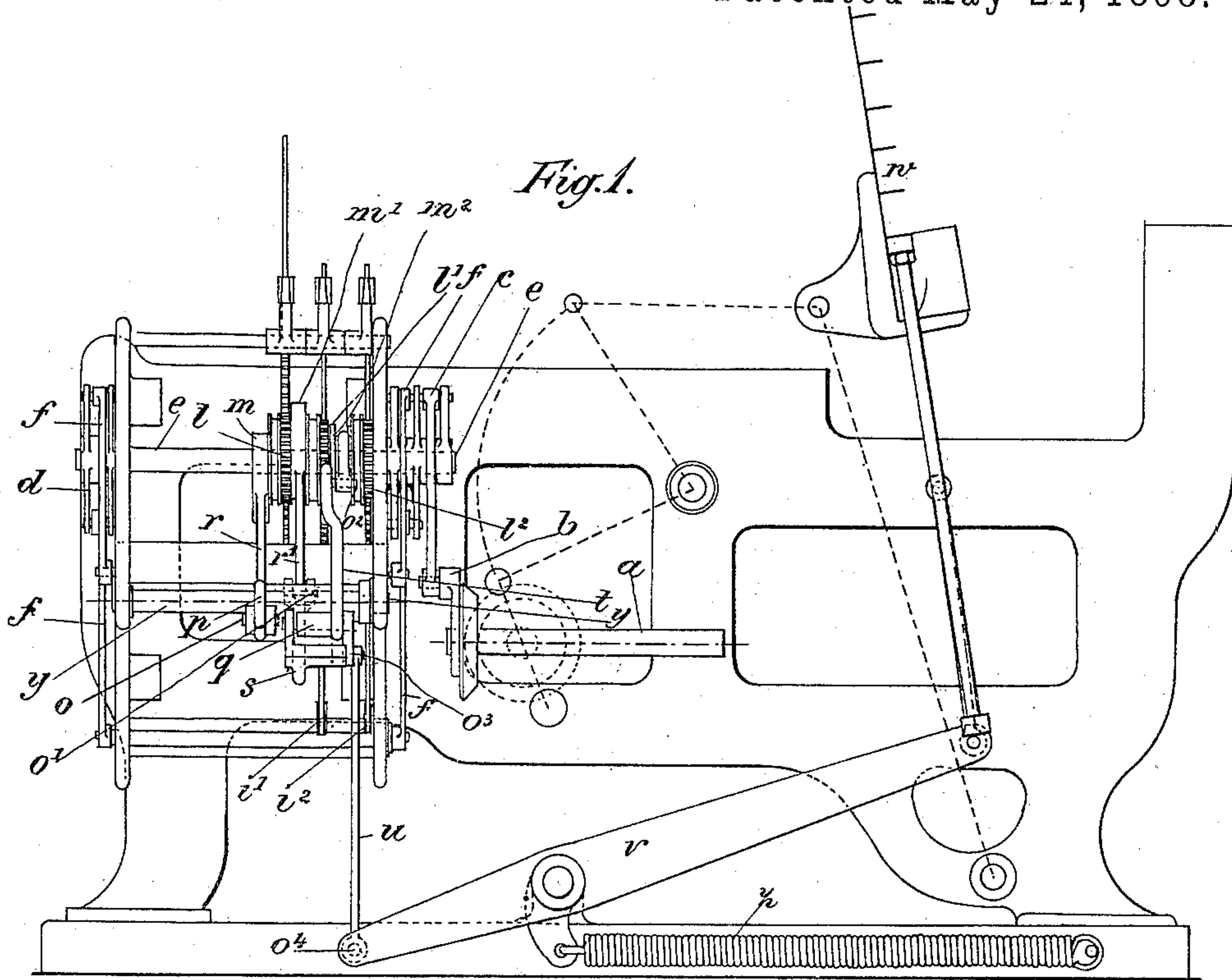
4 Sheets—Sheet 1.

G. SCHWABE.

SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

No. 604,669.

Patented May 24, 1898.



Witnesses  
*James D. Stinson*  
*Harry E. Hay*

Inventor  
*George Schwabe*  
by *James Freeman*  
attorney

(No Model.)

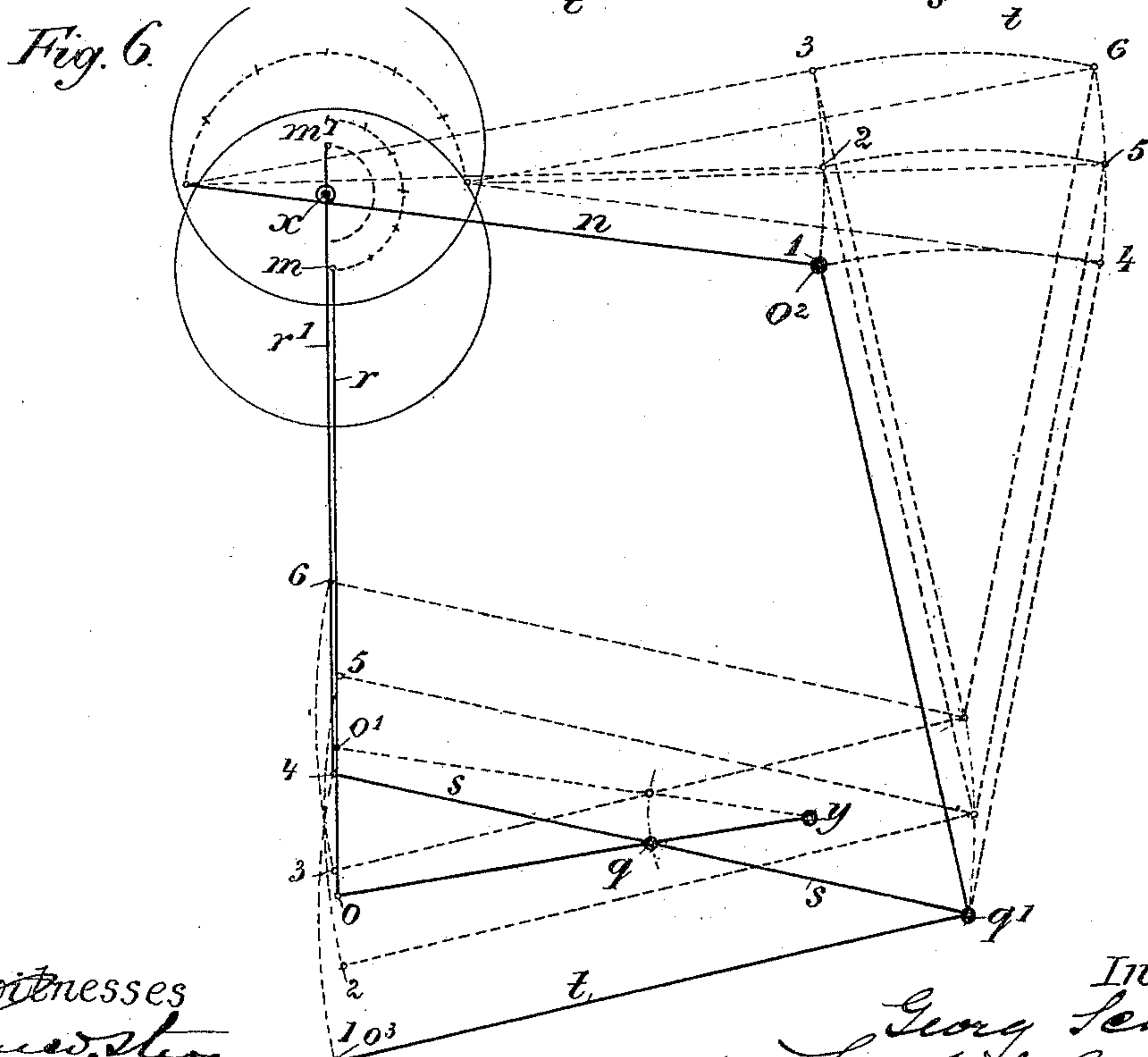
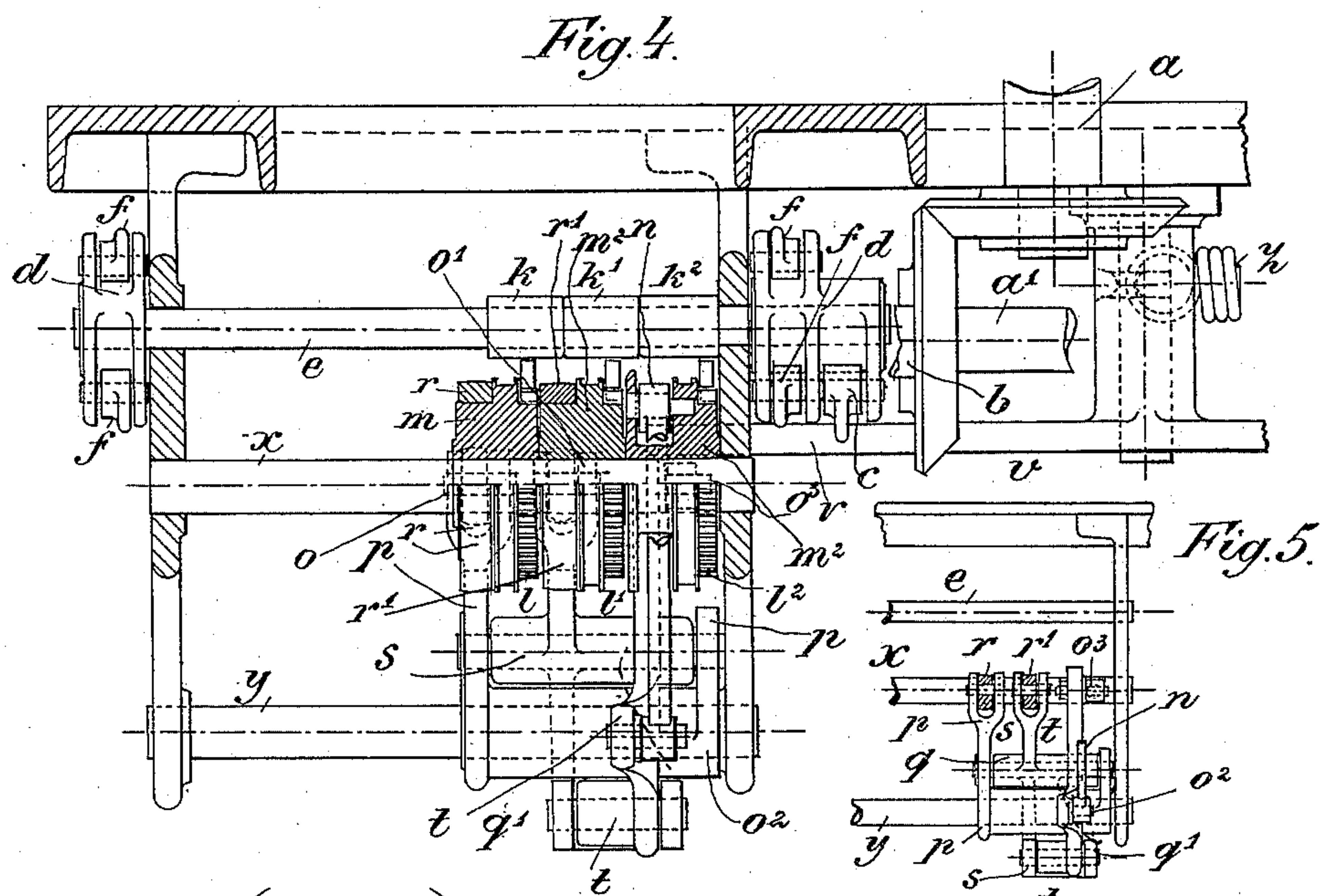
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G. SCHWABE.

# SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

No. 604,669.

Patented May 24, 1898.



*Witnesses*

Times & Stores  
Harry E. Hay.

*Inventor*

Inventor  
George Schwabe  
by Foster Sherman  
attorneys

G. SCHWABE.

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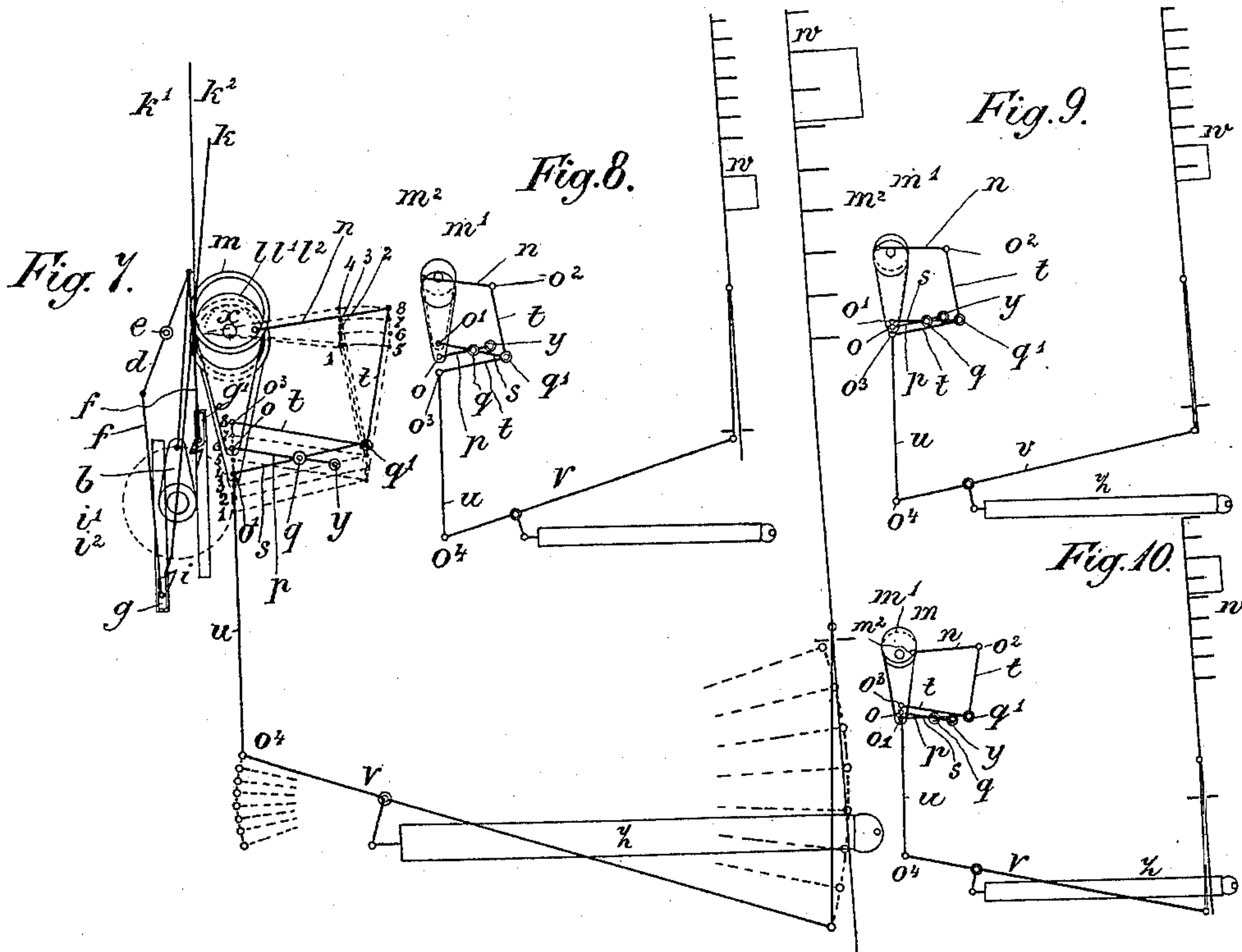


Fig. 11.

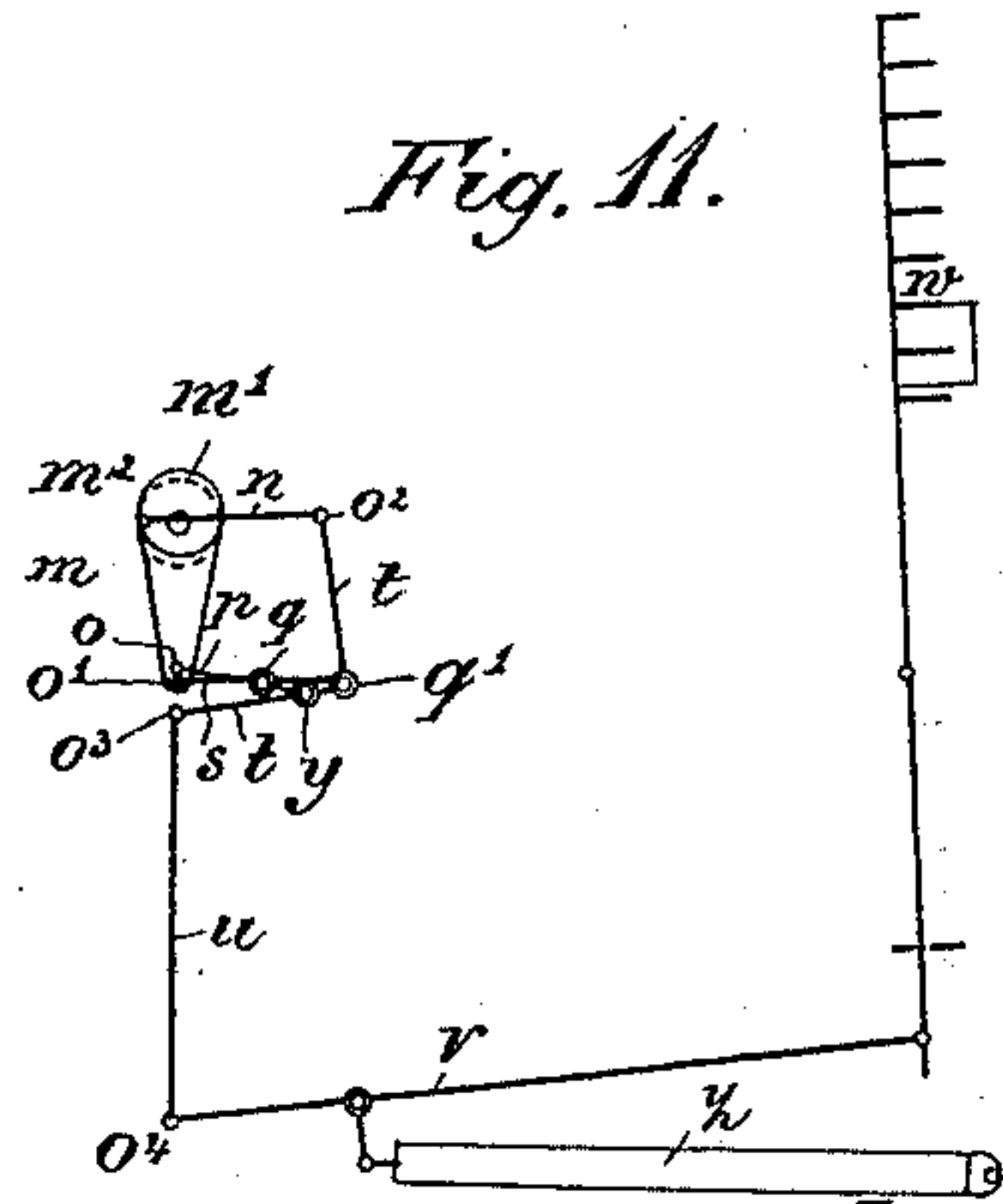


Fig. 12.

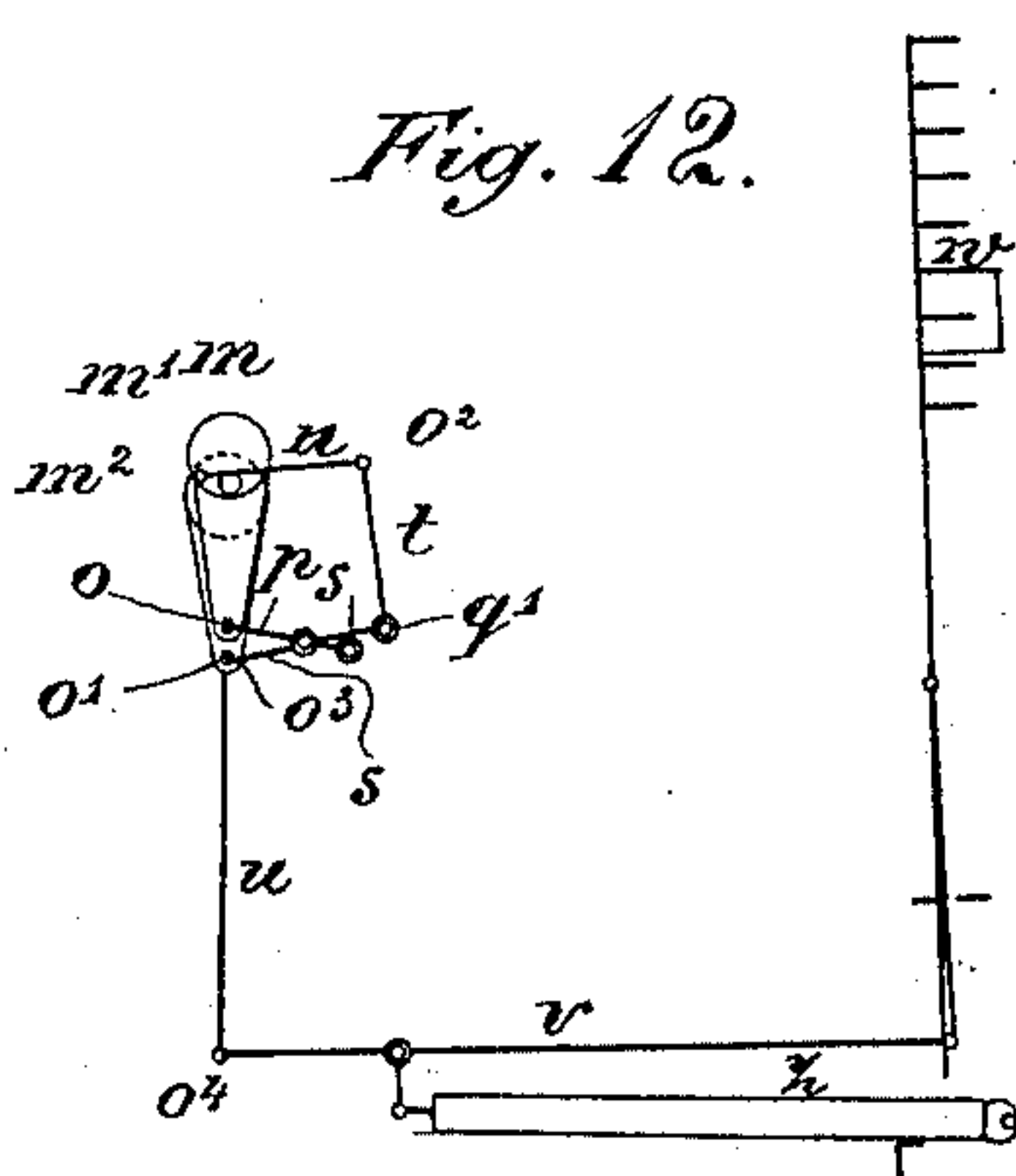


Fig. 13.

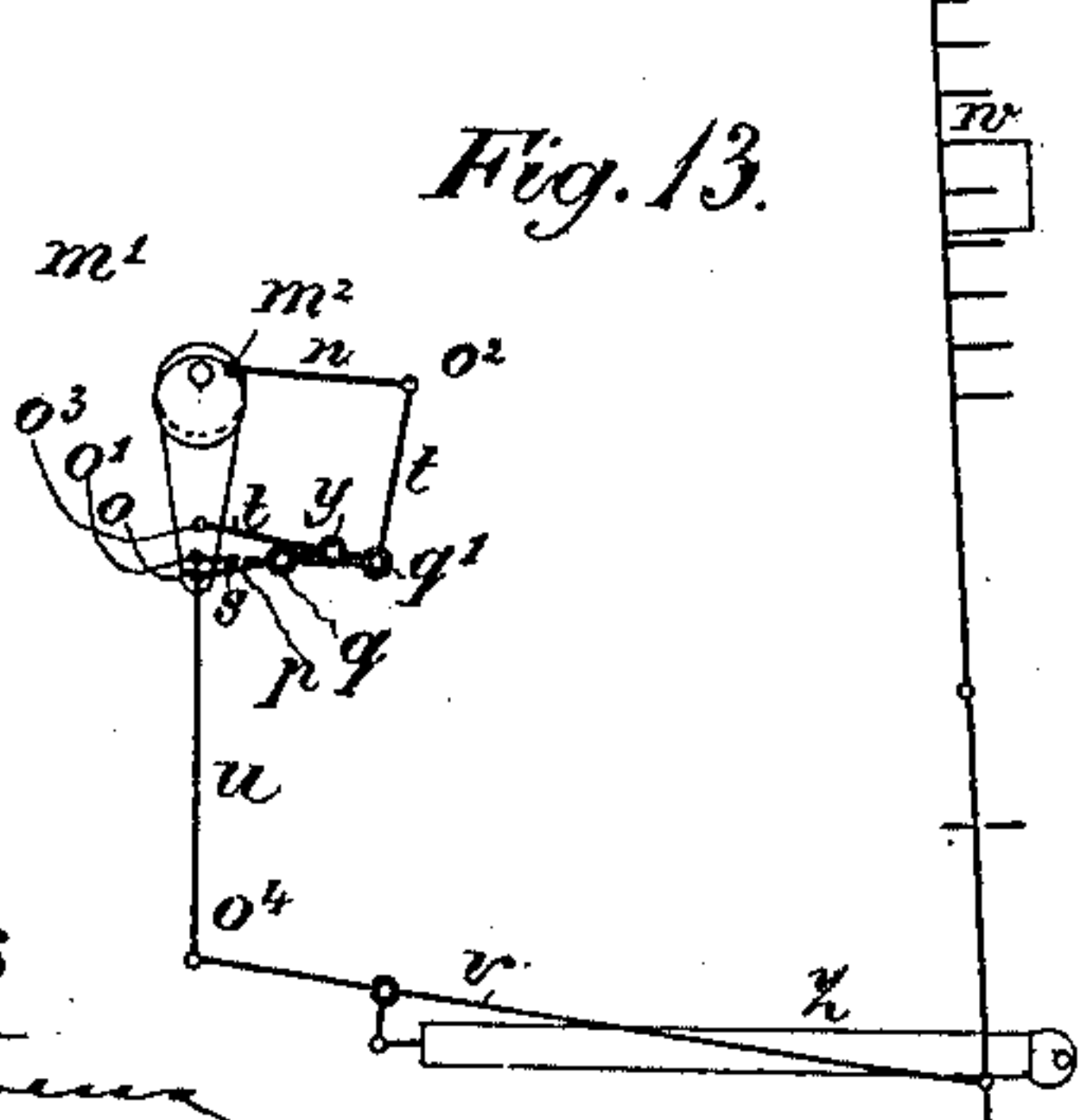
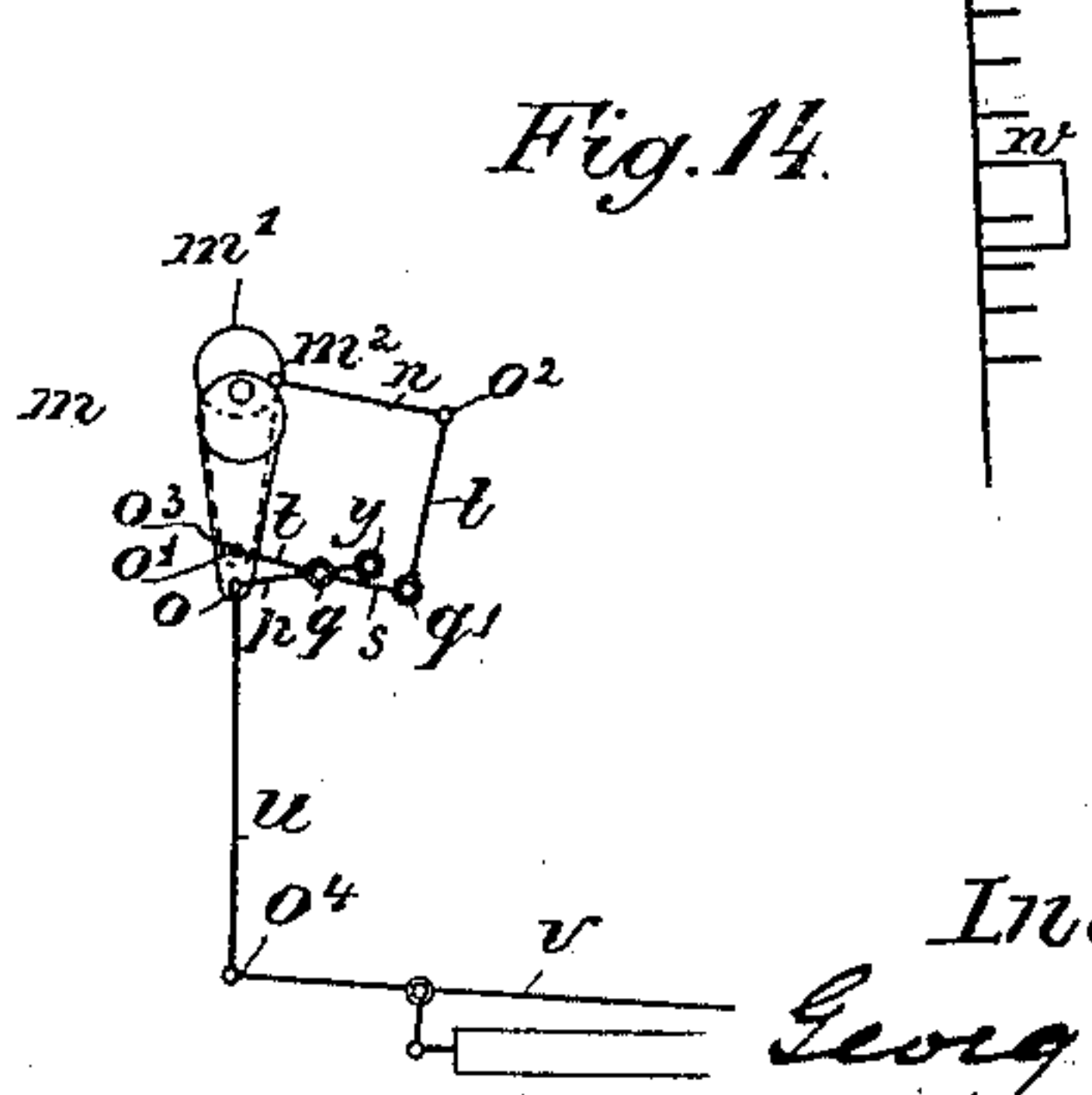


Fig. 14.



Witnesses  
T. J. C. Stinson  
Harry E. Hay.

Inventor  
George Schwabe  
by Foster Truman  
Attorneys



(No Model.)

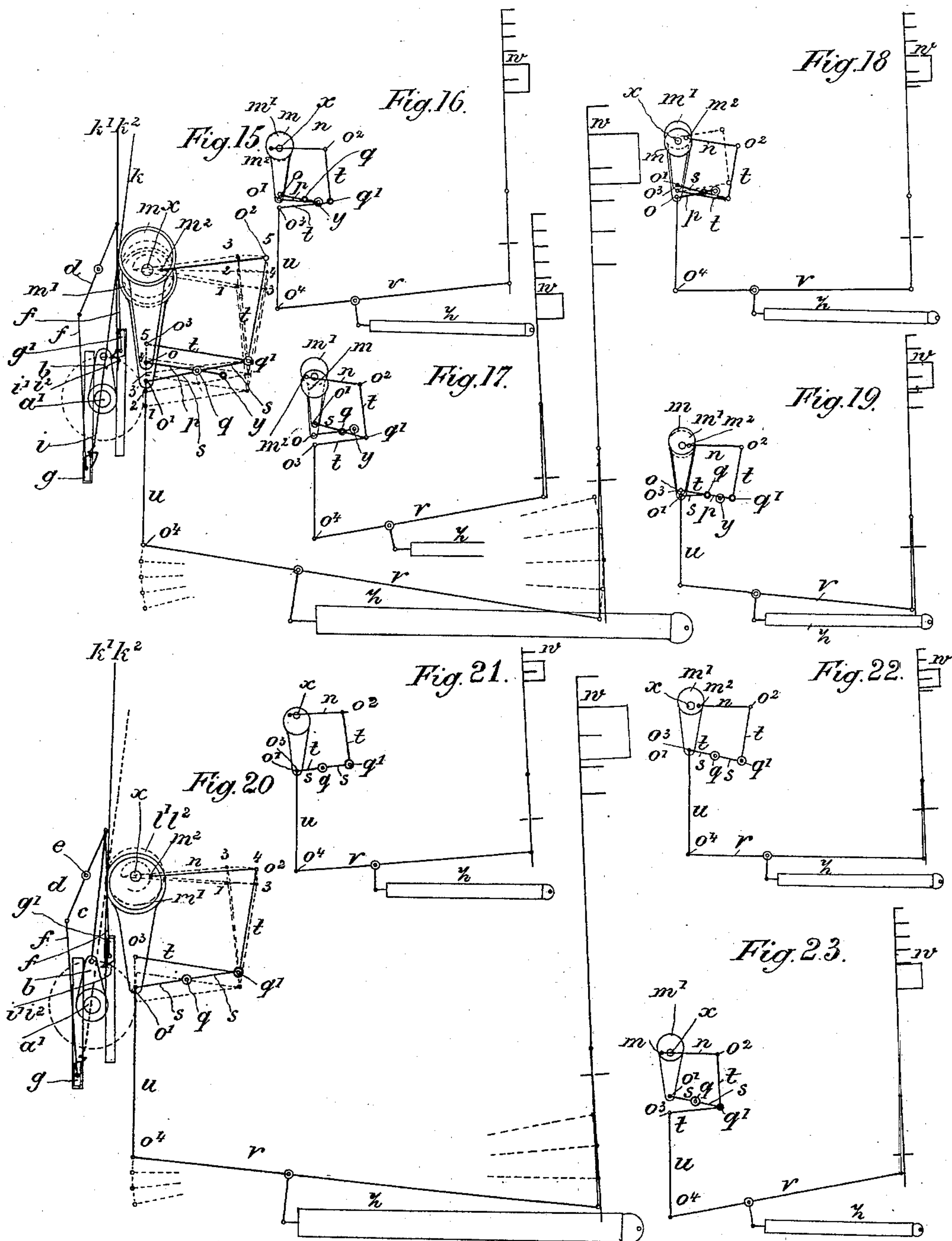
4 Sheets—Sheet 4.

G. SCHWABE.

SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

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Witnesses  
J. H. H. H.  
Harry E. Hay.

Inventor  
Georg Schwabe  
by Foster Freeman  
Attorneys



# UNITED STATES PATENT OFFICE.

GEORG SCHWABE, OF BIALA, AUSTRIA-HUNGARY.

## SHUTTLE-BOX-OPERATING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 604,669, dated May 24, 1898.

Application filed April 27, 1897. Serial No. 634,125. (No model.) Patented in England December 20, 1894, No. 24,794.

*To all whom it may concern:*

Be it known that I, GEORG SCHWABE, a subject of the Emperor of Austria-Hungary, residing at Biala, in the Empire of Austria-Hungary, have invented new and useful Improvements in Shuttle-Box-Operating Mechanism for Looms, (which has been patented in England, No. 24,794, December 20, 1894,) of which the following is a specification.

Power-loom with shuttle-box-changing devices do not generally attain the speed and capacity of production that are possible with looms without multiple shuttles. In particular those looms having arrangements for more than a quadruple change and with rising and falling boxes are limited in their speed, because a greater number of boxes necessitate so complex a construction that all the main requirements of a change of shuttles, such as uniform motion free from shocks, and absolutely reliable rising and falling of the boxes with a minimum expenditure of power, can generally not be simultaneously obtained.

The present invention relates to an improved shuttle-changing apparatus for multiple (eightfold) changes which fulfils all the required conditions in so complete a manner that the capacity of production and speed of such looms are nearly equal to those of looms without change of shuttles. The said apparatus is so arranged that all the moving parts, from the cranks or eccentrics situated side by side on the driving-shaft to the shuttle-boxes themselves, are in perfectly close connection, whereby the raising or lowering of the shuttle-boxes can be effected in a perfectly easy and reliable manner. The end positions of the separate boxes or cells are determined by the end positions of the cranks or eccentrics, in which positions (dead-centers) every pressure produced is taken by the rigid shaft. For preventing inaccuracies in the different vertical motions an arrangement is provided whereby the raising devices only receive so small a stroke that the arc described by the same hardly differs perceptibly from a straight line, and that consequently at the end positions of the corresponding levers no inequalities of the stroke can be produced by relative shortening. In order to avoid the action of the momentum of the masses in motion at high speeds of the

loom, as also the wear of the moving parts, the weight of the shuttle-box and carrier is entirely balanced both in the rising and the falling motion by means of a helical spring connected to the carrier.

I will describe the said invention with reference to the accompanying drawings, in which on Sheets I to IV is shown the construction for six positions, while Sheets V to VIII show diagrammatic views for eight, five, and four positions of the multiple apparatus.

Figure 1 shows a front view, Figs. 2 and 3 section and side view, Figs. 4 and 5 enlarged sectional plans, and Fig. 6 a full-sized diagram for six positions. Figs. 7 to 14 show diagrams of the arrangement for eight shuttle positions. Figs. 15 to 19 show diagrams of the arrangement for five shuttle positions, and Figs. 20 to 23 show diagrams of the arrangements for four shuttle positions.

The crank-shaft *a* of the power-loom drives, by means of bevel-gear, a short shaft *a'*, having a crank *b*, which moves the lever *d*, fixed to the shaft *e*, Figs. 7 and 8, which lever imparts an up and down motion by means of the rods *f* to the knife-bars *g g'*. The pattern-chain *h*, Fig. 2, brings, according to whether it presents a socket or a roller, the vertically-arranged platens *k k' k''* with their beaks *i i' i''* in front of the knife-bars *g g'*, which lay hold of them and carry them along. The teeth of each platen take into a corresponding toothed segment *l l' l''*. The latter are situated loose side by side upon a fixed bolt *x*, on which they can turn.

The toothed segment *l* carries a circular eccentric *m*, cast thereon, which carries an eccentric-strap *r* and is guided at the point *o* by the lever-arm *p*, pivoted on the fixed pin *y*. In like manner the toothed segment *l'* carries an eccentric *m'*, cast thereon, which has an eccentric-strap *r'* and is guided at *o'* by the lever *s*, which is pivoted to the pin *q*, carried by the first lever *p*. Also the toothed segment *l''* has a crank *m''*, which is connected by the rod *n* to the pin *o''* on the lever *t*, which is pivoted to a pin *q'* on the second lever *s*.

From the pin *o''* of lever *t* the rod *u* passes to the pin *o'''* on the shuttle-box carrier *v*, which is rigidly connected to the shuttle-box *w*. Each toothed segment has a small groove for the reception of a brake-strap, which only



has the object to prevent any overrunning of the toothed platens  $k$   $k'$   $k^2$  during the motion.

On the shuttle-box carrier  $v$  is a short lever-arm, with which is connected the spring  
5 Z, the other end of which is connected to the loom-frame.

According as the toothed platen  $k$ , Figs. 1 and 2, is moved up or down by the reciprocating knife-bars  $g$   $g'$  the toothed segment  $l$ ,  
10 with its eccentric  $m$ , receives a semirotation either in the upward or the downward direction.

The eccentric-strap  $r$ , which is guided at  $o$ , rises or falls and with it the lever  $p$ , pivoted  
15 to the pin  $y$ . Consequently the pin  $q$ , serving as pivot to lever  $s$ , also rises and falls.

According as the second toothed platen  $k'$  is moved up or down by the reciprocating knife-bars  $g$   $g'$  the second toothed segment  $l'$   
20 and its eccentric  $m'$  receive a semirotation in an upward or downward direction and the strap  $r'$ , which is guided at  $o'$ , rises and falls, as does also the second lever  $s$ , pivoted to the pin  $q$ .

According as the third toothed platen  $k^2$  is moved up or down by the reciprocating knife-bars  $g$   $g'$  the third toothed segment  $l^2$  receives a semirotation in an upward or downward direction, while its crank  $m^2$  receives a  
30 horizontal to or fro motion, as does also, by means of the rod  $n$ , the third lever  $t$ , which is pivoted to the pin  $q'$ . As now in consequence of the up-and-down motion of the two levers  $p$  and  $s$ , as also of the pivot  $q$ , the  
35 point  $q'$  receives four different positions in a vertical direction, which are imparted to the lever  $t$ , pivoted at  $q'$  and having a horizontal to-and-fro motion, the point  $o^3$  will receive eight different positions, which are situated  
40 in a figure similar to a rectangle. These eight positions appear at the point  $o^3$  of the elbow-lever  $t$  as eight perfectly equal different vertical positions, which are situated almost vertically one above the other. The  
45 elbow-lever  $t$  consequently imparts, by means of the connecting-rod  $u$ , to the point  $o^4$  of lever  $v$ , and consequently also to the shuttle-box, eight perfectly equal different vertical positions.

By suitably determining the stroke of the two eccentrics  $m$   $m'$  the pivot  $q'$  of lever  $s$  can in like manner receive only three positions in the vertical direction instead of four, which then give, in conjunction with the elbow-lever  
55  $t$  at the point  $o^3$ , six equal vertical positions, so as to impart six corresponding positions to a six-cell shuttle-box, as indicated at Fig. 6.

By reducing the stroke of the crank  $m^2$  two other positions in Figs. 15 and 16 will be made  
60 to coincide, thus producing a middle position, so that the elbow-lever  $t$  will have at point  $o^3$  five accurately equal vertical positions, as shown at Figs. 15 to 19, while by further shortening the lever of the eccentric  $m'$  the three  
65 positions in vertical direction can be reduced

to two, so that the point  $o^3$  of the lever  $t$  will then only receive four accurately equal vertical positions, in which case the stroke of the eccentric  $m$  is equal to zero, as indicated at Figs. 20 to 23.

All the movements of the eccentrics and cranks are closed, and are consequently definitely-prescribed motions, and the end positions are accurately fixed by the dead-centers thereof at each perfect semirevolution.

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—

1. In shuttle-box-operating mechanism, the combination with the shuttle-boxes, of a lifting and depressing lever connected therewith and pivoted at a fixed point, a second pivoted lever connected to the lifting and depressing lever, and pattern-controlled devices for shifting the pivotal point of said second lever and for swinging it upon its pivot, substantially as described.

2. In shuttle-box-operating mechanism, the combination with the shuttle-boxes and their carrier, of a lever connected with the carrier and pivoted at a fixed point, mechanism for swinging the lever upon its pivot, an eccentric, connections between the eccentric and the pivot of the lever, and pattern-controlled devices for rotating the eccentric and for operating the swinging mechanism of the lever, substantially as described.

3. In shuttle-box-operating mechanism, the combination with the shuttle-boxes and their carrier, of a lever having a pivot adapted to be moved in different planes, connections between said lever and the shuttle-box carrier, a second lever having a fixed pivotal point, a third lever pivoted to the said second lever and connected to the pivot of the first-mentioned lever, and pattern-controlled devices for swinging any one or more of the three levers upon their pivots, substantially as described.

4. In shuttle-box-operating mechanism, the combination with the shuttle-boxes and their carrier, a lever having a pivot adapted to be moved in different planes, connections between said lever and the shuttle-box carrier, a second lever connected with the pivot of the first, said second lever likewise having a pivot adapted to be moved in different planes, means for shifting said pivotal point, and pattern-controlled devices for swinging one or both of the levers upon their pivots, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORG SCHWABE.

Witnesses:

ANTON BUDSIKIEWICZ,  
CARL SCHMIDT.