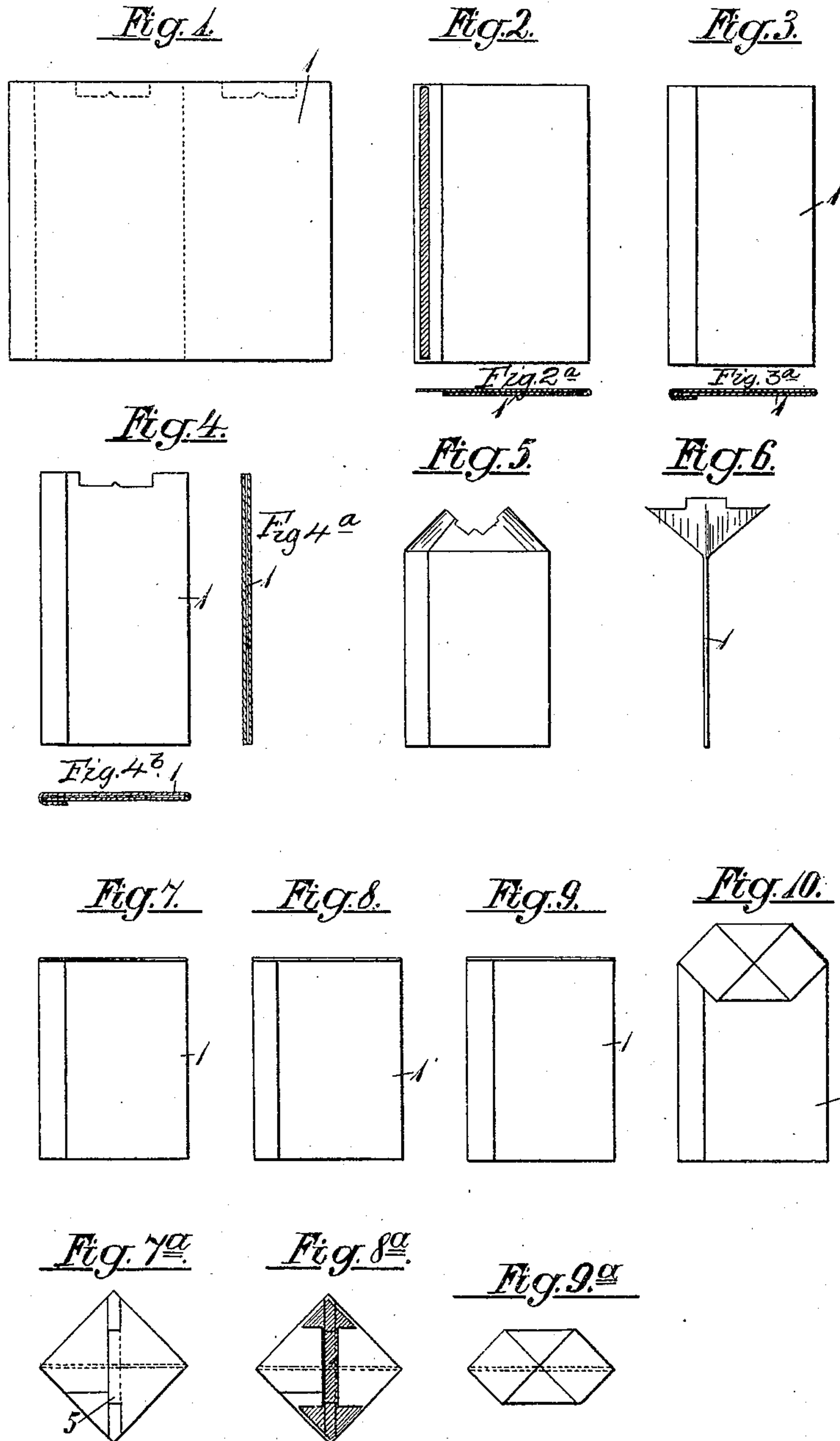


938,486.

O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 1.



Witnesses  
Albert Poplins  
C. H. Walker.

Inventor  
Otto Hesser  
By  
Sturtevant & Greeley  
Attorneys

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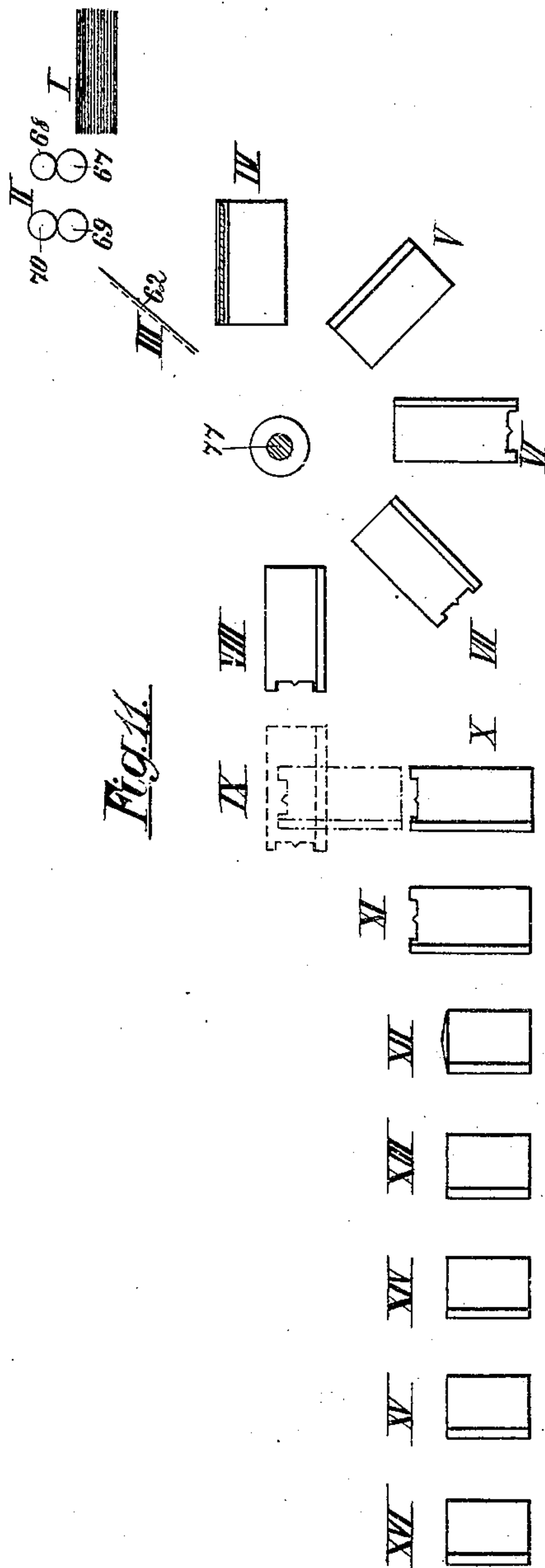


Fig. 11.

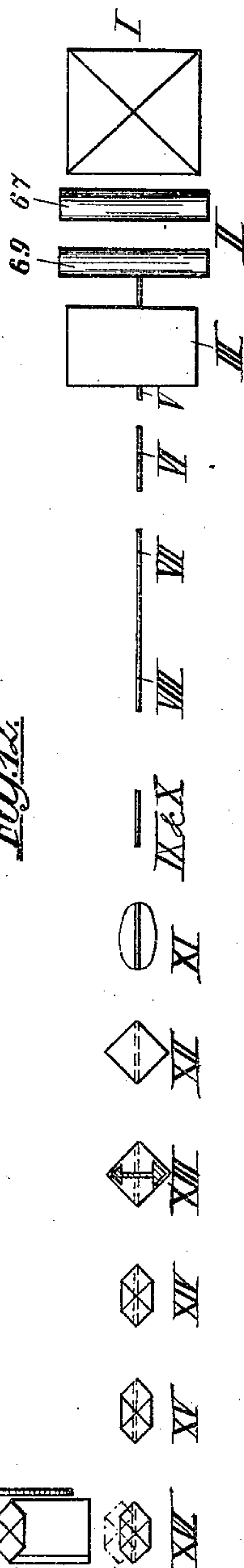
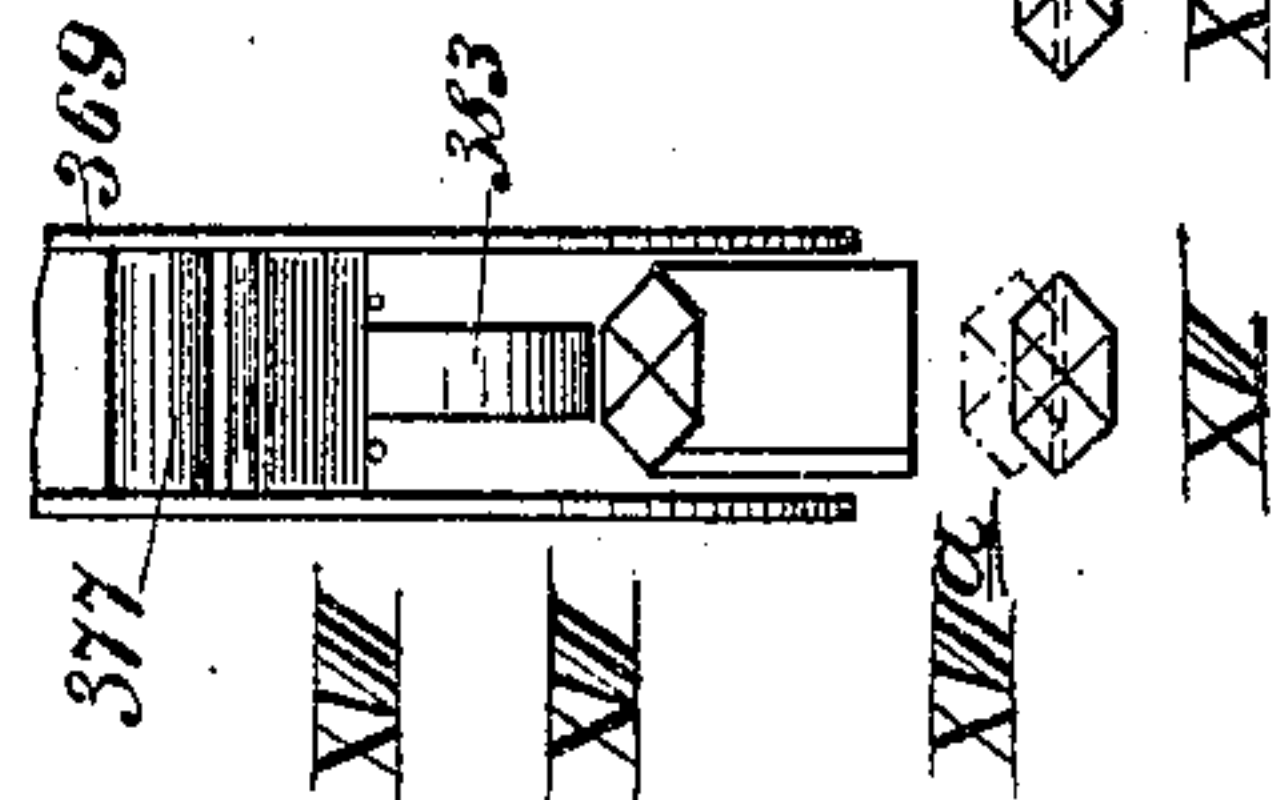


Fig. 12.



Witnesses.  
Albert Popkins  
C. H. Walker.

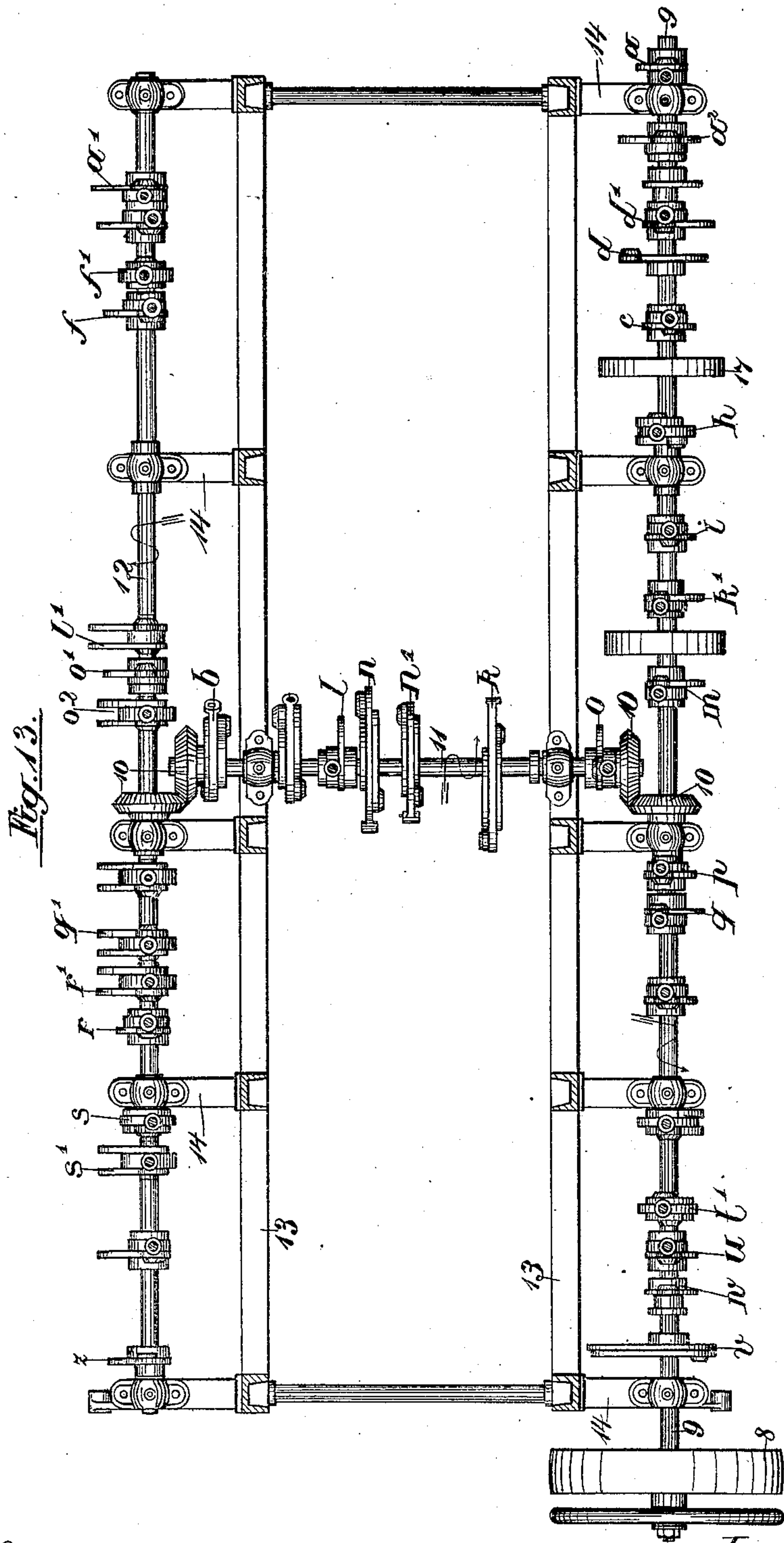
Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys.

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APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.

20 SHEETS—SHEET 3.



Witnesses.  
Albert Poppenz  
C. M. Walker,

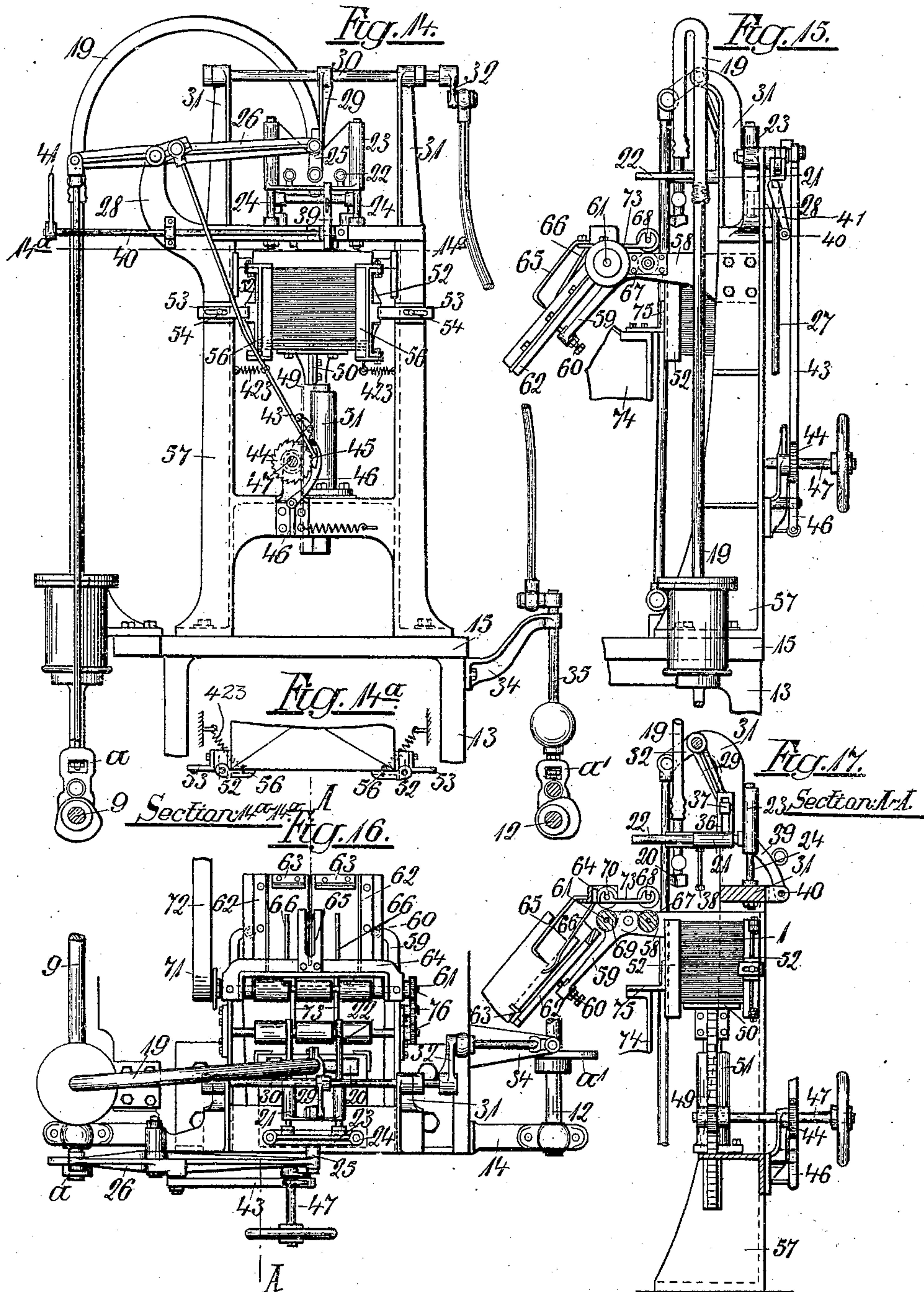
Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys



O. HESSER.  
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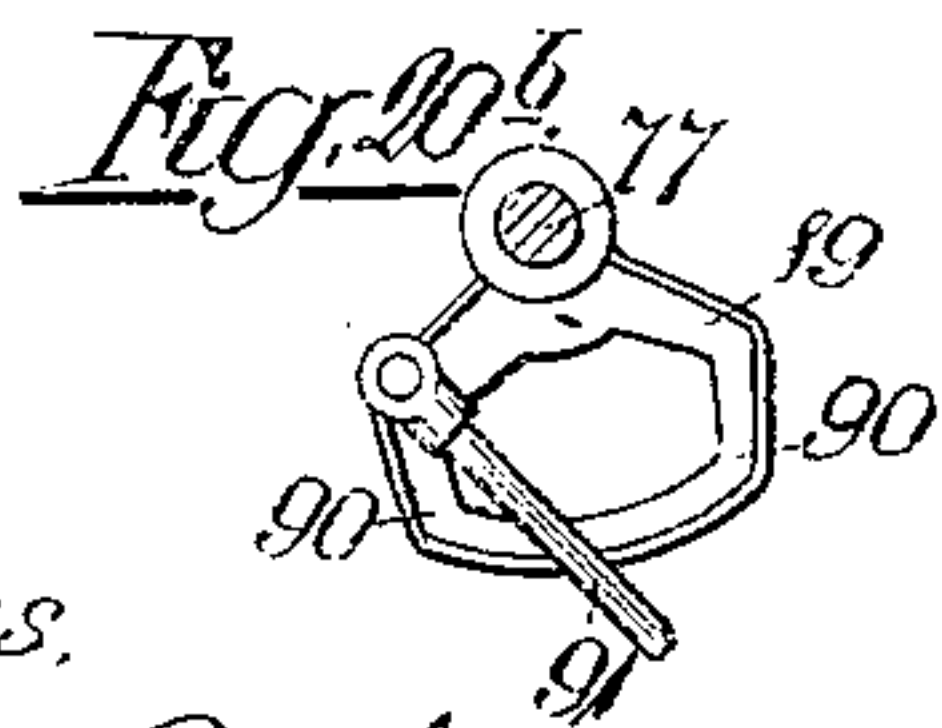
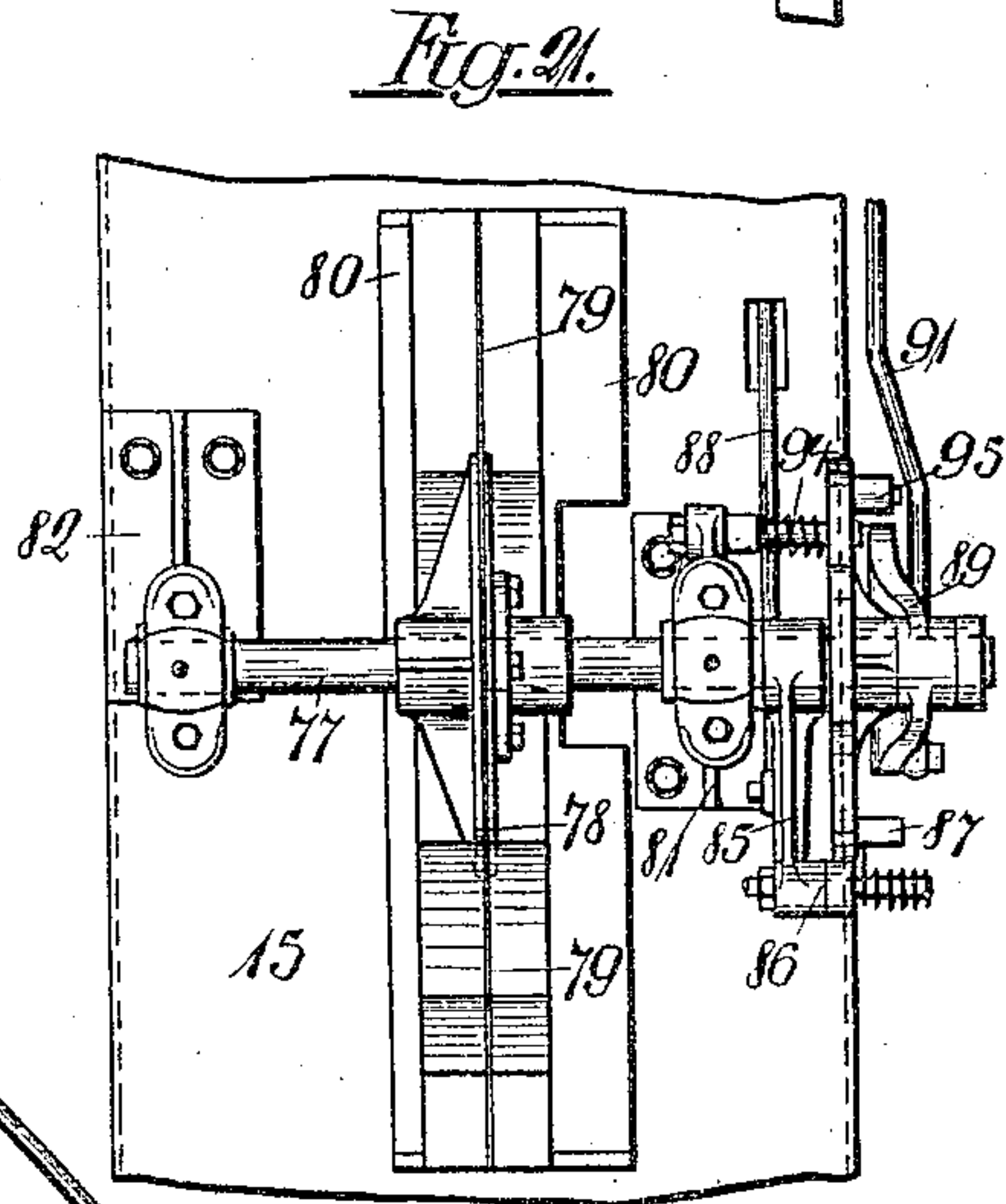
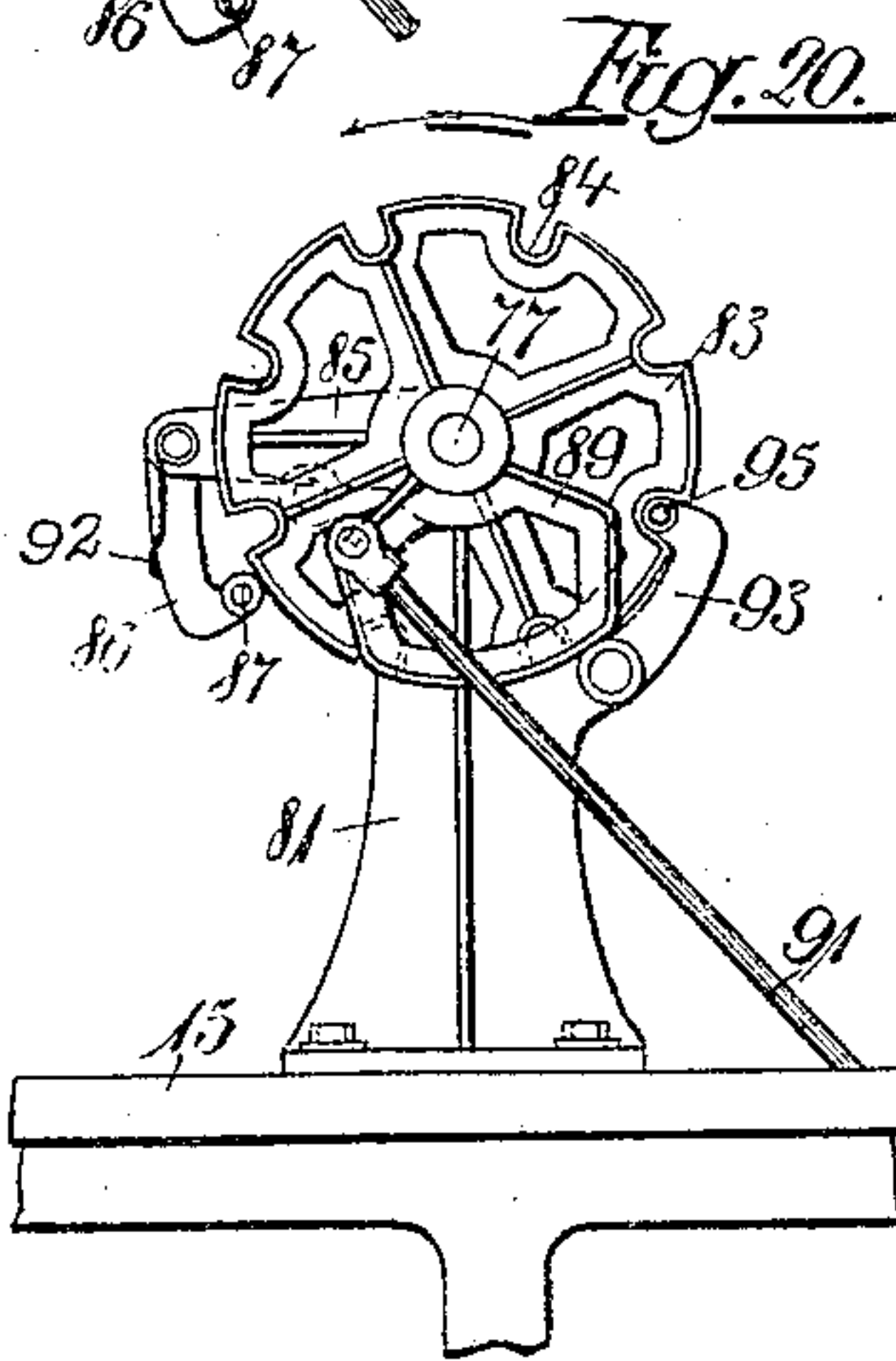
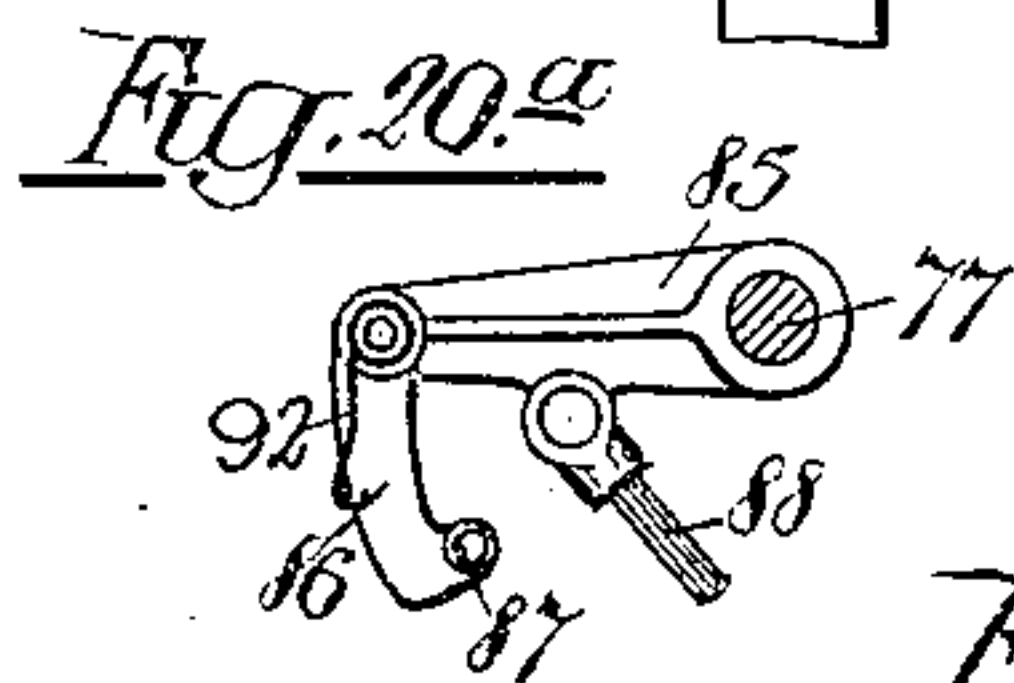
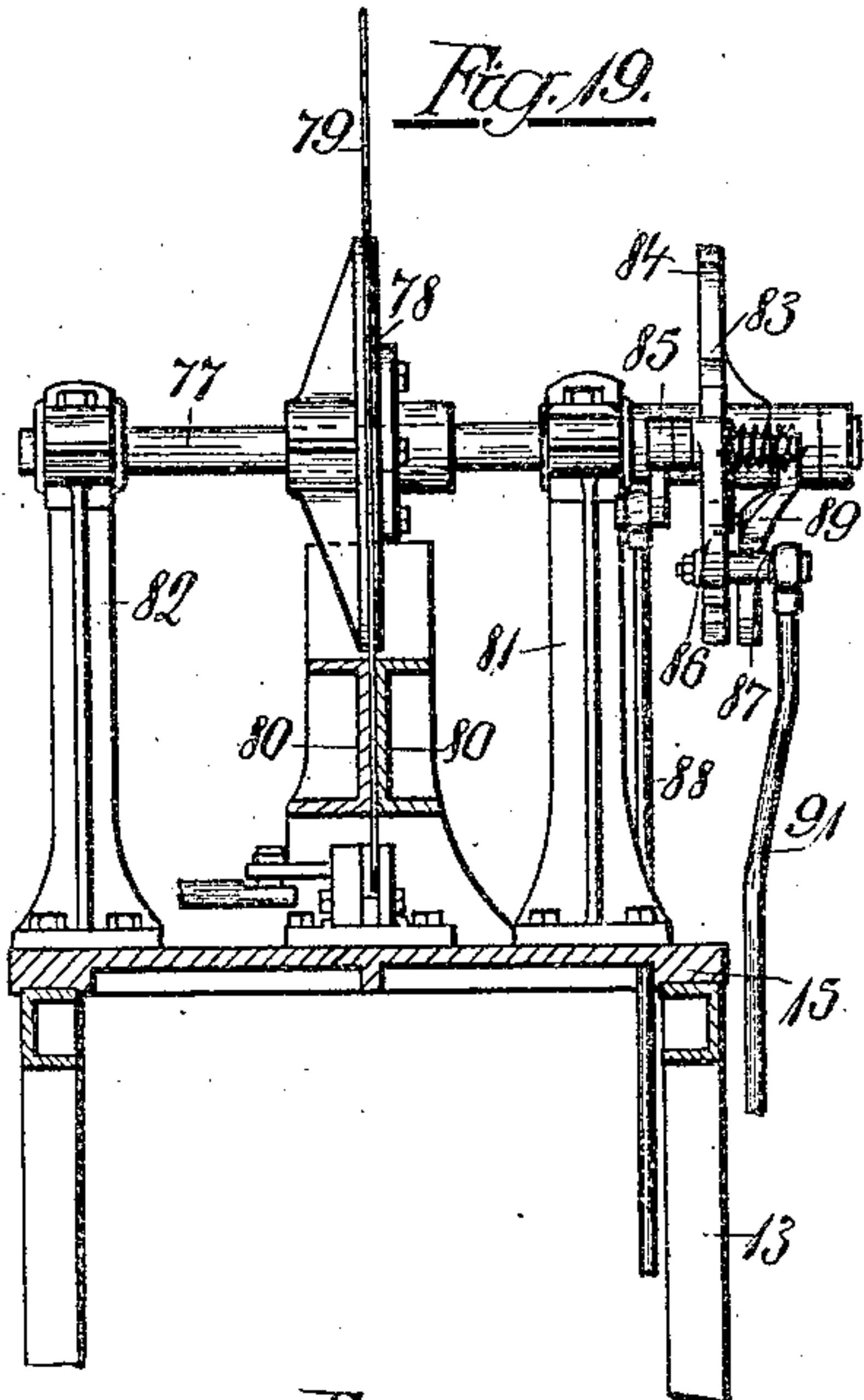
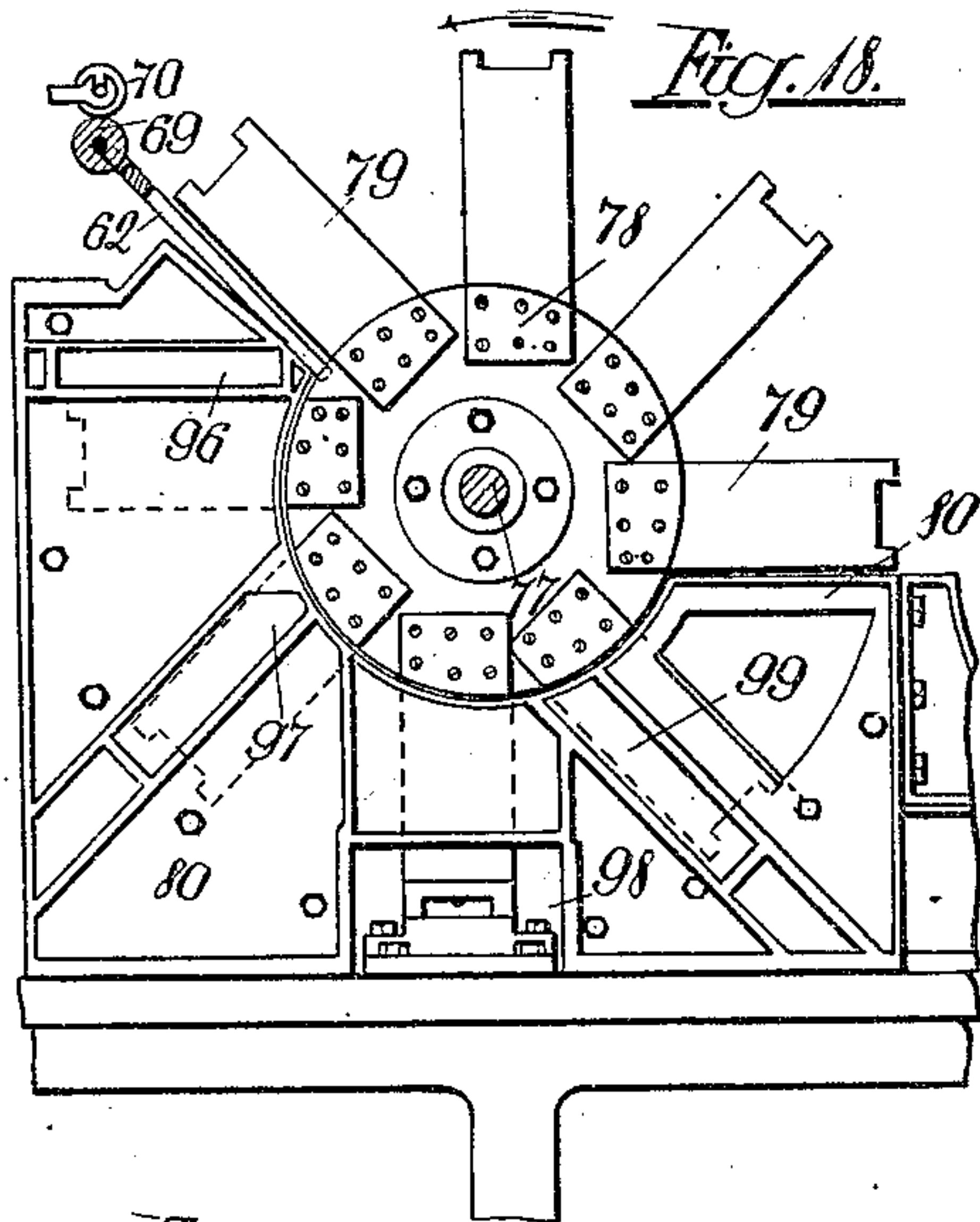
938,486.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 4.



Witnesses.  
Albert Topkins  
C. H. Walker.

Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys



Witnesses,  
Albert Popkins  
C. H. Walker.

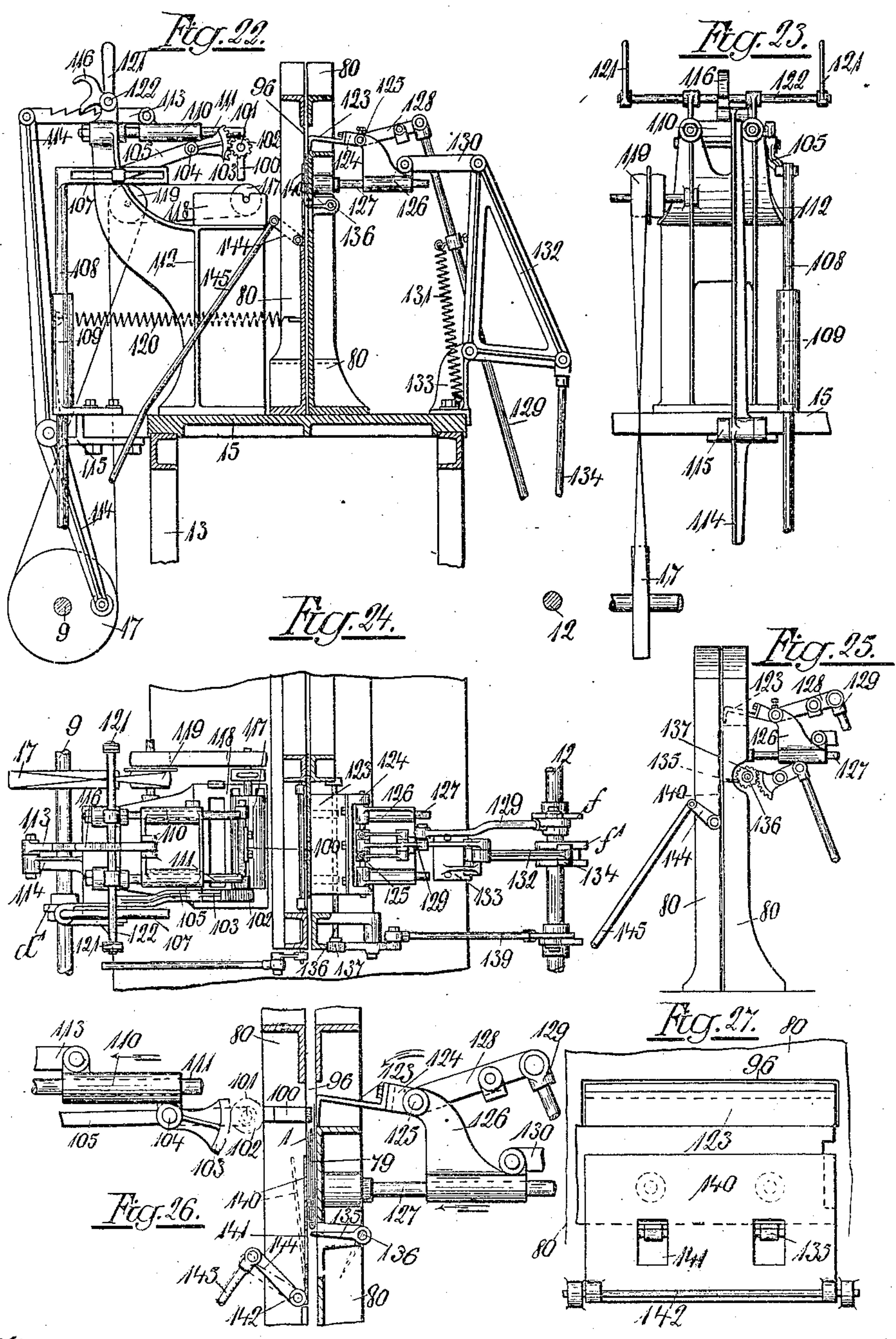
Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys.



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APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
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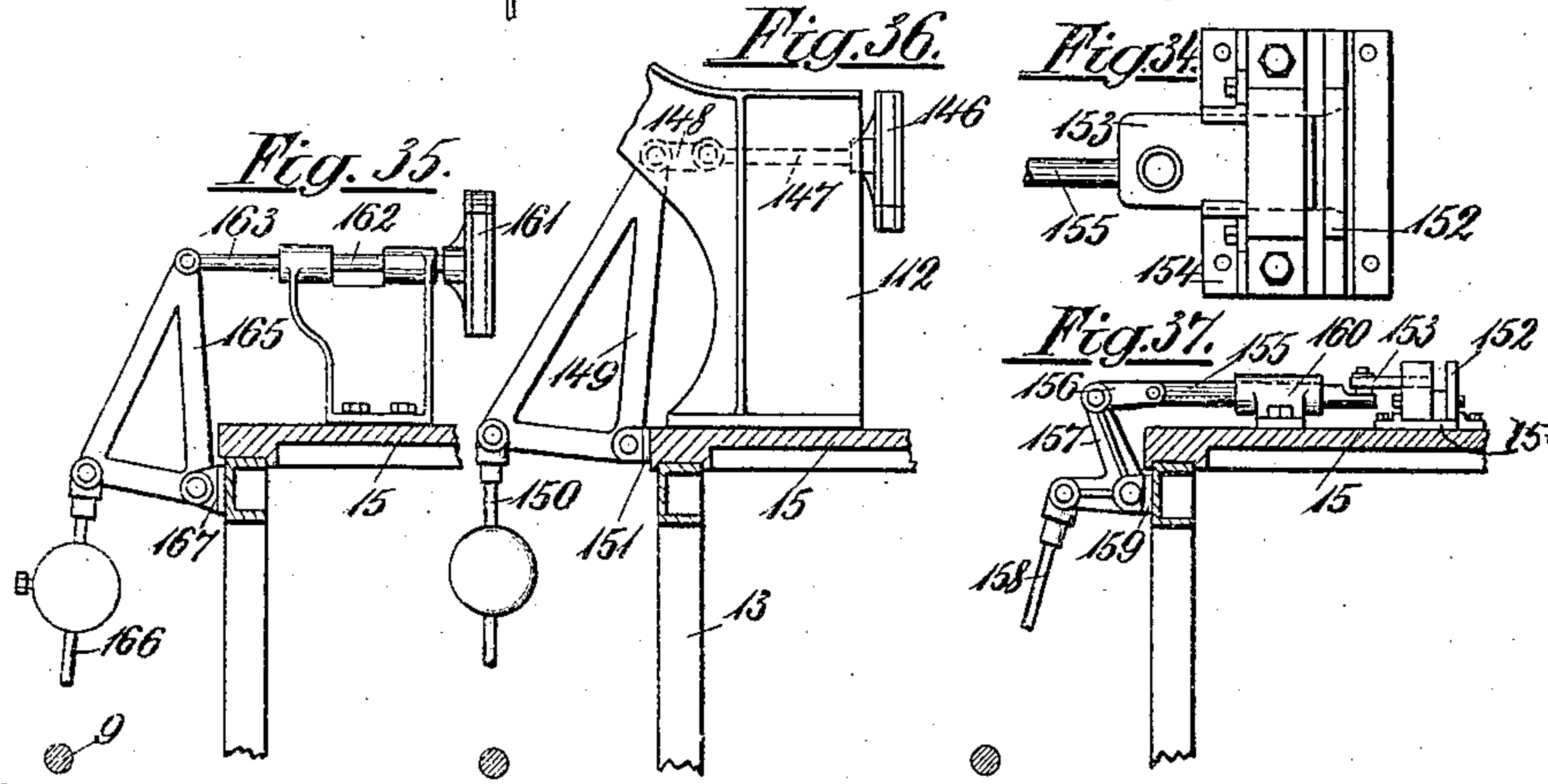
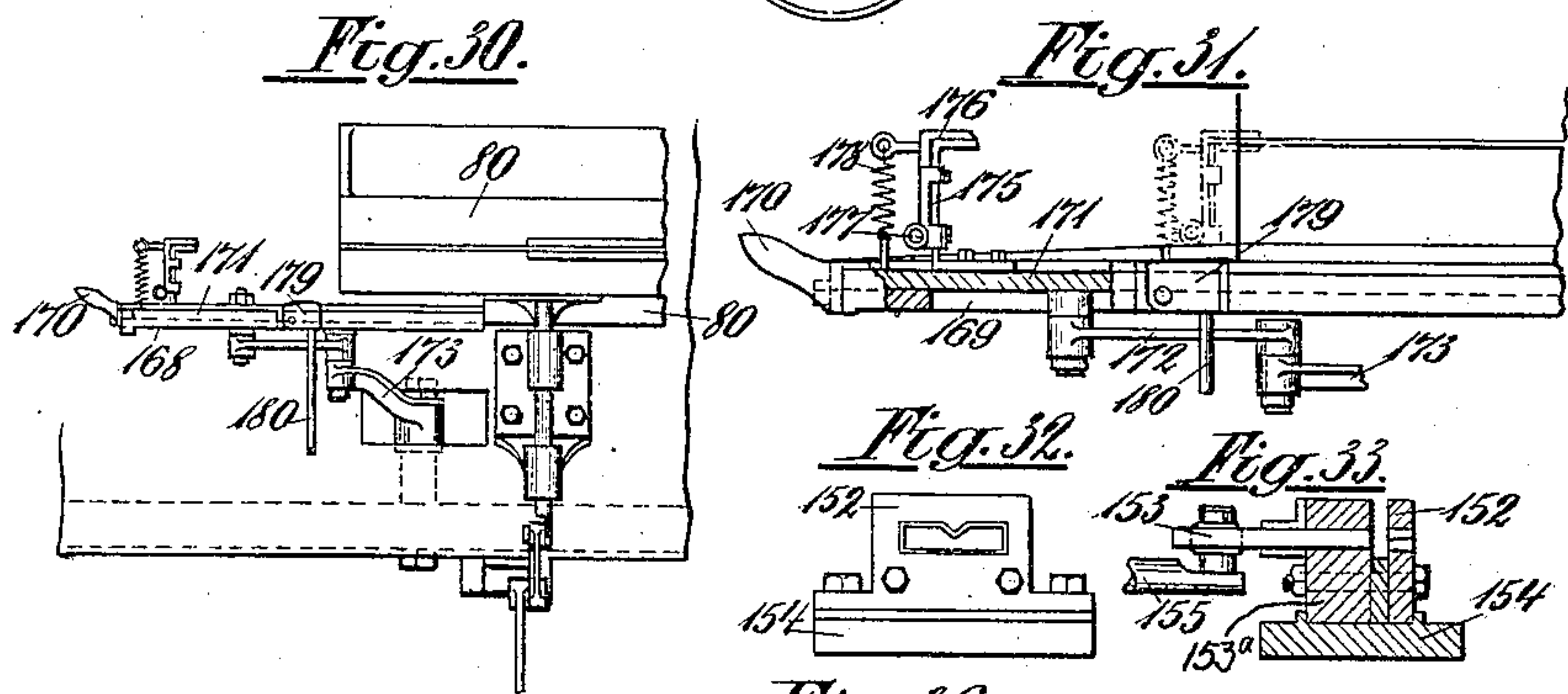
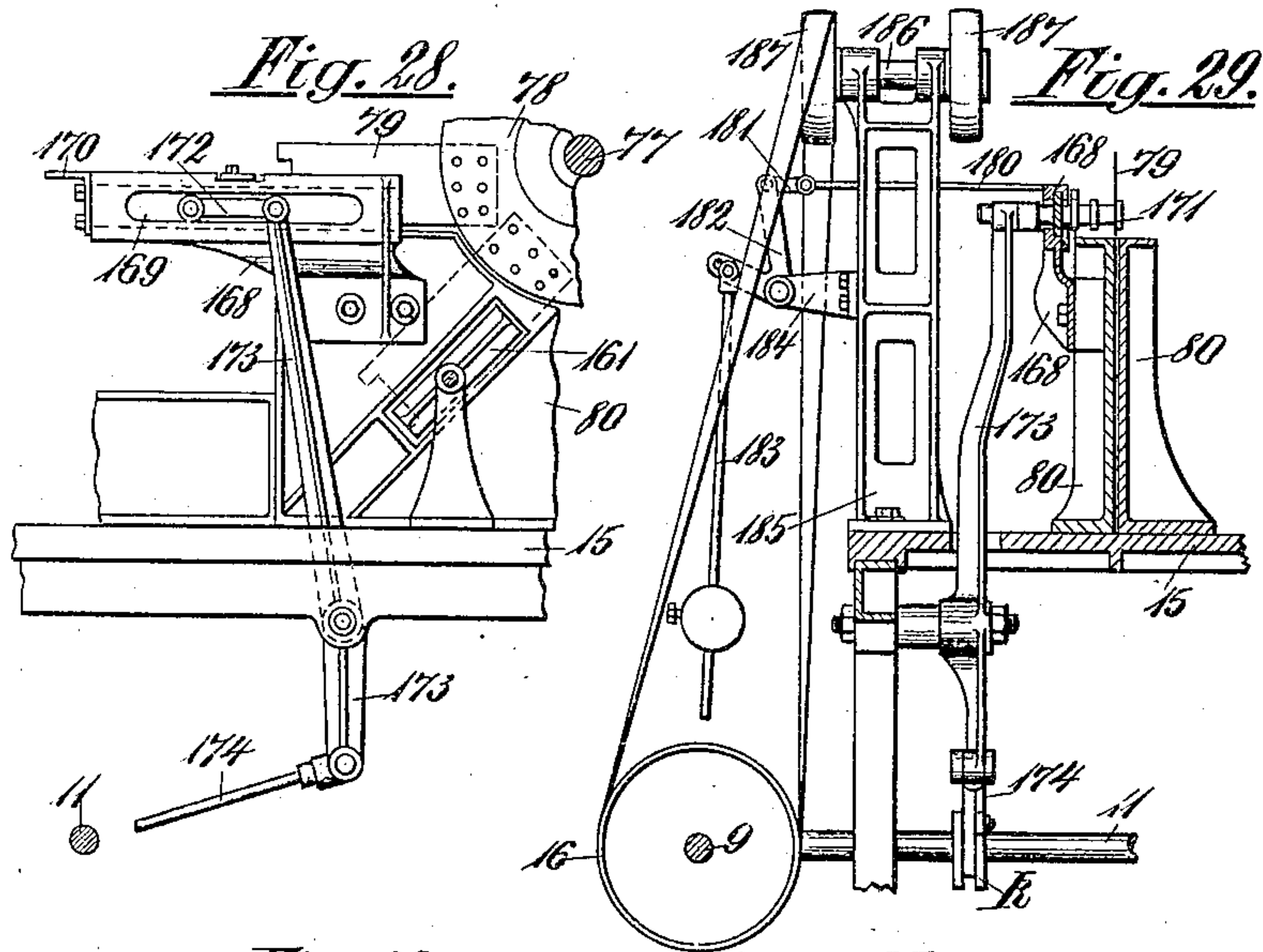
Witnesses.  
Albert Popkins  
C. M. Walker.

Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys

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PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

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Patented Nov. 2, 1909.  
20 SHEETS—SHEET 7.



Witnesses  
Albert Popkins  
C. H. Wheeler.

Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys.



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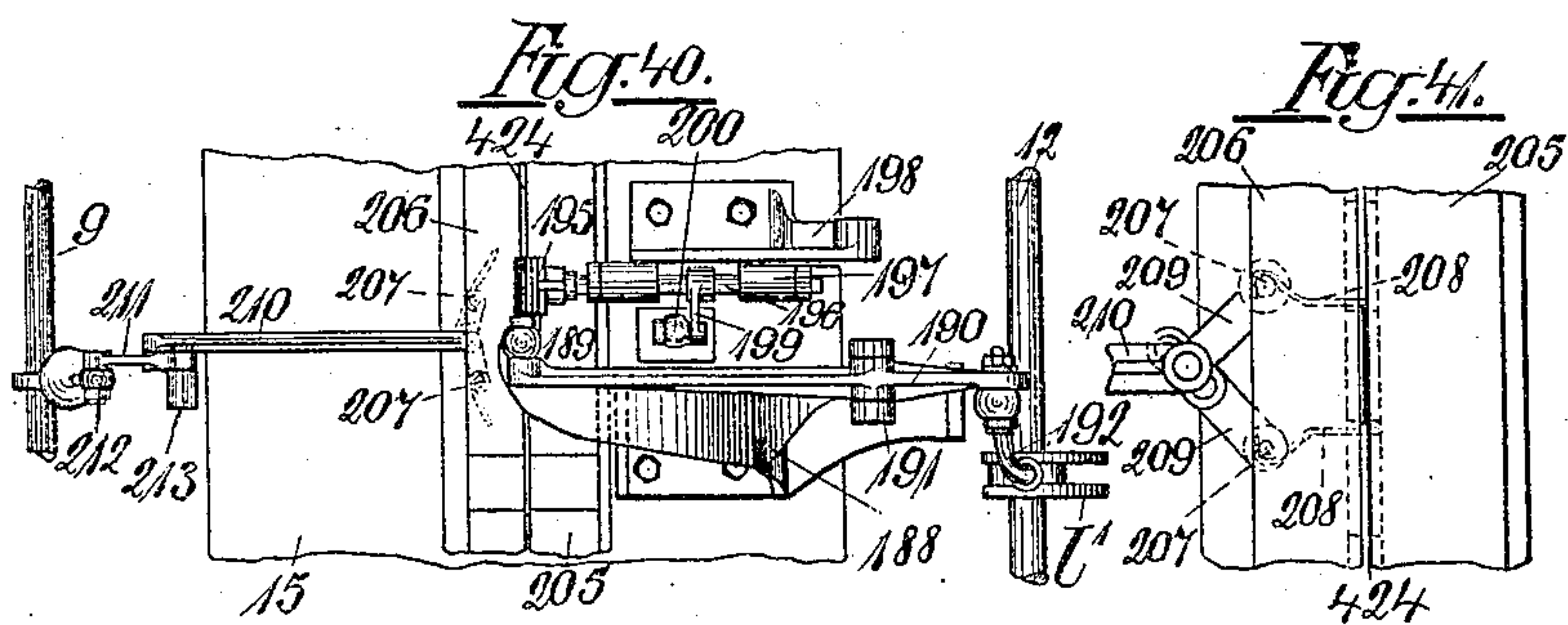
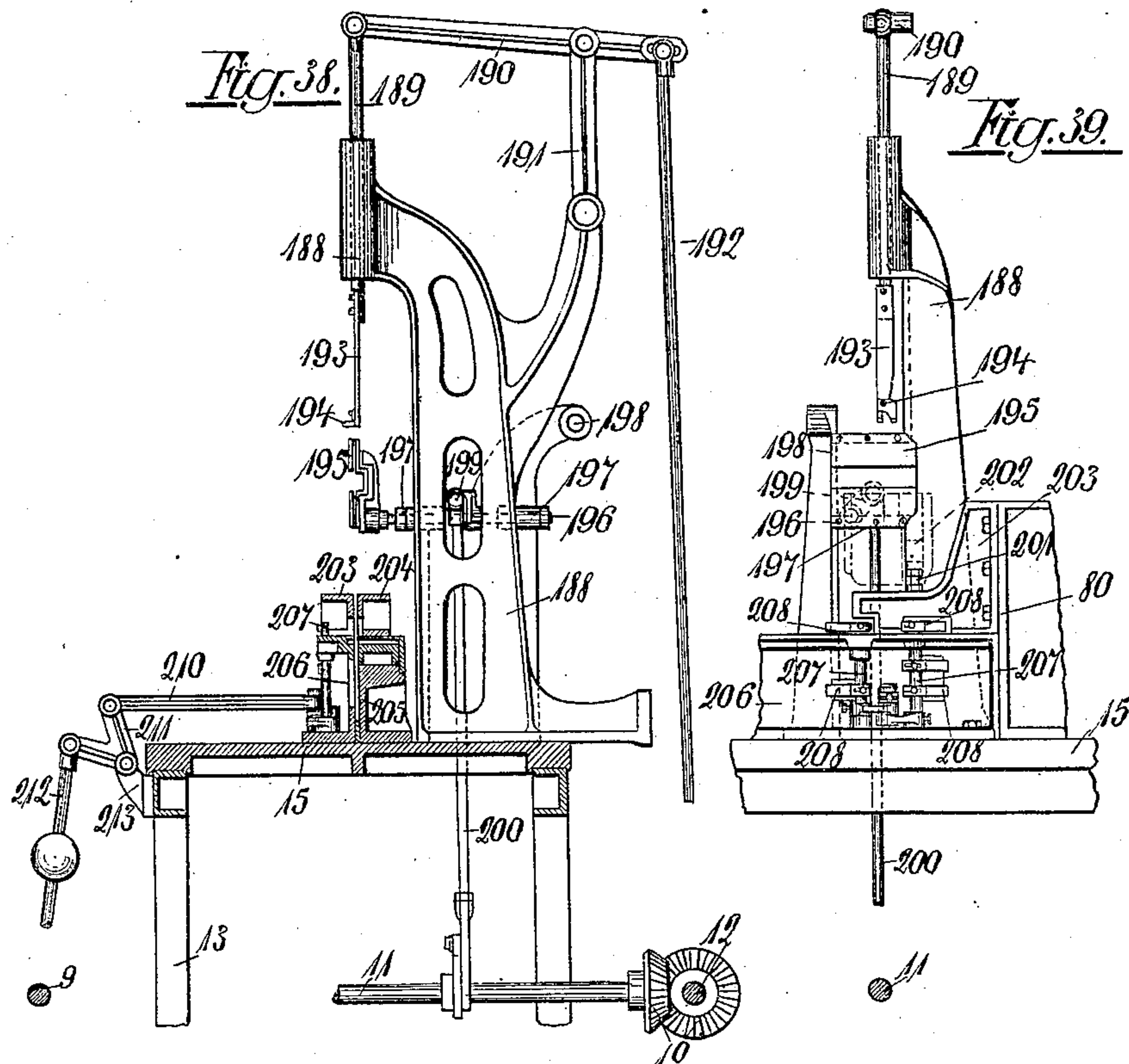
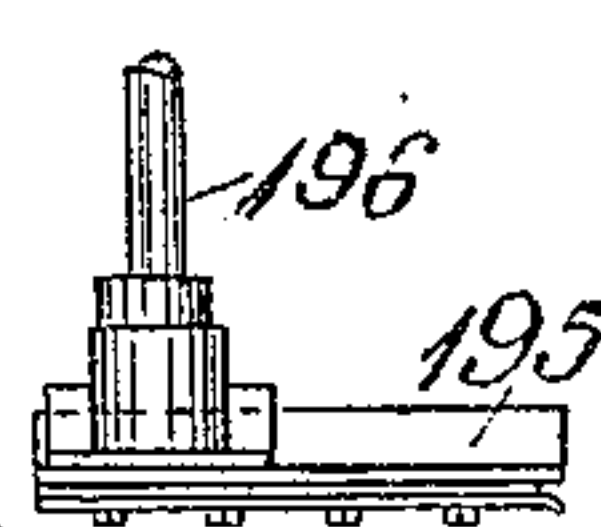
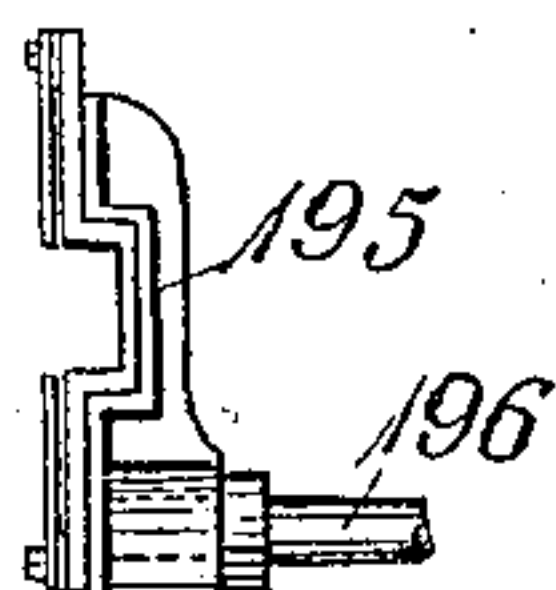
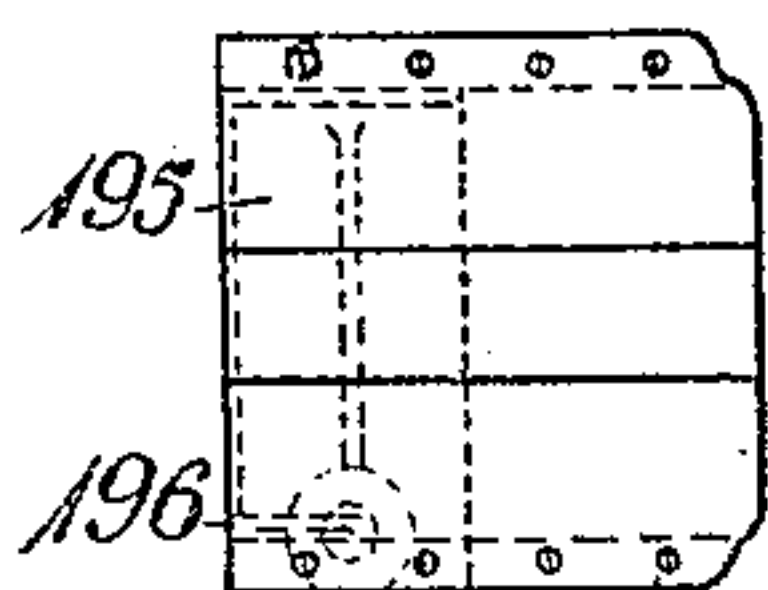


Fig. 42.

Fig. 43.

Fig. 44.



Witnesses

Albert Poplund  
C. M. Walker

Inventor

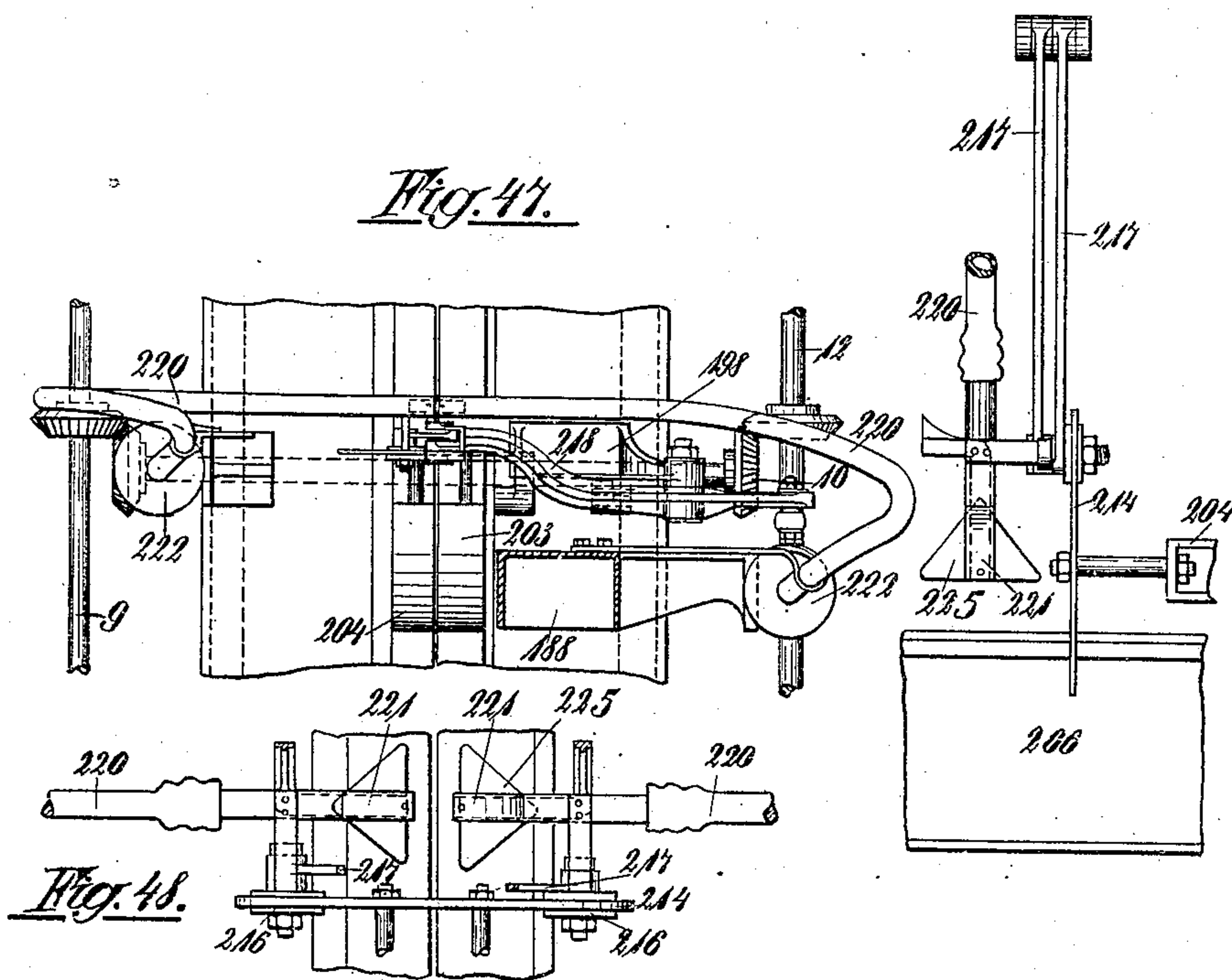
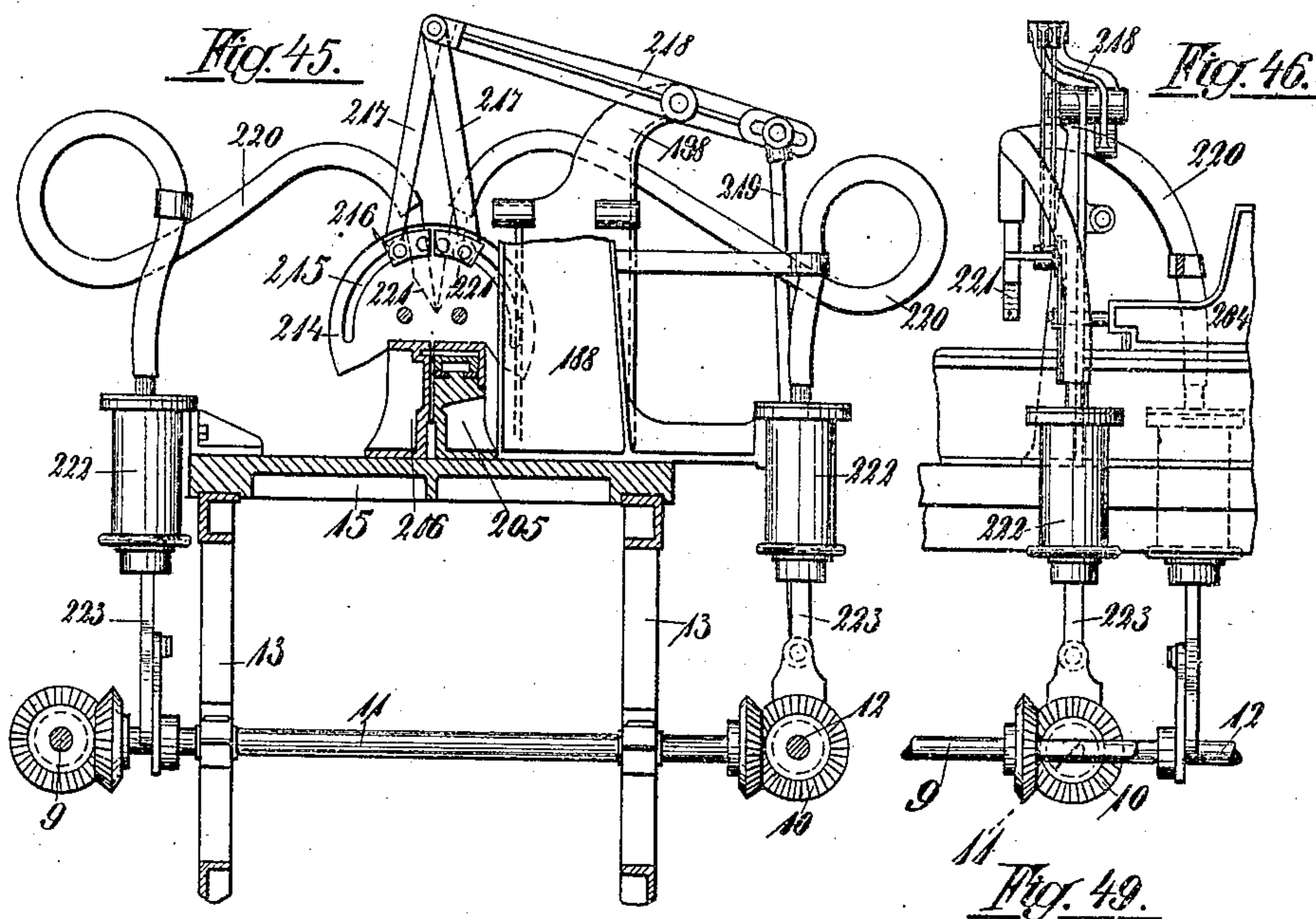
Otto Hesser  
By Sturtevant & Greeley  
Attorneys.



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APPLICATION FILED MAY 9, 1903.

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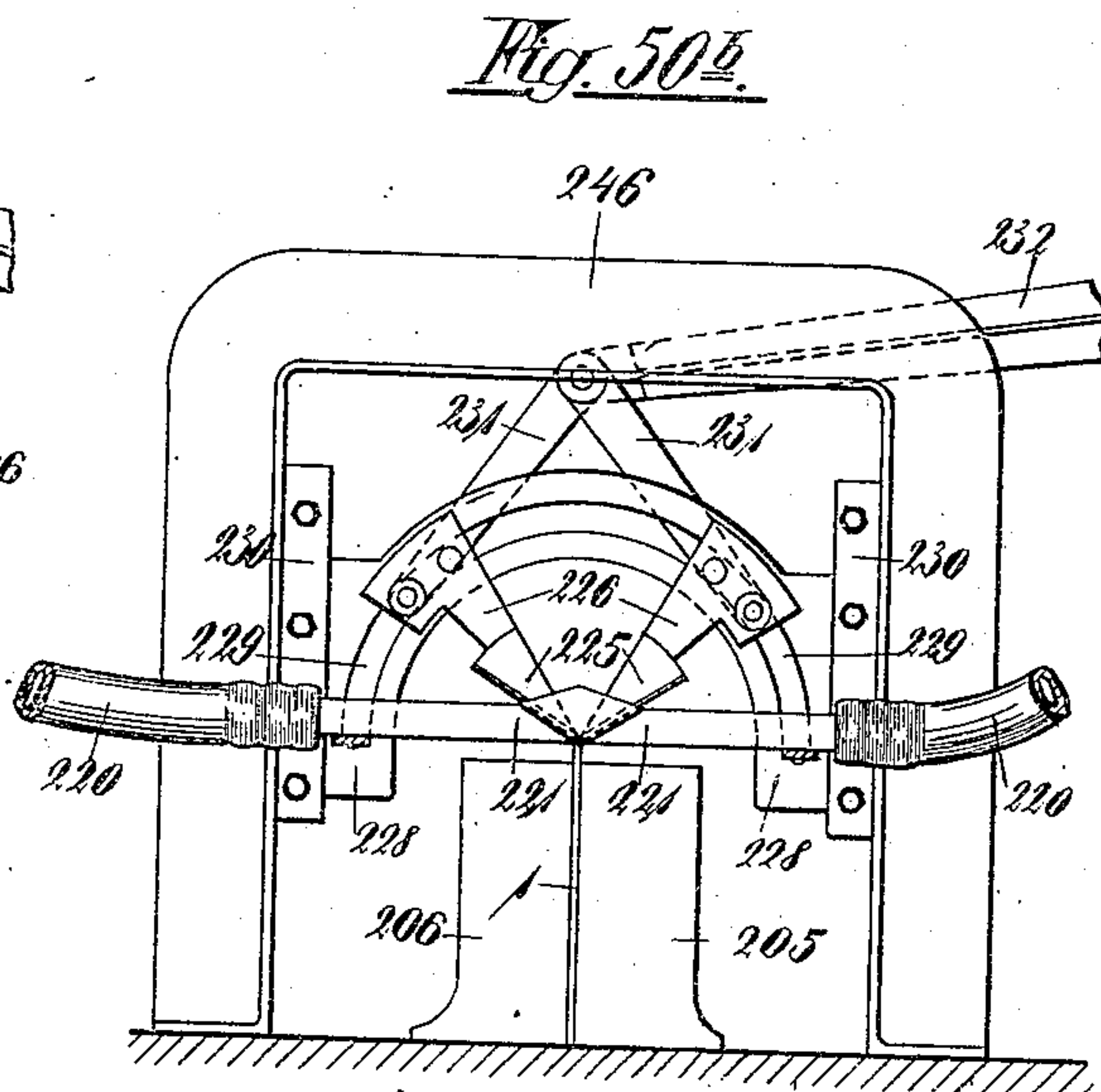
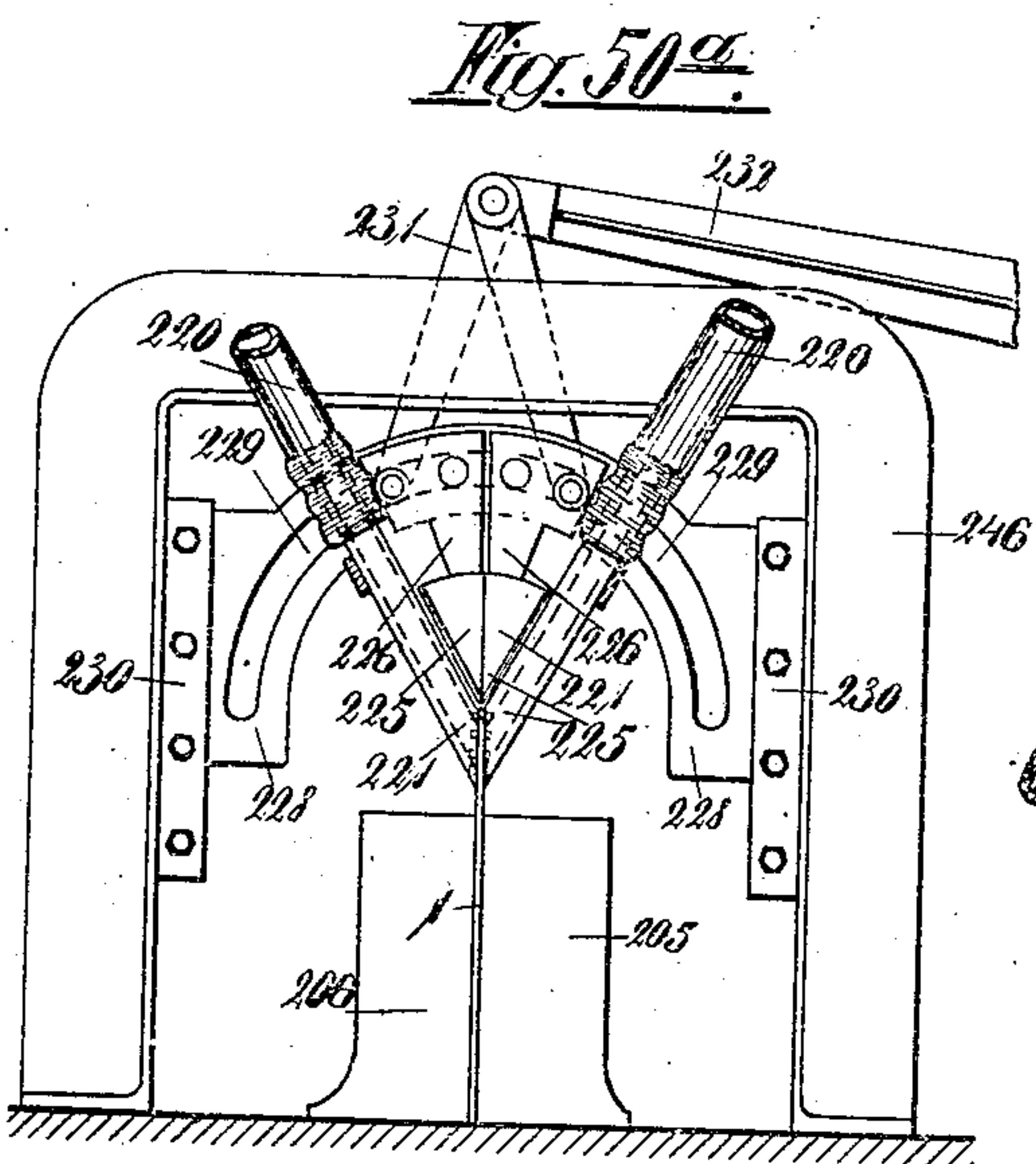
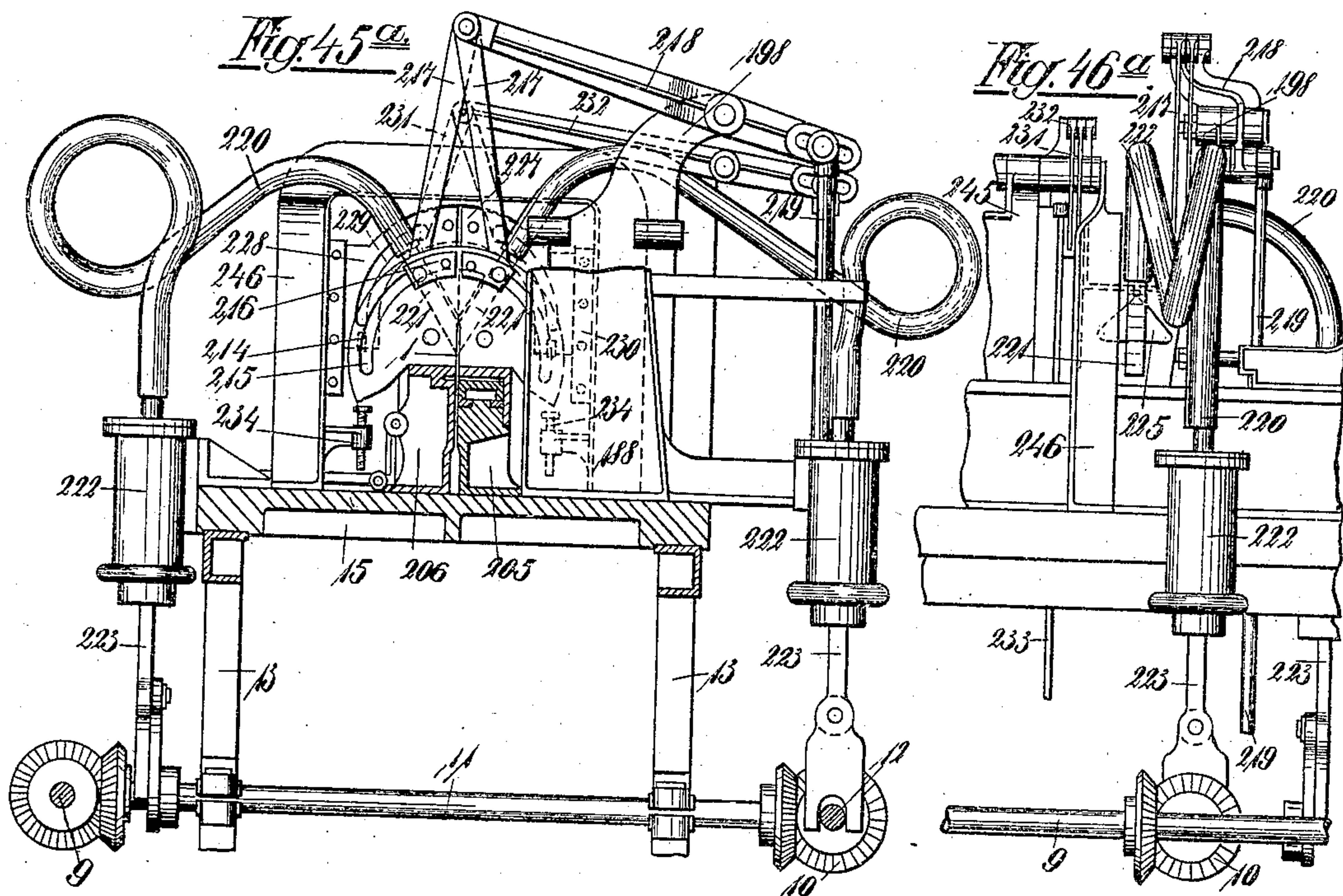
Witnesses  
Albert Popkin  
C. H. Walker.

Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys.

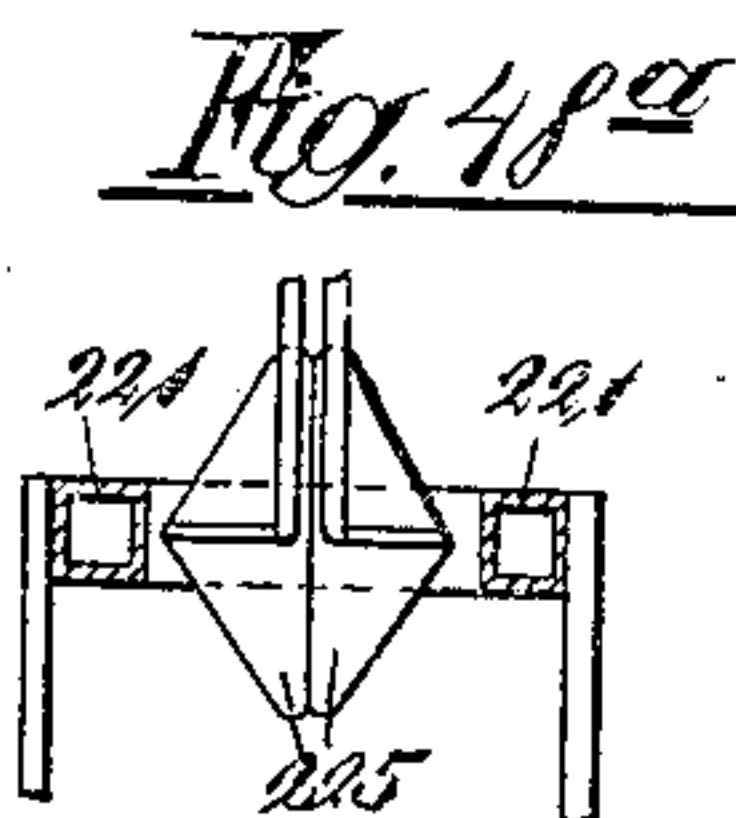
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20 SHEETS—SHEET 10.



Witnesses.  
Albert Popkewitz  
C. W. Walker.



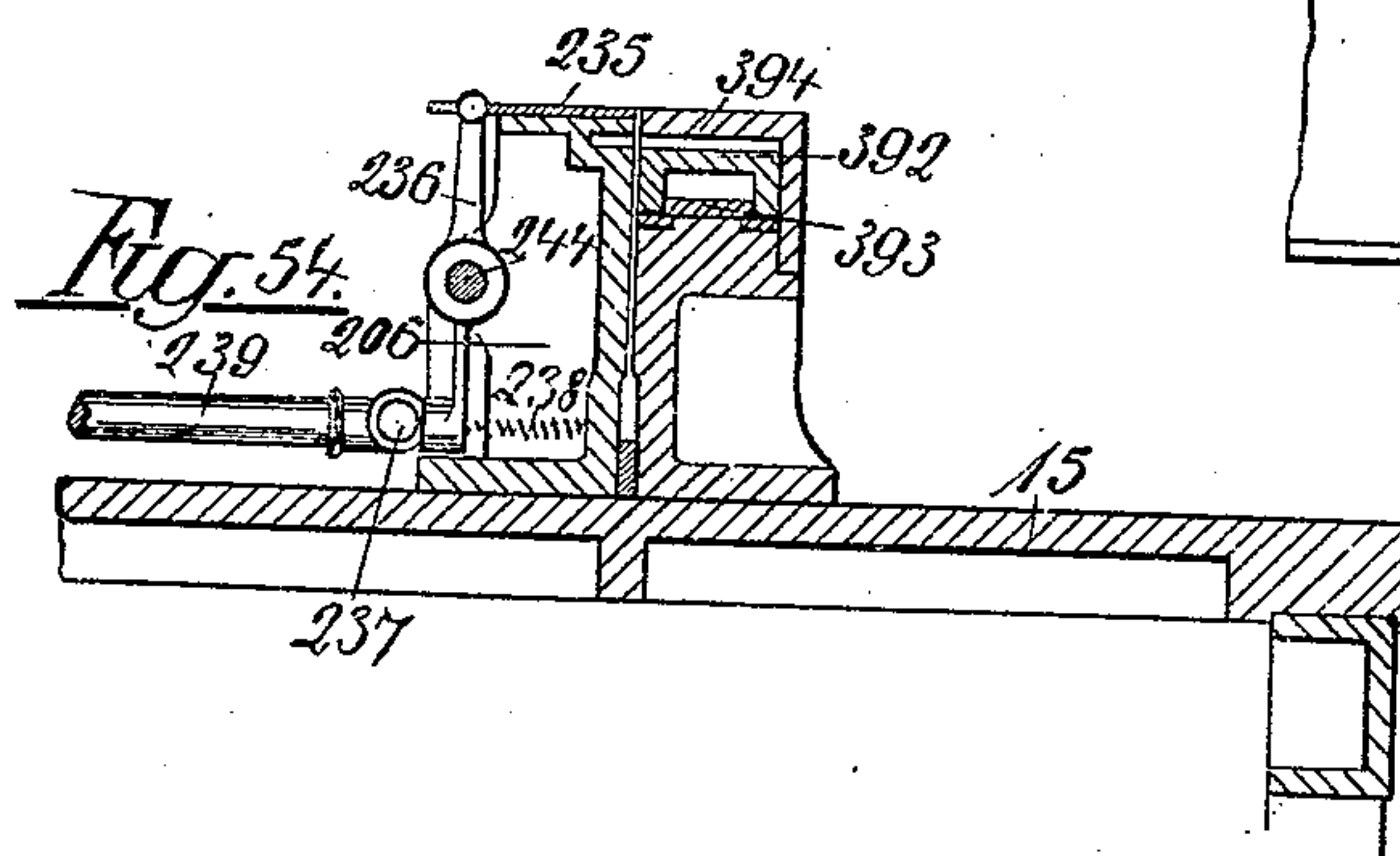
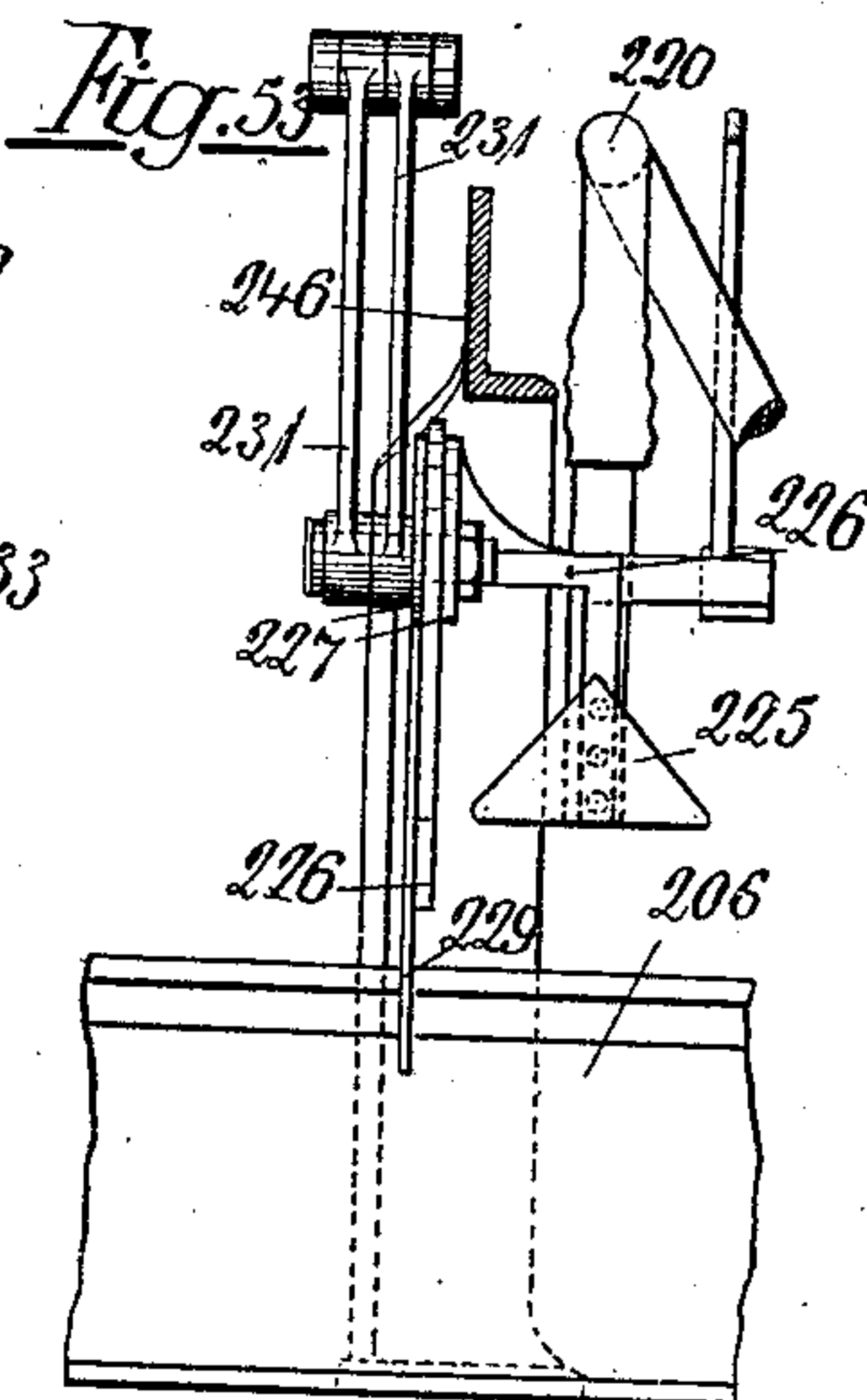
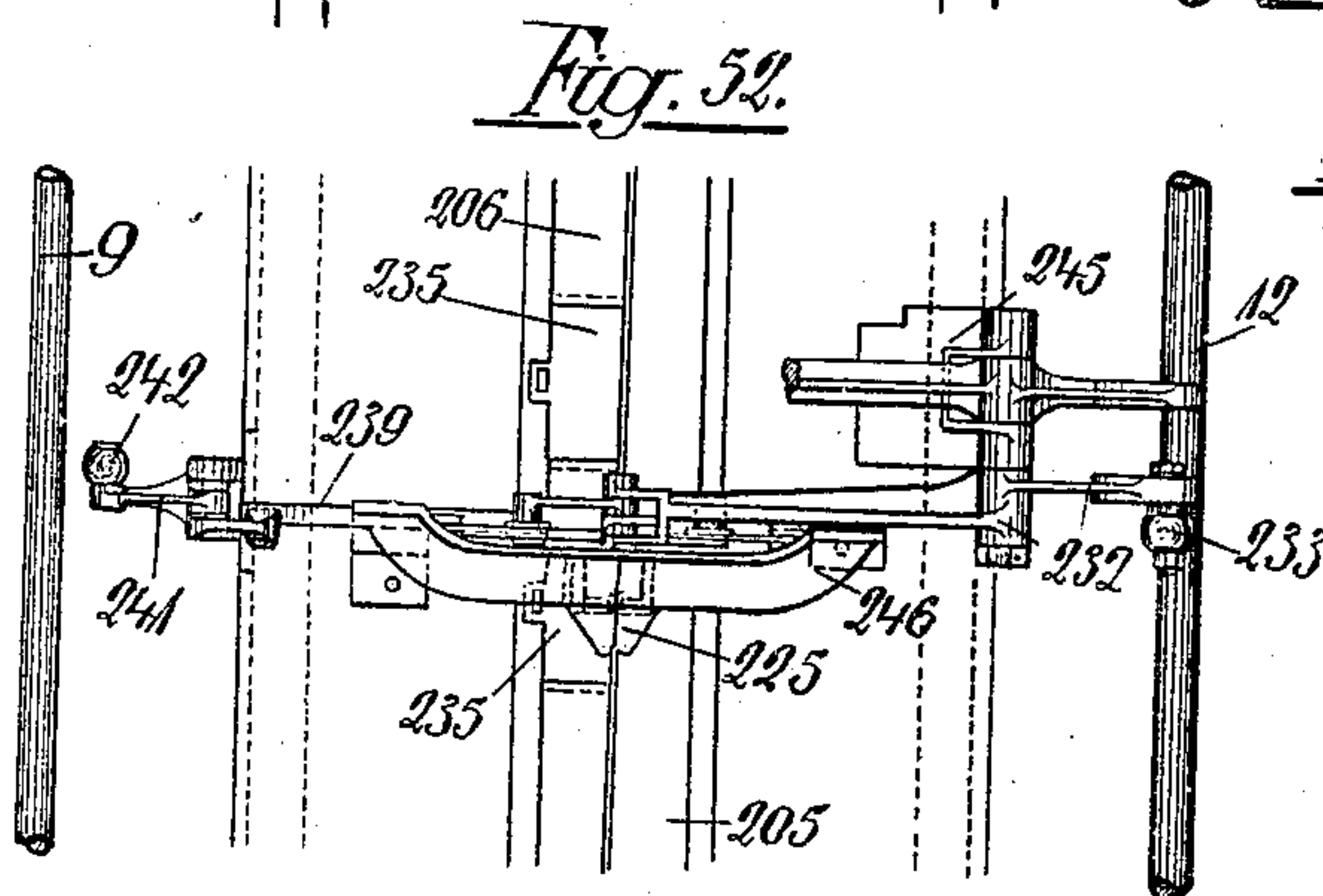
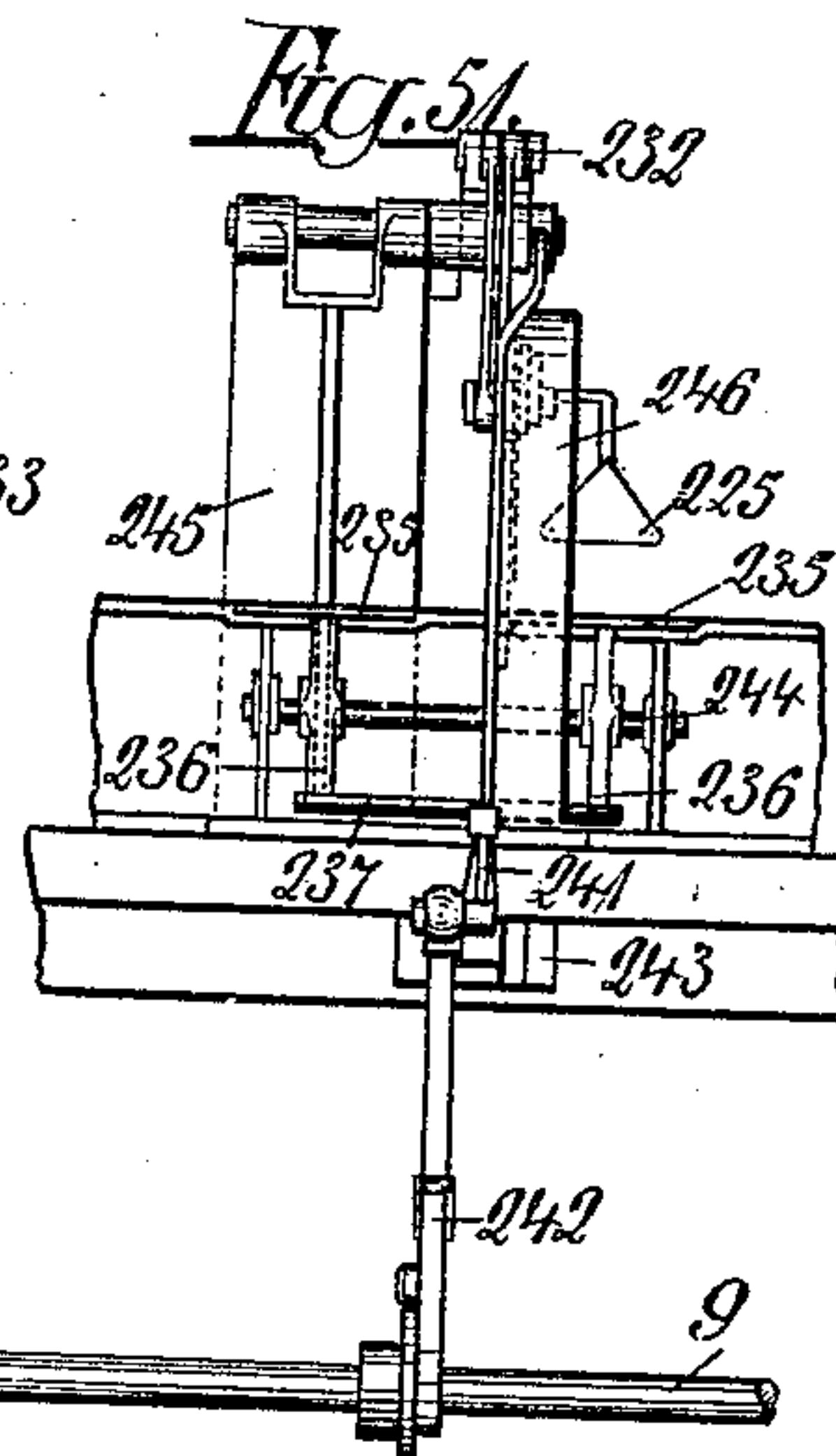
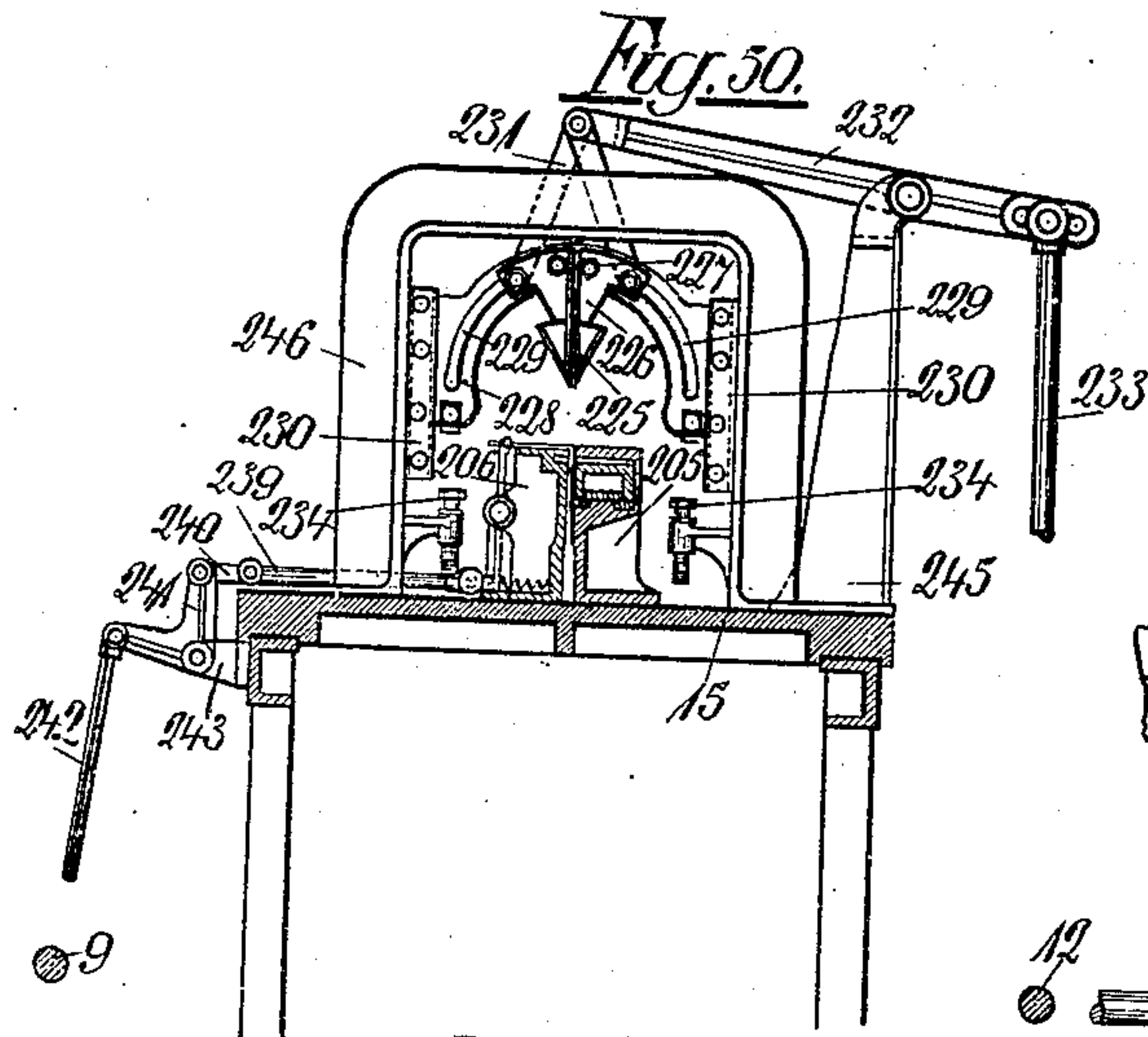
Inventor  
Otto Hesser  
By *Sturtevant & Greeley*  
Attorneys



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PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

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20 SHEETS—SHEET 11.



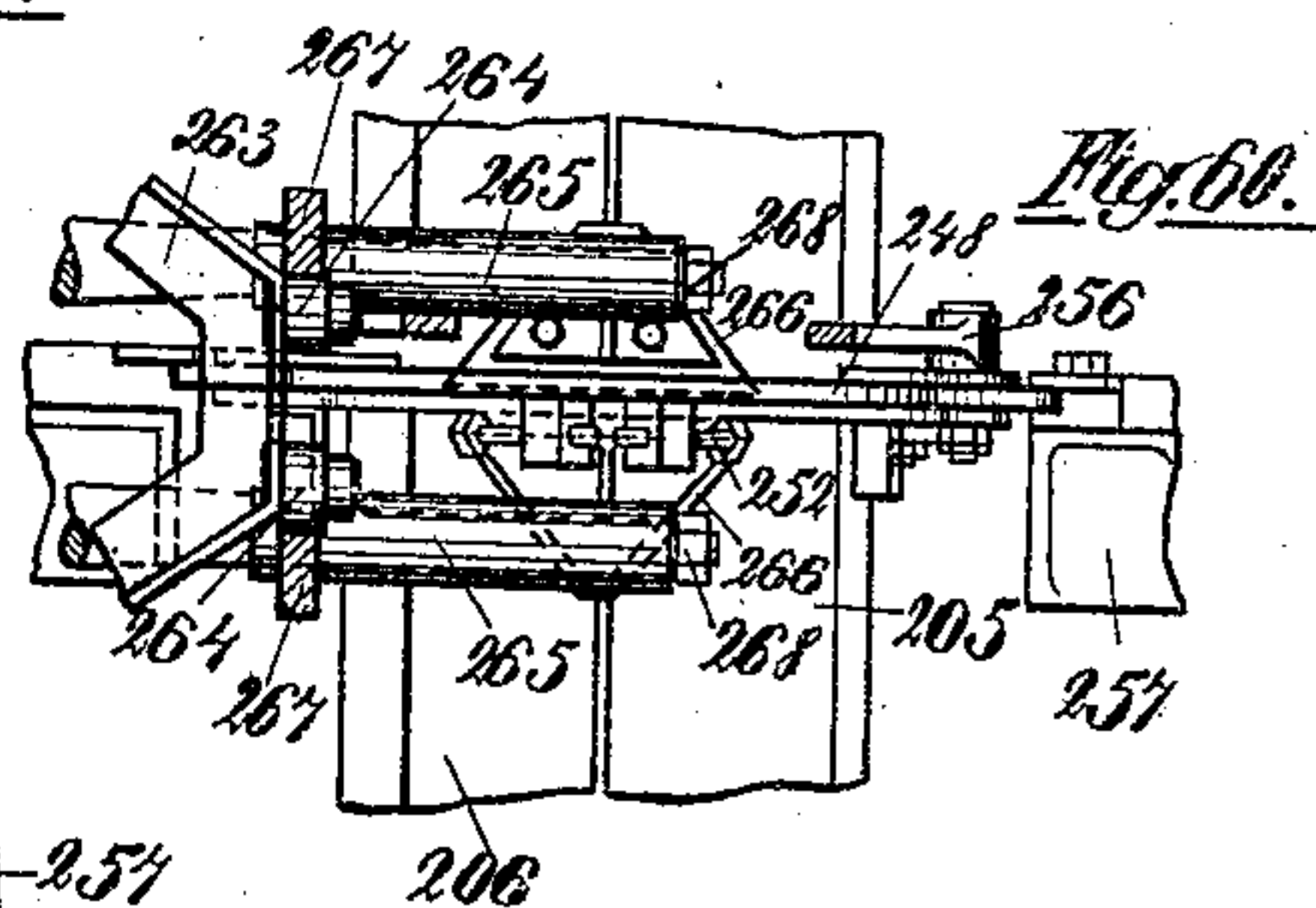
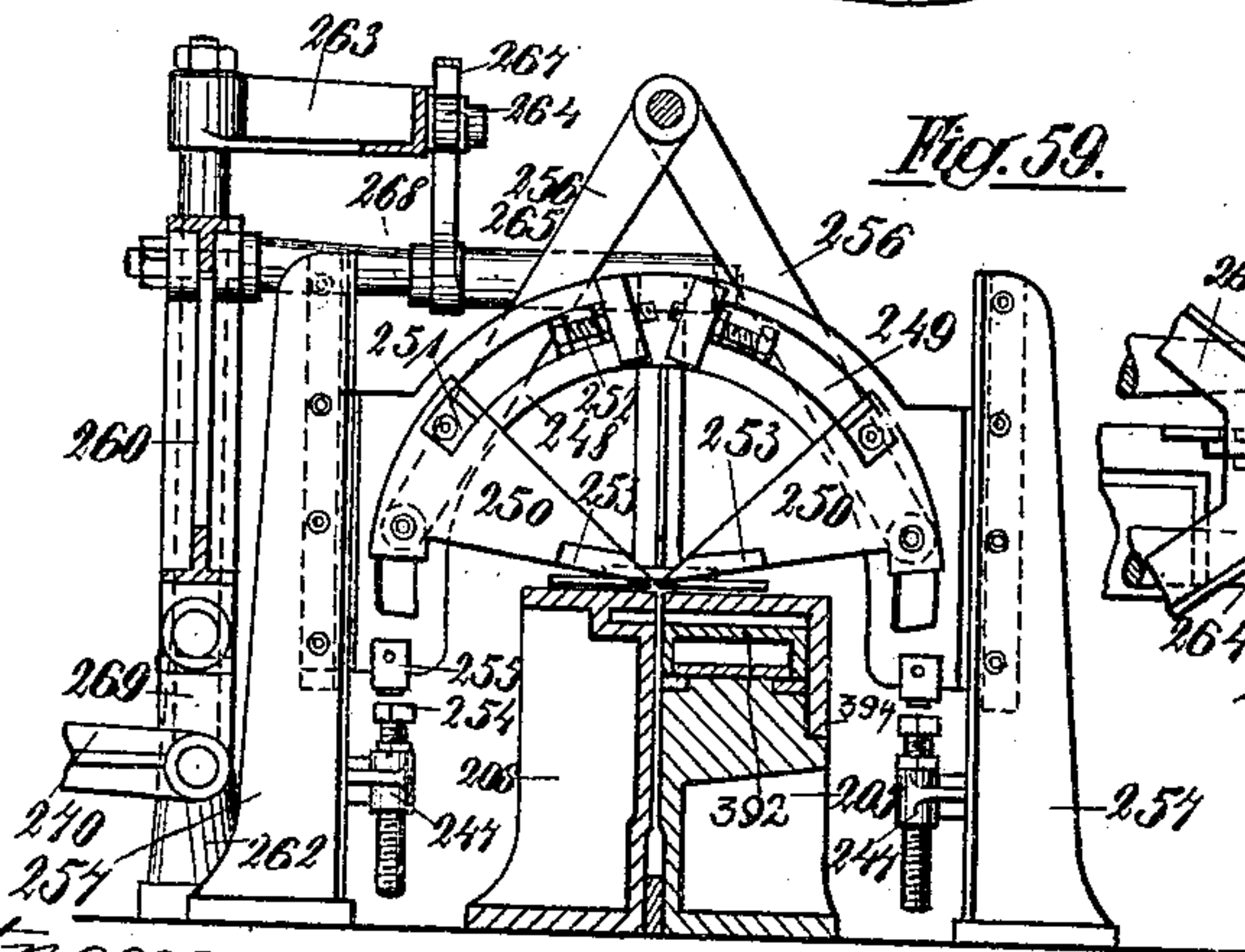
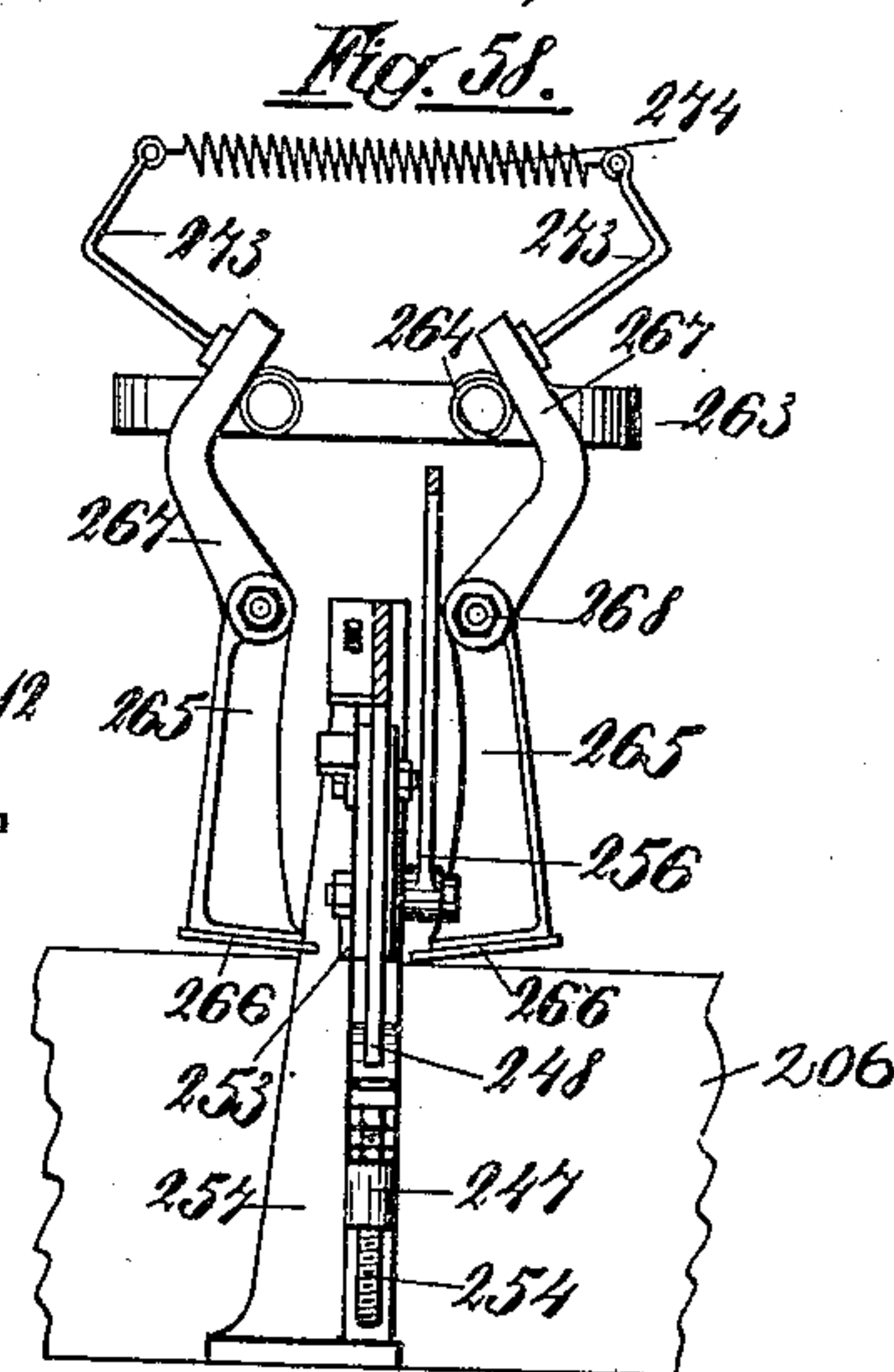
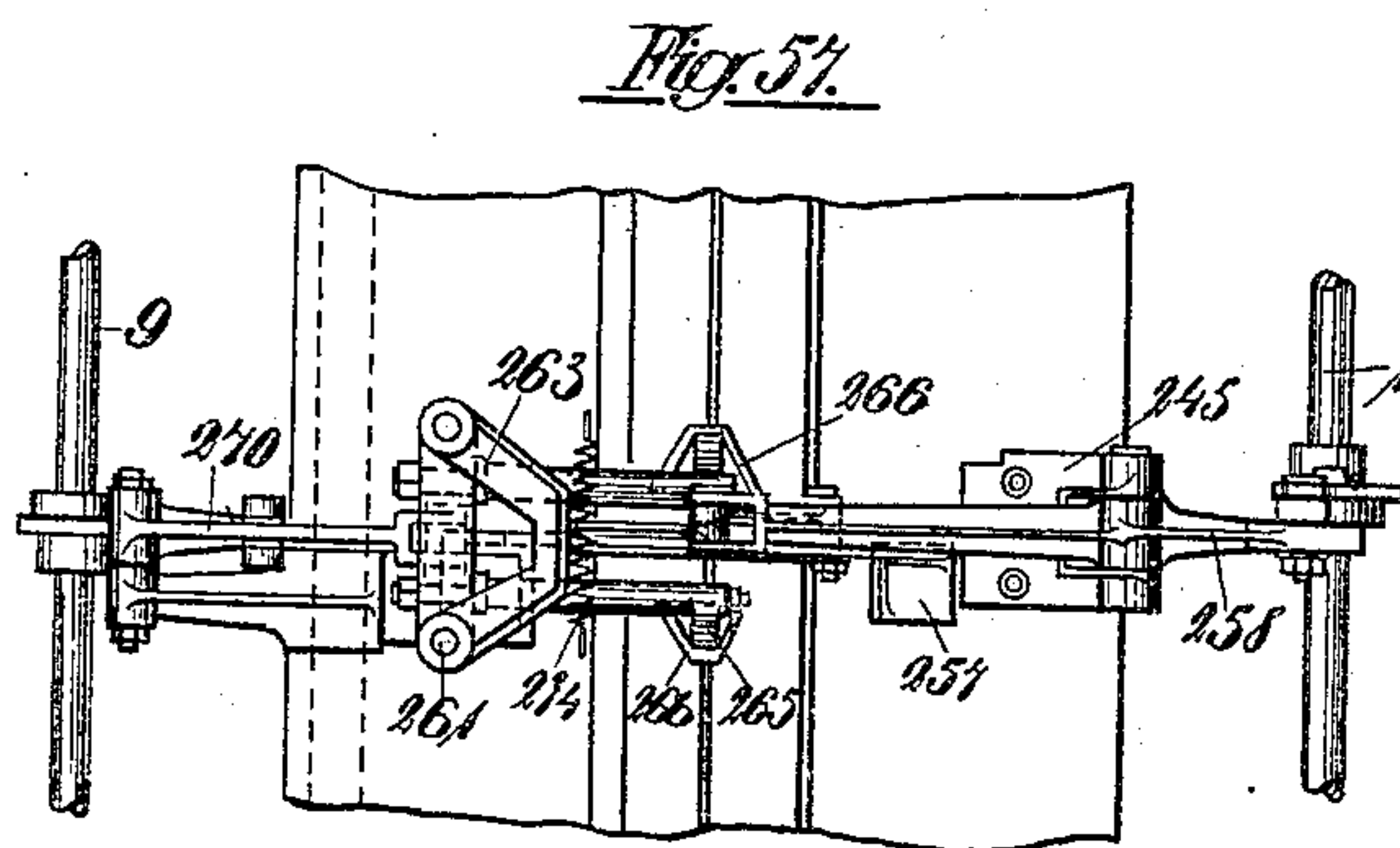
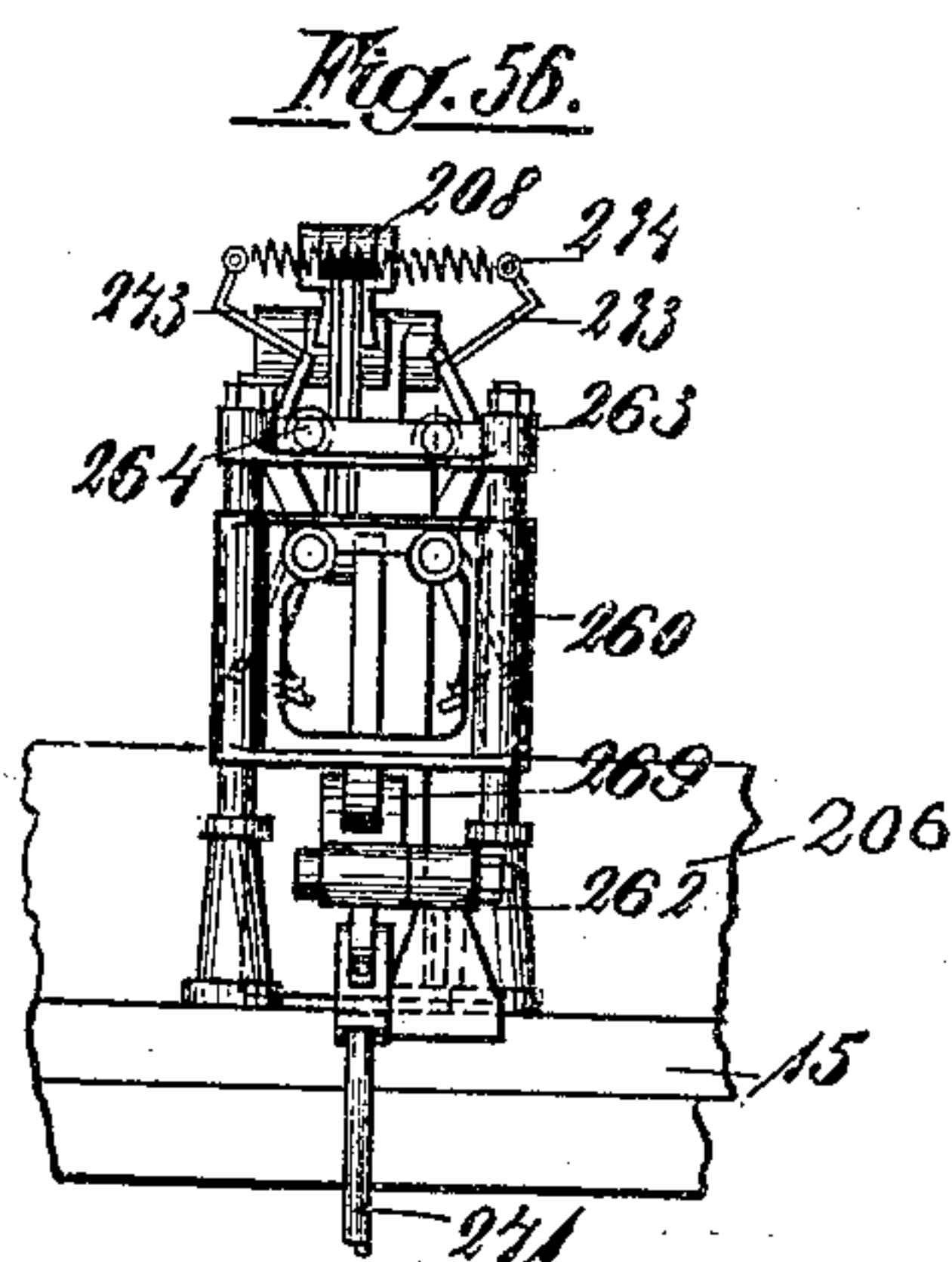
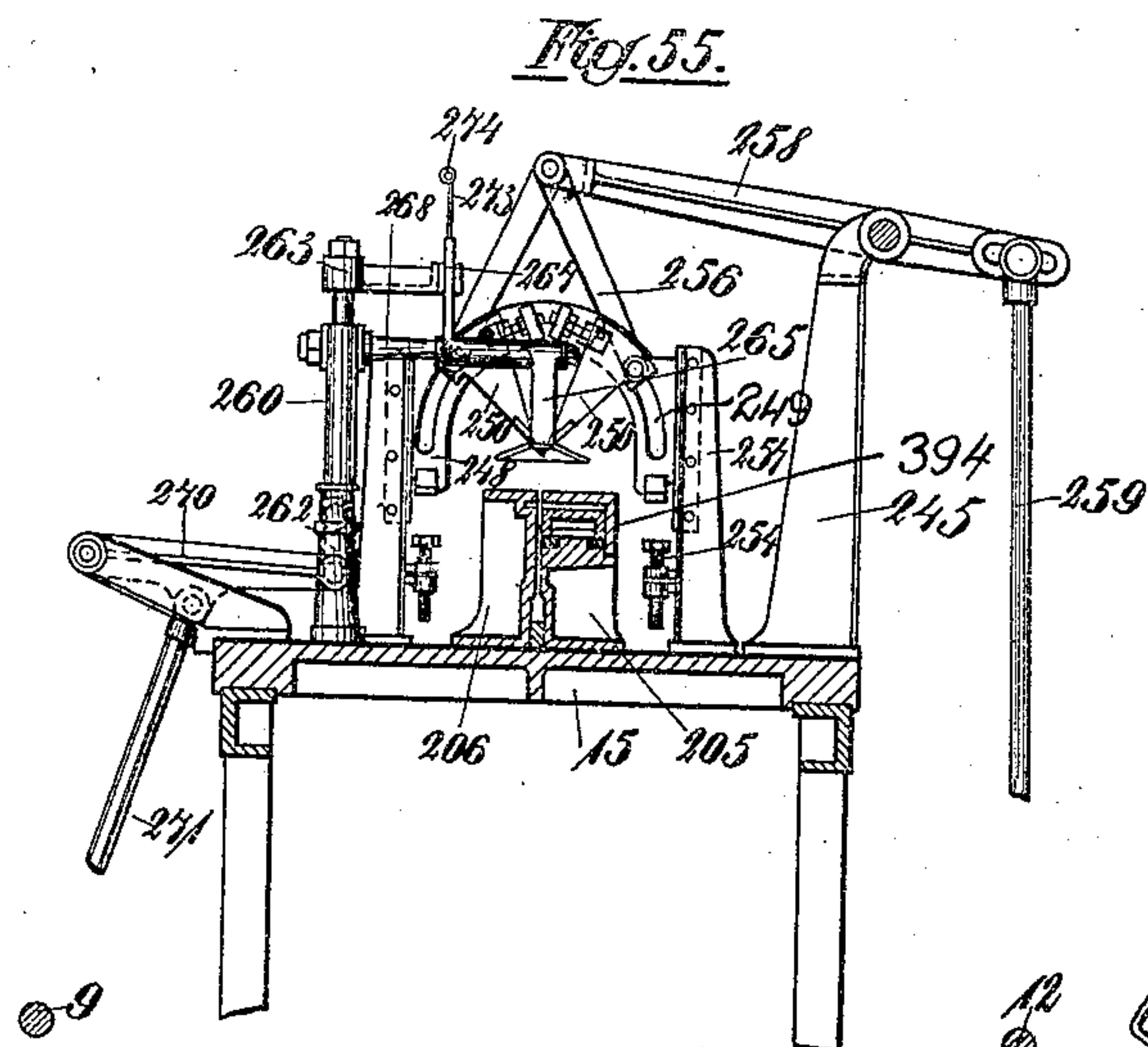
Witnesses  
Albert P. Hesser  
C. H. Walker

Inventor  
Otto Hesser  
By Shurtland & Greeley  
Attorneys

938,486.

O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 12.



Witnesses

Albert Pophurs  
C. Wacker.

Inventor

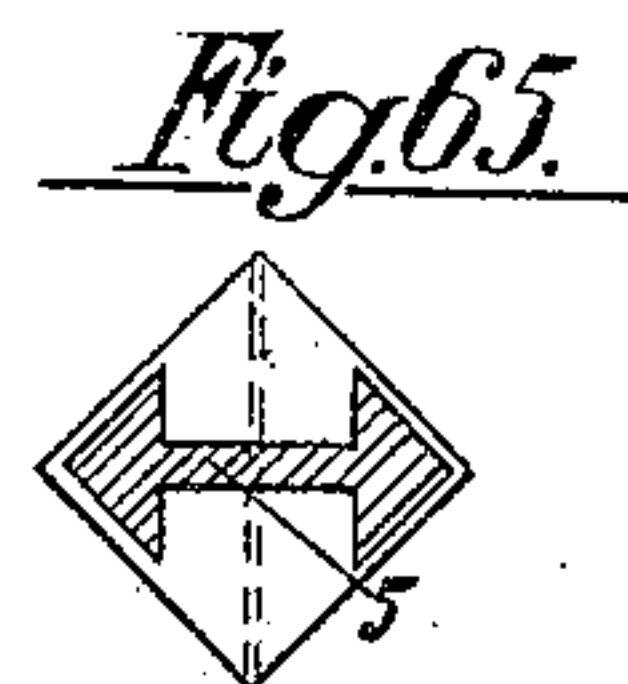
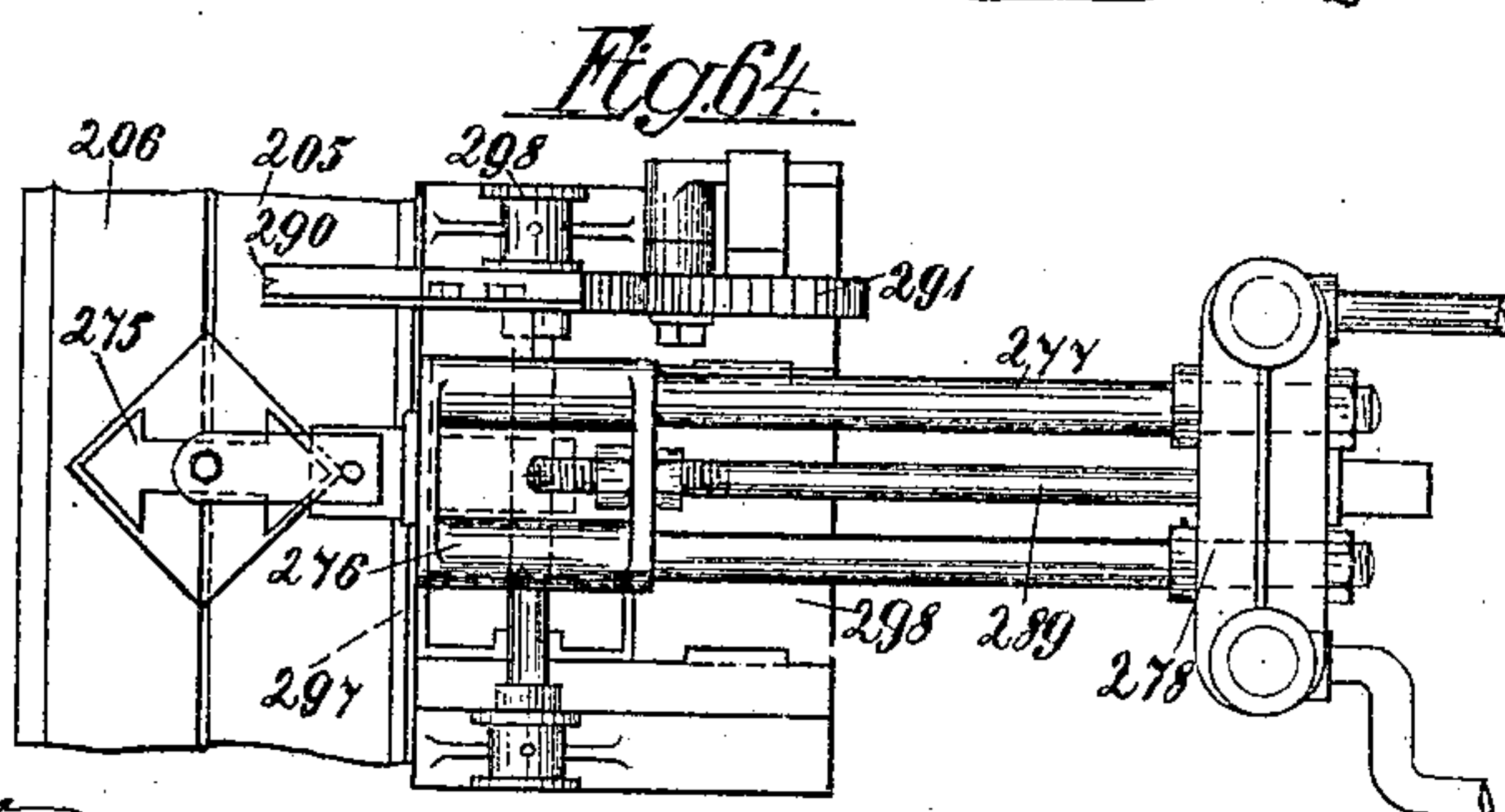
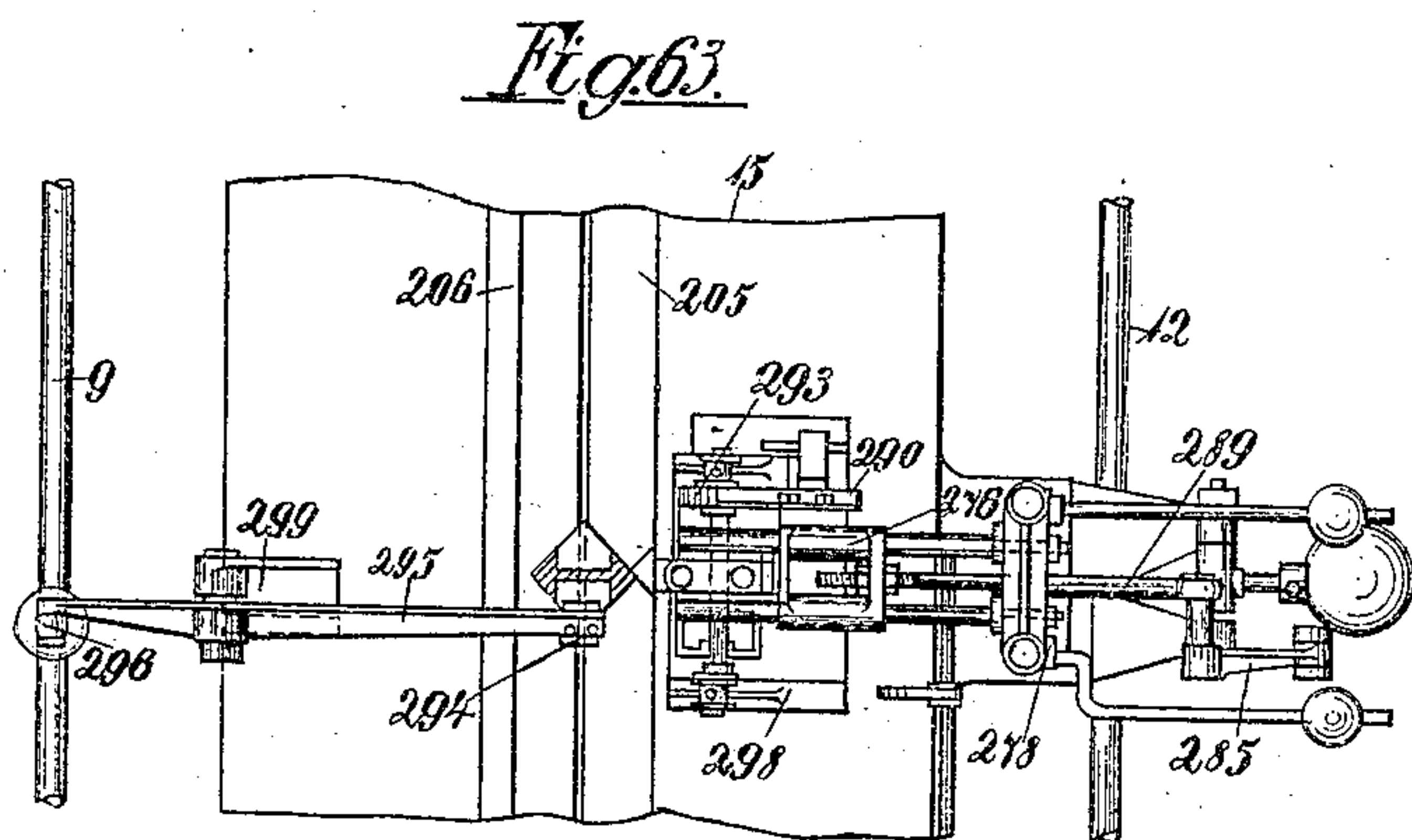
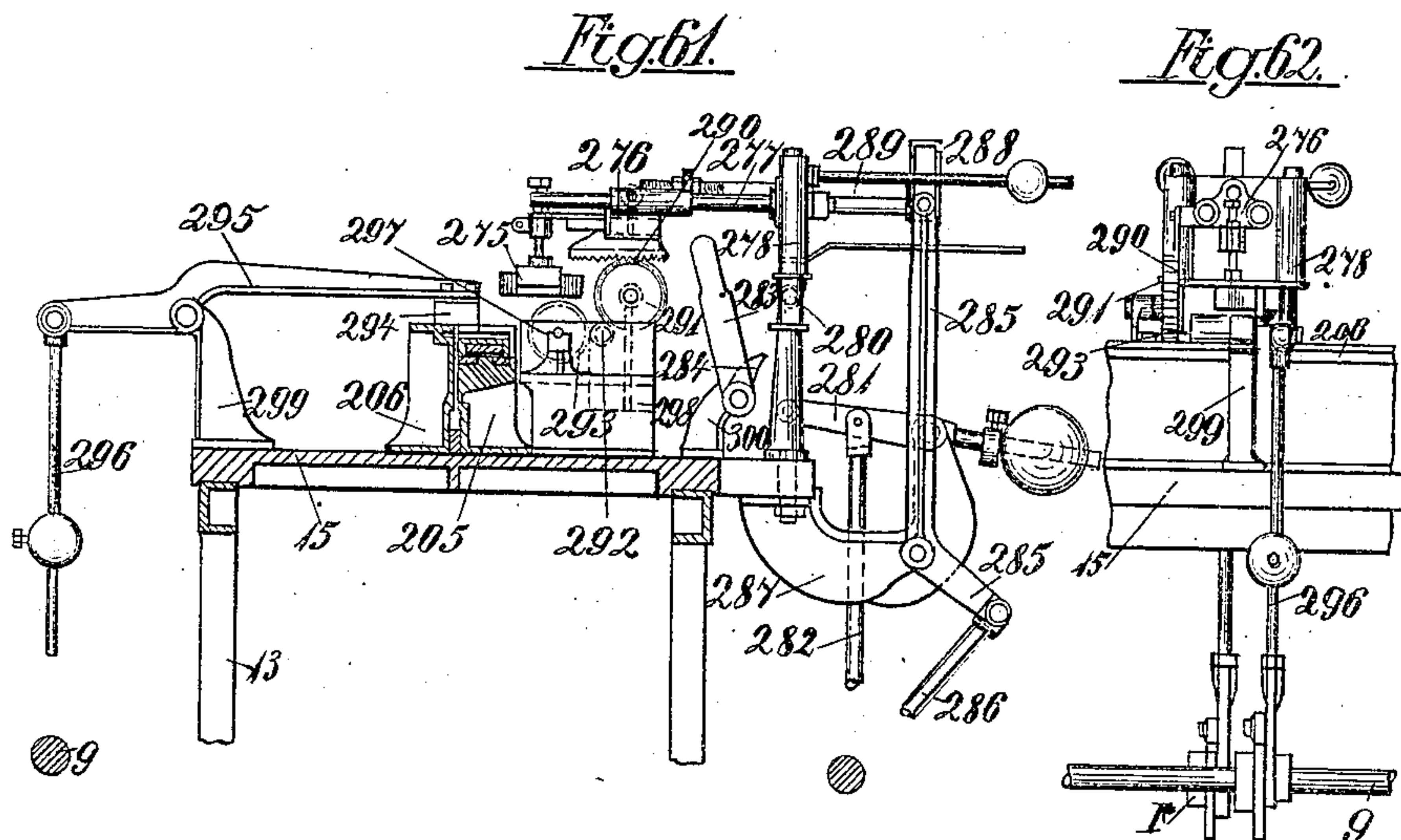
Otto Hesser  
By Shurtzant & Greeley  
Attorneys.



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O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 13.



Witnesses.

Albert Pophers

C. H. Walker.

Inventor

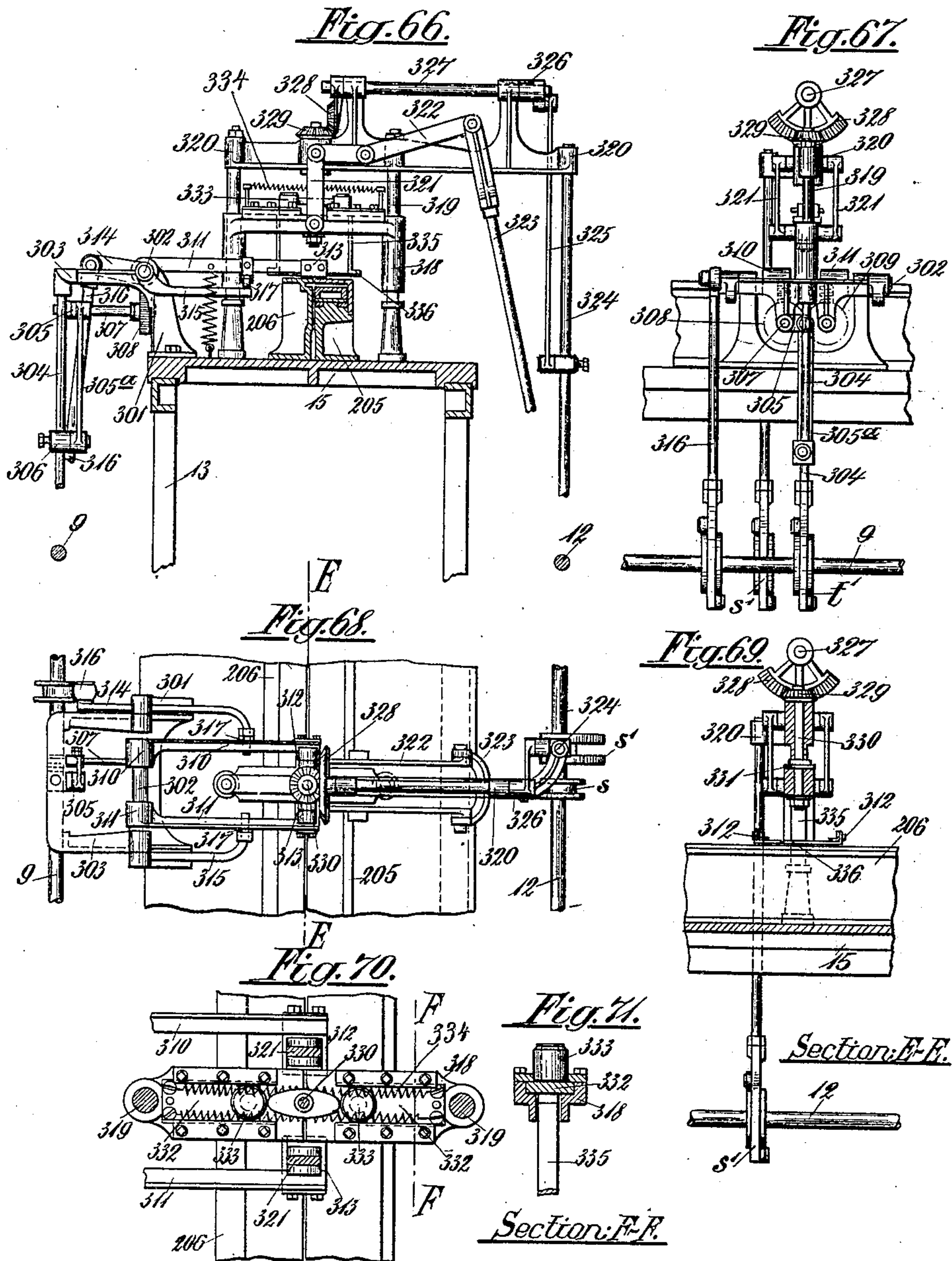
Otto Hesser

By Sturtevant & Greeley  
Attorneys.

938,486.

O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 14.



Witnesses  
Albert F. Perkins  
C. H. Walker.

Inventor:  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys



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O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 15.

Fig. 68<sup>a</sup>.

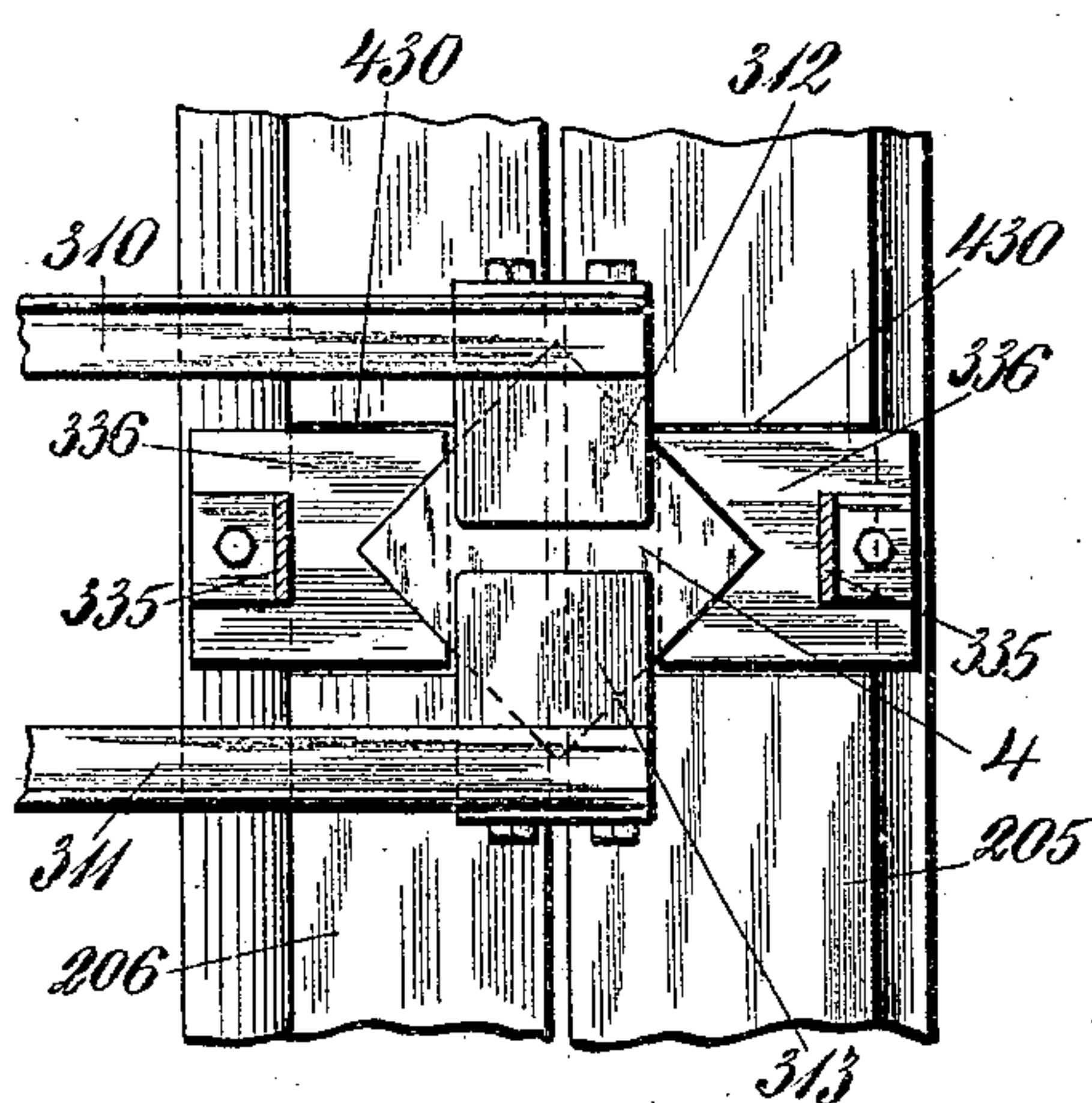


Fig. 66<sup>a</sup>.

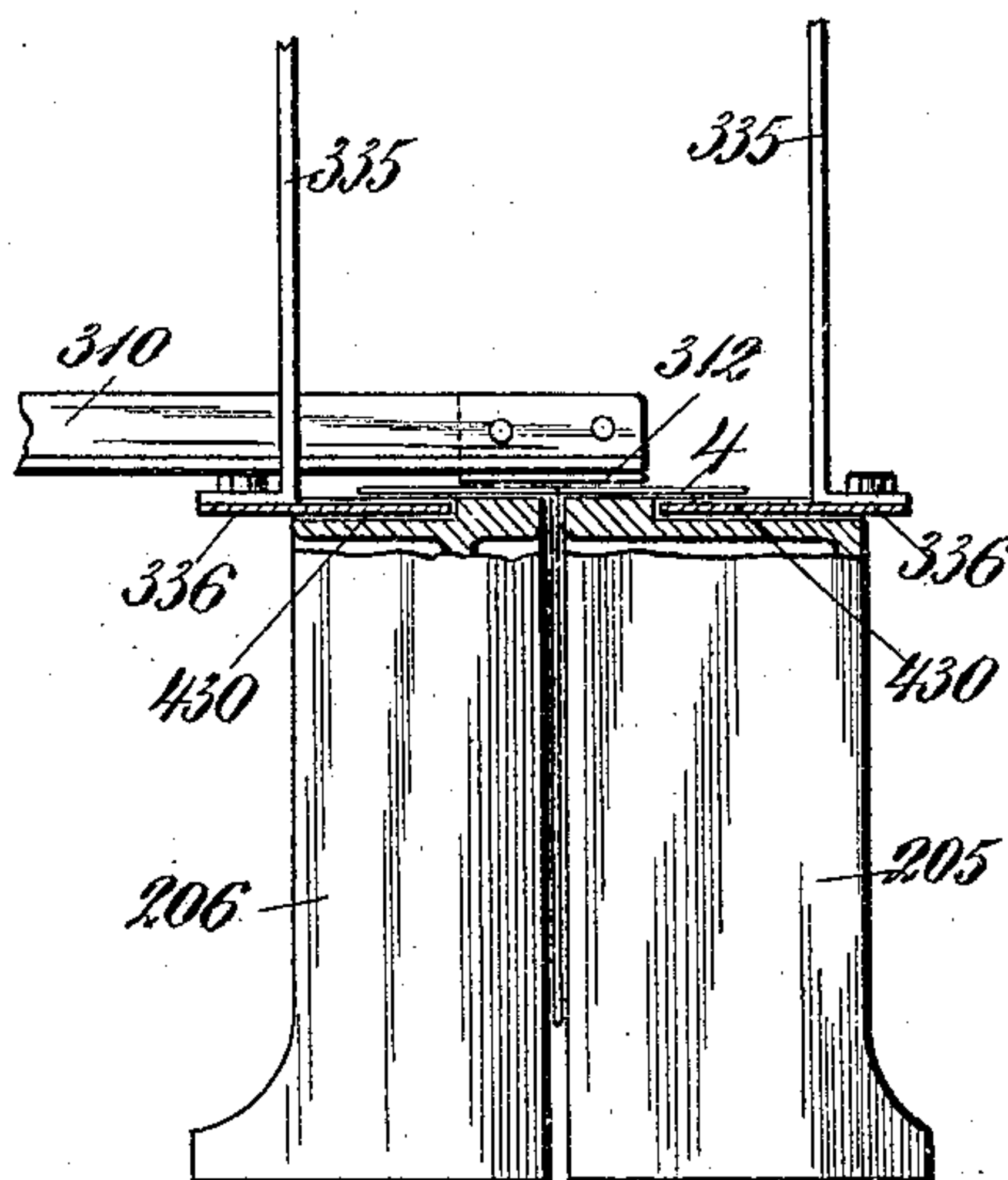


Fig. 68<sup>b</sup>.

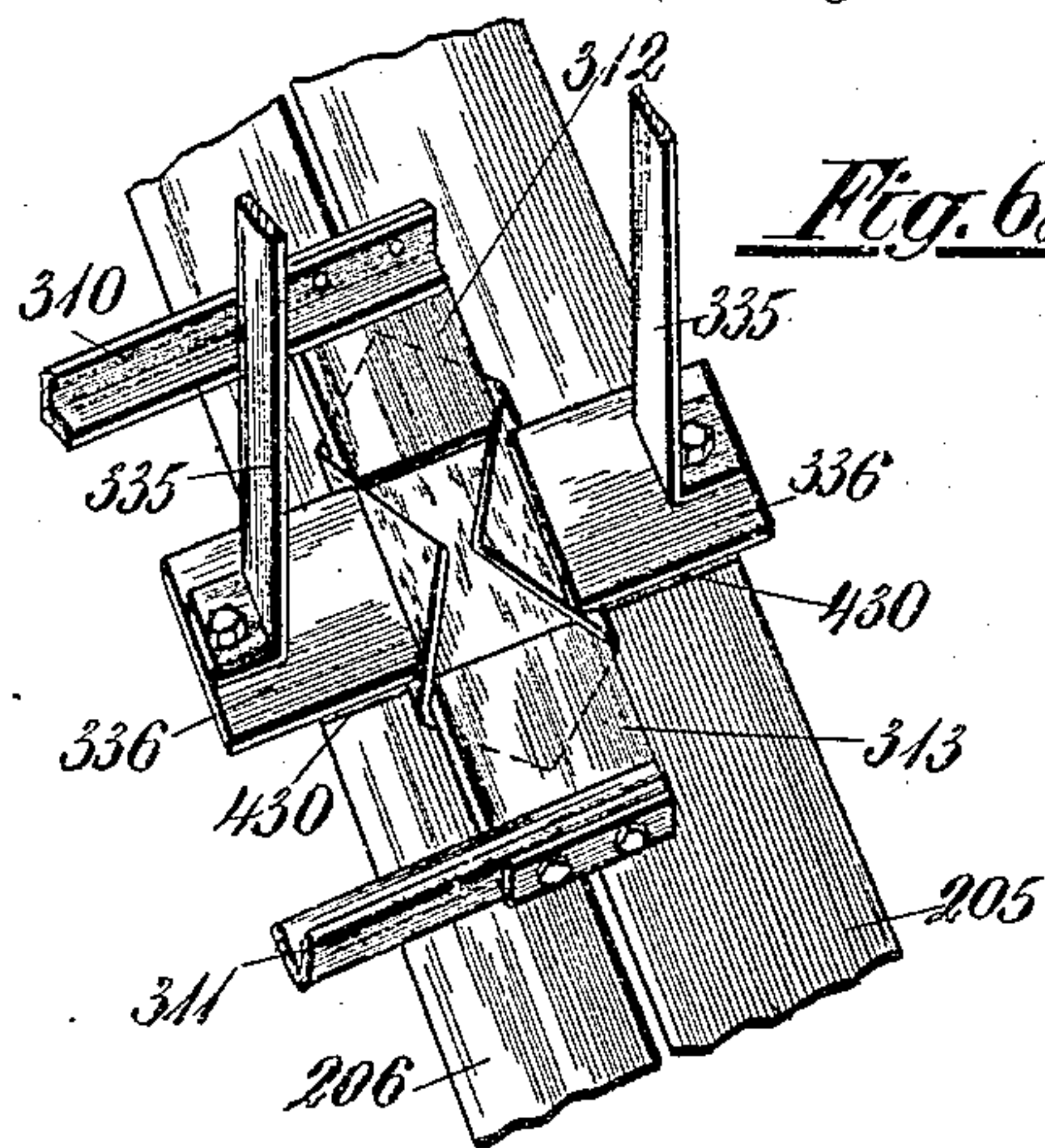


Fig. 68<sup>c</sup>.

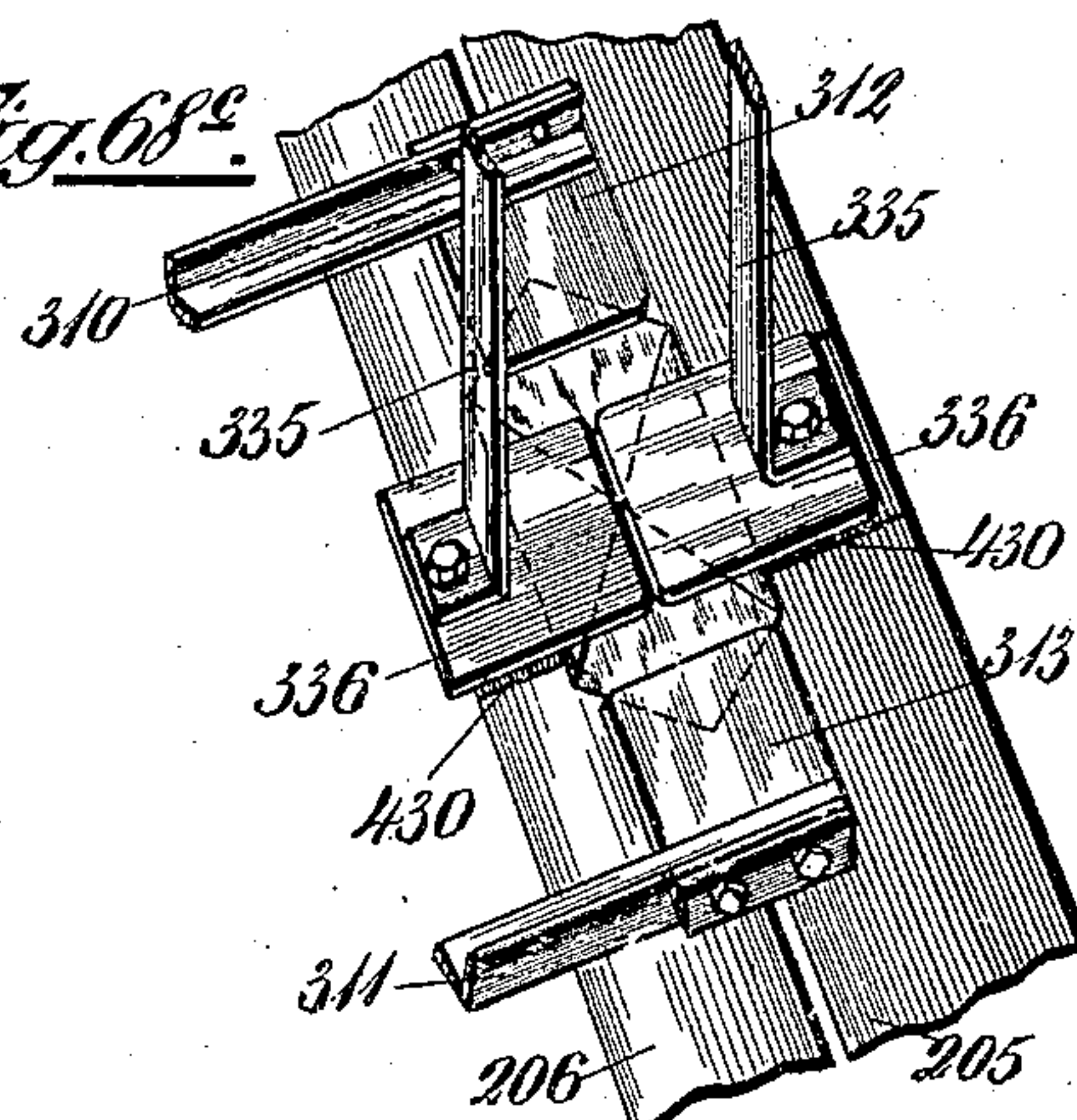


Fig. 66<sup>b</sup>.

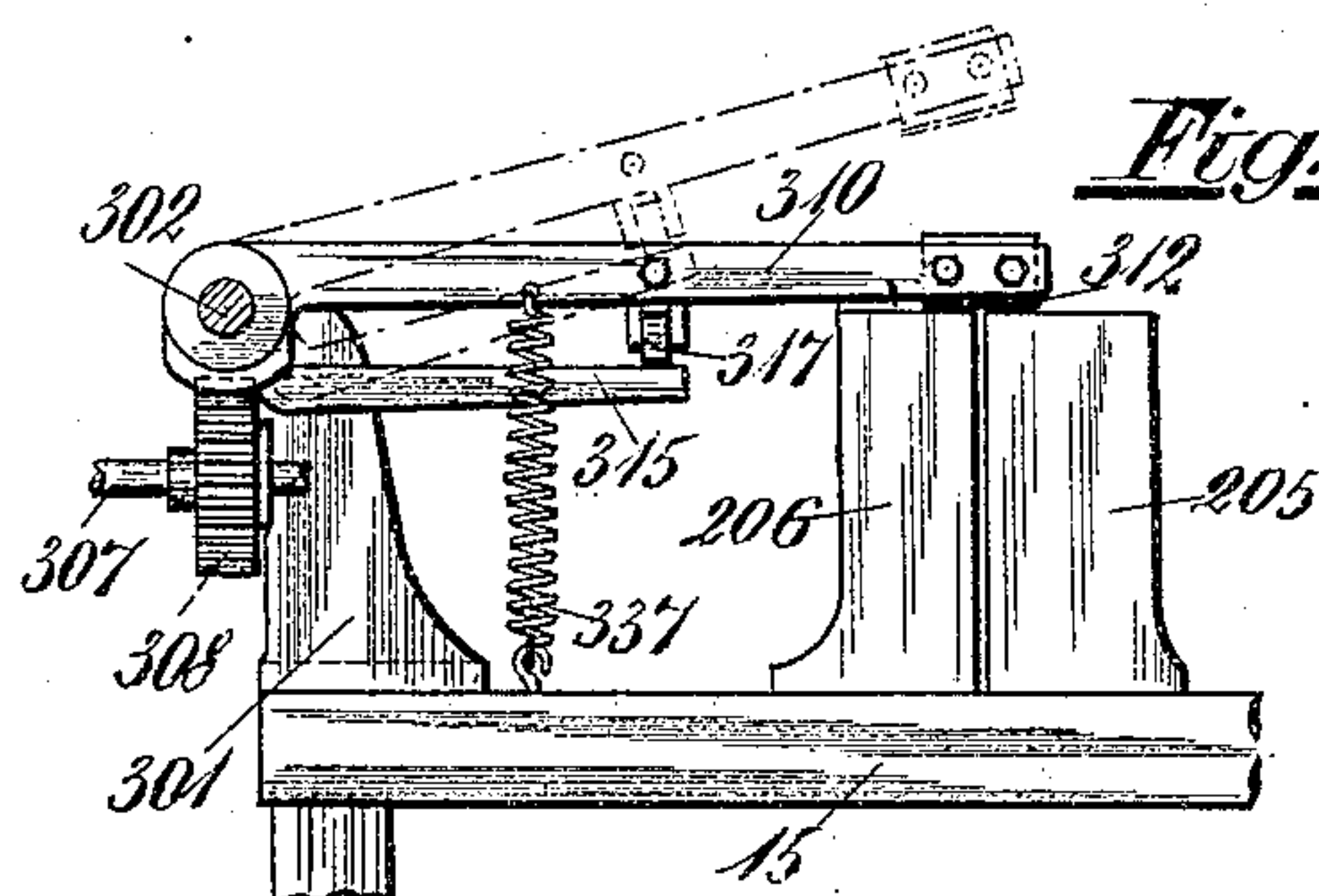
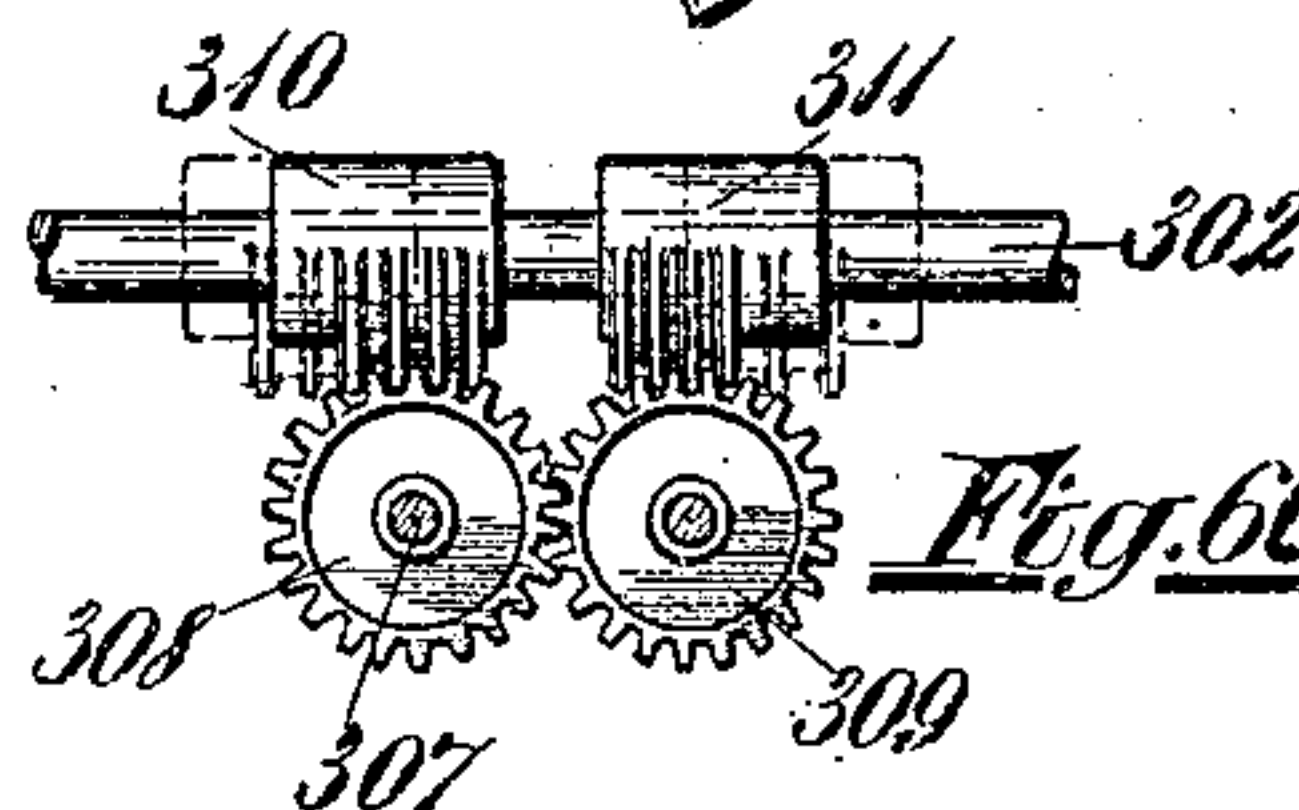


Fig. 66<sup>c</sup>.



Witnesses

Albert H. Perkins  
Mary W. Hammer.

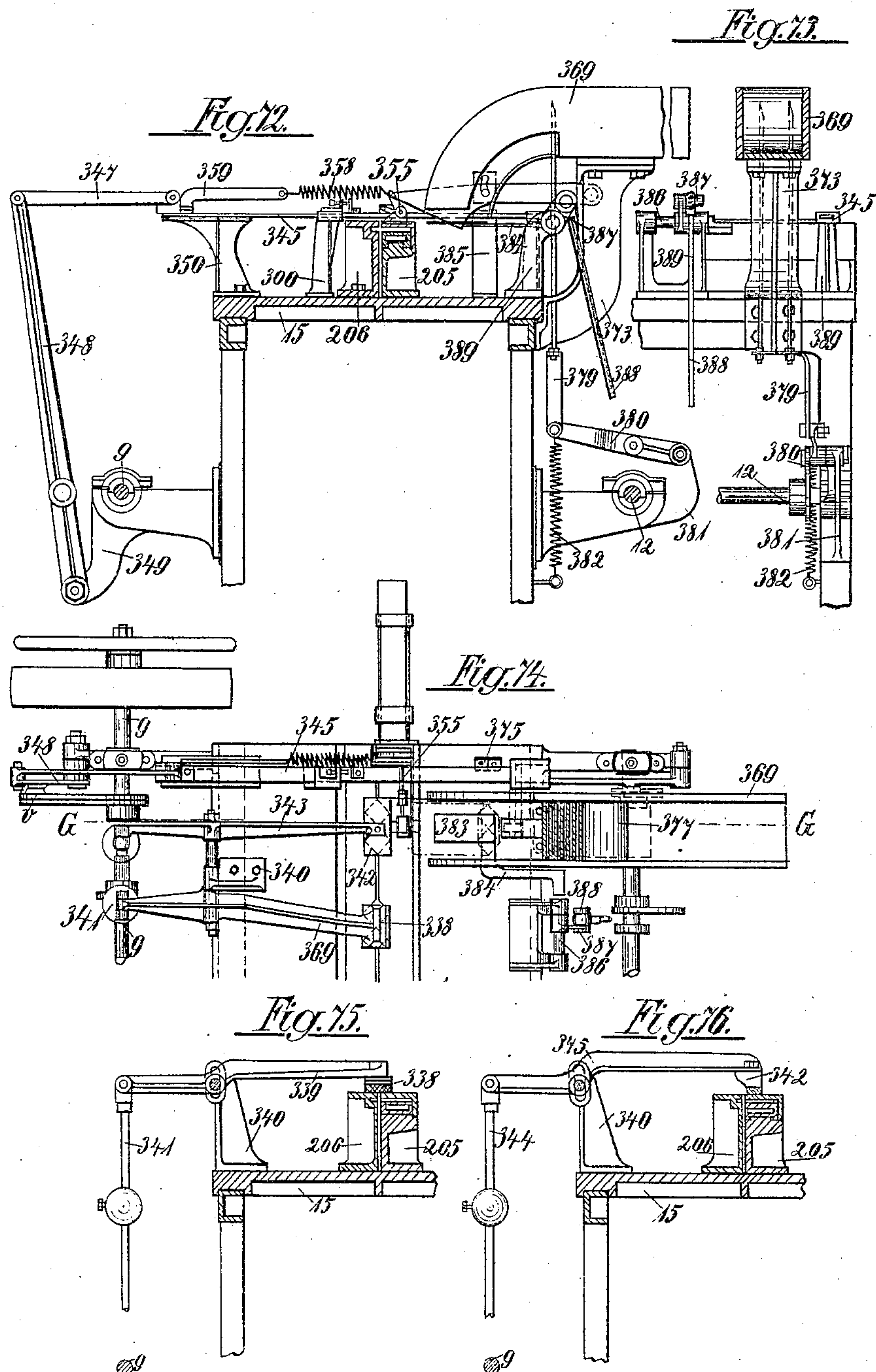
Inventor  
Otto Hesser

By Sturtevant & Greeley  
Attorneys

938,486.

O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 16.



Witnesses  
Albert Popkins  
C. H. Walker.

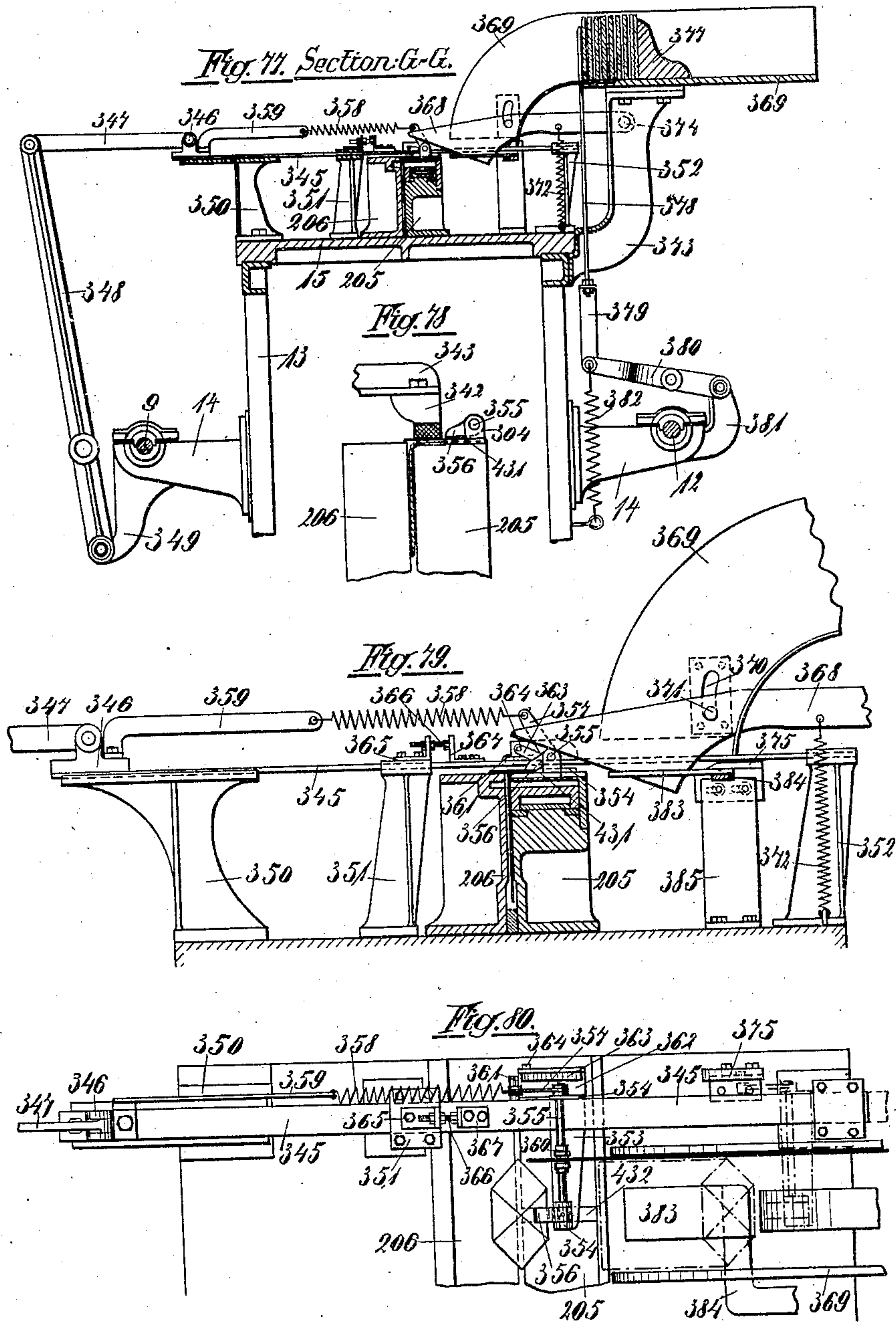
Inventor  
Otto Hesser  
By Shurtwain & Greeley  
Attorneys.



938,486.

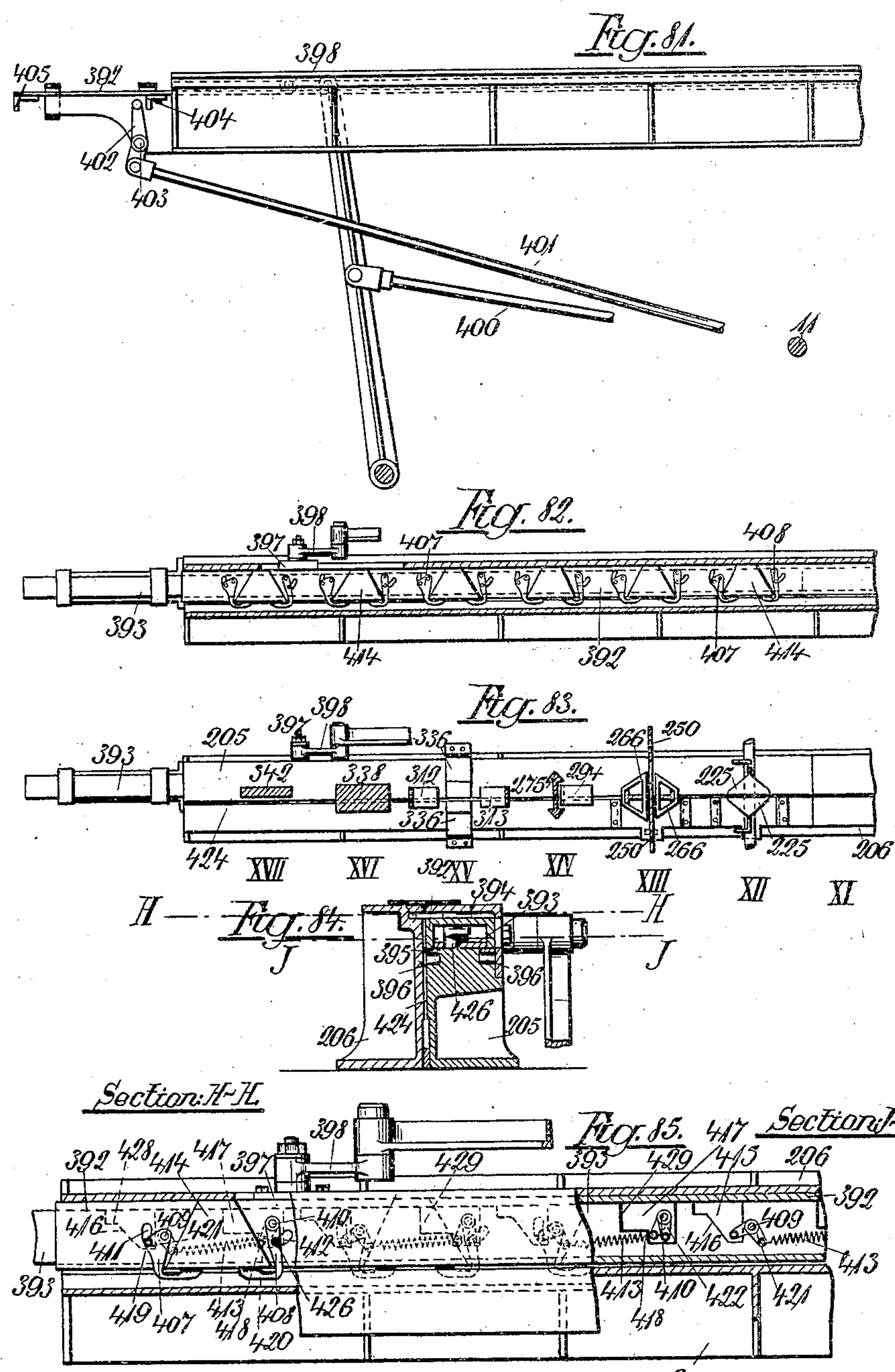
O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 17.



Witnesses  
Albert Perkins  
E. N. Walker

Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys



Witnesses

*Albert P. Lewis*

*C. W. Wacker*

Inventor

*Otto Hesser*

By *Sturtevant & Greeley*

Attorneys.



938,486.

O. HESSER.  
PAPER BAG MACHINE.  
APPLICATION FILED MAY 9, 1903.

Patented Nov. 2, 1909.  
20 SHEETS—SHEET 19.

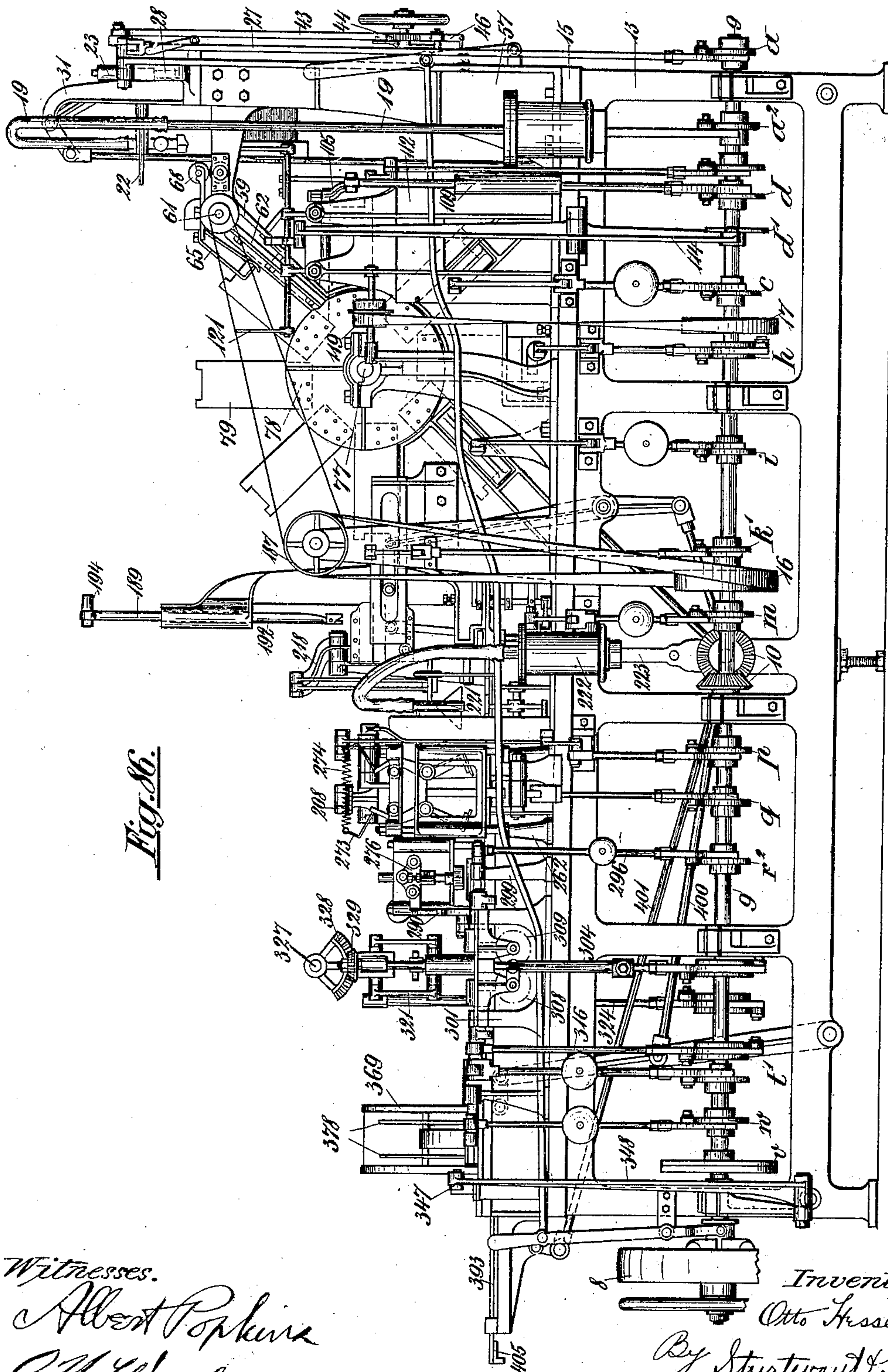
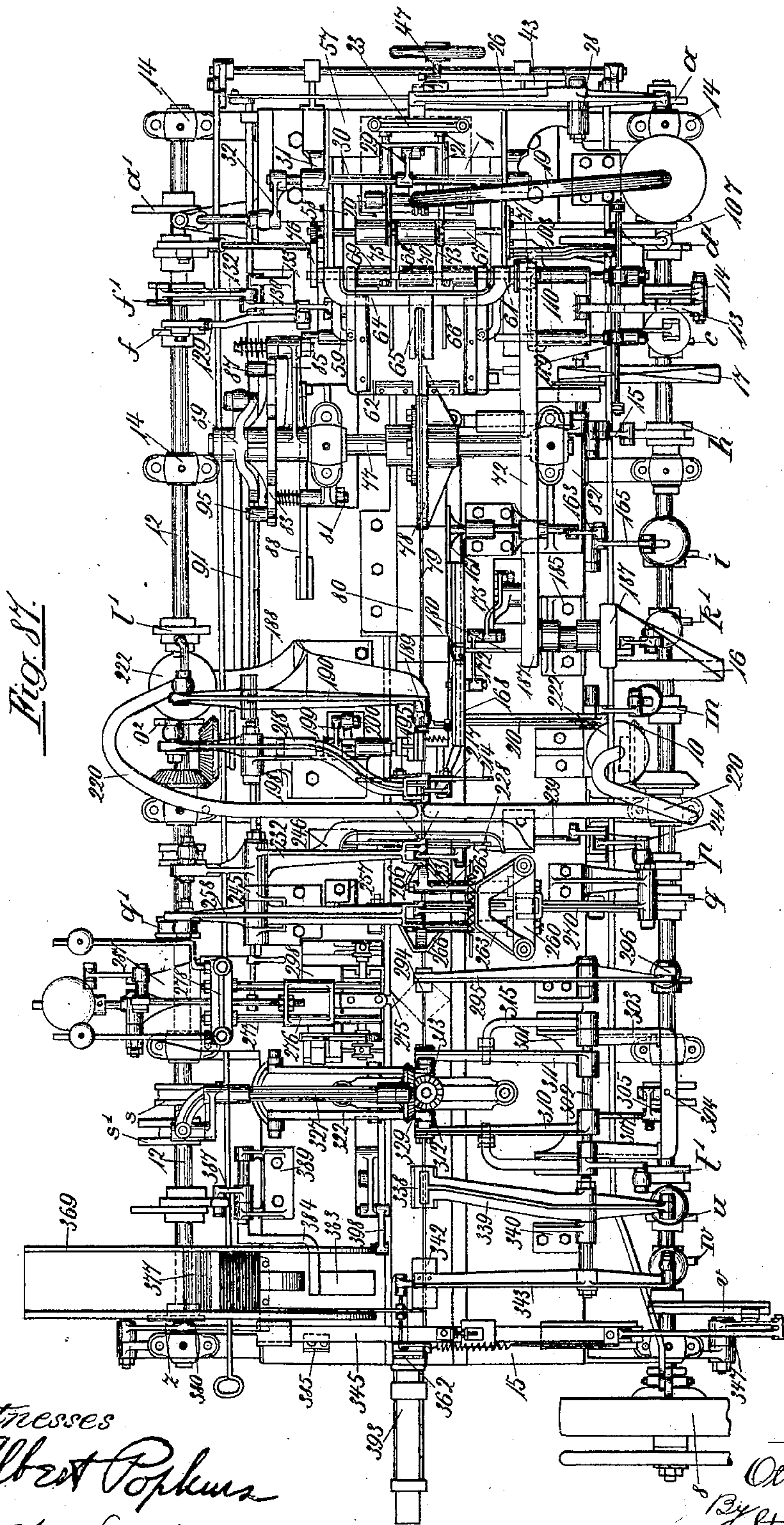


Fig. 86.

Witnesses.  
Albert Popkin  
C. H. Walker.

Inventor  
Otto Hesser  
By Sturtevant & Greeley  
Attorneys





Witnesses  
 Albert Popkin  
 C. W. Walker.

Inventor  
 Otto Hesser  
 By Sturtevant & Greeley  
 Attorneys



# UNITED STATES PATENT OFFICE.

OTTO HESSER, OF CANNSTATT, GERMANY.

## PAPER-BAG MACHINE.

938,486.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed May 9, 1903. Serial No. 156,402.

*To all whom it may concern:*

Be it known that I, OTTO HESSER, a citizen of the German Empire, residing at Cannstatt, in the Kingdom of Württemberg, Germany, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a description, reference being had to the accompanying drawing, and to the letters and figures of reference marked thereon.

My invention relates to machines for the manufacture of square bottom paper bags and has for its principal object to provide a machine to which paper blanks of suitable size may be fed by hand or automatically, these paper blanks being engaged, folded and pasted for the purpose of forming tubes which are afterward acted upon by suitable mechanism for the formation of a square bottom, and the finished bags being finally delivered into the storage trough or the like.

Further objects of the invention are to improve and simplify the construction of the various mechanisms by which the pasting, cutting and the several folding operations are carried into effect.

With these and other objects in view, the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings—Figure 1 is a face view of a blank of proper size and shape for the formation of a bag, the cutting and folding lines being dotted; Fig. 2 is an elevation of the sheet after the first fold; Fig. 2<sup>a</sup> is an end view of the same; Fig. 3 is a view similar to Fig. 2, showing the completely folded and pasted tube; Fig. 3<sup>a</sup> is an end view of the tube; Fig. 4 is an elevation of the tube after the cutting away of the end portion; Fig. 4<sup>a</sup> is an edge view of the same; Fig. 4<sup>b</sup> is an end view of the tube; Fig. 5 is an elevation of the tube with the bottom partly folded; Fig. 6 is an edge view of the same; Figs. 7, 7<sup>a</sup>, 8, 8<sup>a</sup>, 9, 10, 11 and 12 illustrate stages of the folding operation more specifically referred to hereinafter; Fig. 13 is a plan view beneath the table of the machine, showing the various shafts, cams and eccentrics through which motion is imparted to the several parts of the machine; Fig. 14 is an elevation looking toward the feed end of the machine, showing the mechanism for lifting and feeding the successive sheets to

the inclined folding table; Fig. 14<sup>a</sup> is a plan sectional view of a portion of the same; 14<sup>a</sup>—14<sup>a</sup> of Fig. 14; Fig. 15 is a side elevation of the sheet feeding mechanism; Fig. 16 is a plan view of such mechanism; Fig. 17 is a vertical sectional view of the same on the line A—A of Fig. 16; Fig. 18 is an elevation of the revoluble folding disk and its removable folding plates; Fig. 19 is an end view of the same showing the main table in section; Fig. 20 is an elevation of the complete detent mechanism looking from the right of Fig. 19; Fig. 20<sup>a</sup> is a detail view of the detent or locking pawl; Fig. 20<sup>b</sup> is a detail view of the pawl releasing cam; Fig. 21 is a plan view of the mechanism shown in Fig. 19; Fig. 22 is a view in transverse section on the line C—C of Fig. 24, across the plane of one of the folding blades, showing the mechanism for effecting the folding over of the edge of the partly folded sheet to form a tube, the first stage of the operation being shown in Fig. 2 and the final stage in Fig. 3; Fig. 23 is an end elevation of this mechanism looking from the left of Fig. 22; Fig. 24 is a sectional plan view on the line B—B of Fig. 22; Fig. 25 is a detail view of a portion of the edge folding mechanism shown in Fig. 22; Fig. 26 is a detail view on an enlarged scale of portions of the gumming and folding mechanism shown in Fig. 22; Fig. 27 is an elevation of the pivoted flap for pressing the sheet against the folding plate; Fig. 28 illustrates a portion of the mechanism at the rear of the revoluble folding disk showing principally the mechanism for removing the paper tube from the folding plate; Fig. 29 is an elevation of the same partly in section looking from the right of Fig. 28; Fig. 30 is a plan view of the mechanism shown in Fig. 28; Fig. 31 is a plan view of the tube clamp showing its carrier in section; Fig. 32 is an elevation of the female cutting die employed in cutting the end of the tube as shown in Fig. 4; Fig. 33 is a vertical section of the same on the line D—D of Fig. 34, showing both the male and female dies; Fig. 34 is a plan view of the dies; Fig. 35 is a side elevation of a pressing stamp shown in end view in Fig. 28; Fig. 36 is a similar view of another pressing stamp for pressing down the folded flap in the formation of the tube; Fig. 37 is an elevation of the cutting dies and their connections showing the table in section; Fig. 38 is a view transversely of the machine showing in elevation the mechanism



for turning the folded paper tube at a right angle for its removal from the folding blade; Fig. 39 is an end view of the same looking from the left of Fig. 38; Fig. 40 is a plan view of the tube turning mechanism; Fig. 41 is a detail plan view of the tube centering or adjusting mechanism; Figs. 42, 43 and 44 are detail views in elevation, edge and plan, of the turning table detached; Fig. 45 is a view transversely of the machine, showing in elevation the air suction nozzles by which the end of the paper tube is opened; Fig. 45<sup>a</sup> is a similar view illustrating further details; Fig. 46 is an end view of the same looking from the left of Fig. 45; Fig. 46<sup>a</sup> is an end view of the mechanism shown in Fig. 45<sup>a</sup>; Fig. 47 is a plan view of the mechanism shown in Fig. 45; Fig. 48 is a detail plan view of the suction nozzles and preliminary folders; Fig. 48<sup>a</sup> is a detail view of the folders; Fig. 49 is an elevation of the same looking from the left of Fig. 48; Fig. 50 is a view transversely of the machine showing the scoop-shaped folders which enter the partly opened bag to fold the bottom over; Figs. 50<sup>a</sup> and 50<sup>b</sup> illustrate on an enlarged scale the operation of the folders; Fig. 51 is an end view of the same looking from the left of Fig. 50; Fig. 52 is a plan view of the mechanism shown in Fig. 50; Fig. 53 shows in further detail the mechanism illustrated in Fig. 49; Fig. 54 is a sectional view on an enlarged scale of the guide rails shown in Fig. 50; Fig. 55 is a view transversely of the machine showing the mechanism employed for finishing the folding of the bottom; Fig. 56 is an end view of the same looking from the left of Fig. 55; Fig. 57 is a plan view of the mechanism shown in Fig. 55; Fig. 58 is a detail view of a portion of the mechanism shown in Fig. 56, drawn to an enlarged scale; Figs. 59 and 60 are similar views of portions of the mechanism shown in Figs. 55 and 57 respectively; Fig. 61 is a view transversely of the machine showing in elevation the mechanism for applying paste to the bottom of the bag; Fig. 62 is an end view of the same looking from the left of Fig. 61; Fig. 63 is a plan view of the mechanism shown in Fig. 61; Fig. 64 is a view on an enlarged scale of the parts shown in Fig. 63; Fig. 65 is a plan view of the bag at this stage showing the extent of the surface to which the paste is applied; Fig. 66 is a view transversely of the machine showing in elevation the mechanism for closing the bottom of the bag; Fig. 66<sup>a</sup> is a transverse section, on an enlarged scale, showing one of the clamp plates and the pair of folding plates used in folding the corners of the square bottom. Fig. 66<sup>b</sup> is an end view on a smaller scale, showing the actuating mechanism of the clamp plates. Fig. 66<sup>c</sup> is a detail view of a portion of the operating mechanism of the clamp plates. Fig.

67 is an end view of the same looking from the left of Fig. 66; Fig. 68 is a plan view of the mechanism shown in Fig. 66; Fig. 68<sup>a</sup> is a plan view of the mechanism shown in Fig. 66<sup>a</sup>. Figs. 68<sup>b</sup> and 68<sup>c</sup> are perspective views illustrating different steps in the operation of the clamp plates and folders. Fig. 69 is a detail view in section on the line E—E of Fig. 68, of the folder controlling cam; Fig. 70 is a plan view showing the folders, the folder carriages and the actuating cam; Fig. 71 is a detail sectional view on the line F—F of Fig. 70; Fig. 72 is a view transversely of the machine showing in elevation the mechanism for pressing the previously closed bottom and then flattening the bottom of the bag against the side of the tube; Fig. 73 is an end view of the same showing the bag storage trough in section; Fig. 74 is a plan view of the mechanism shown in Fig. 72; Figs. 75 and 76 are detail views of two pressing stamps for acting on the bag bottom; Fig. 77 is a transverse section on the line G—G of Fig. 74; Fig. 78 shows on an enlarged scale the portion of the pressing stamp shown in Fig. 76; Fig. 79 is a detail view corresponding to Fig. 77, showing portions of the mechanism on an enlarged scale; Fig. 80 is a plan view of the mechanism shown in Fig. 79; Fig. 81 shows in elevation the paper tube and bag guiding bars and the intermittent feeding mechanism for the bag; Fig. 82 is a sectional plan view of the same on the line H—H of Fig. 84, the view being on a scale somewhat smaller than that of Fig. 84; Fig. 83 is a plan view of the guide partly in the nature of a diagram and illustrating the successive stepping points or stages of the tube and bag; Fig. 84 is a transverse section through the guide drawn to an enlarged scale; Fig. 85 is a view of the guide partly in plan and partly in section on lines H—H and J—J of Fig. 84; Fig. 86 is a side elevation of the entire machine; Fig. 87 is a plan view of the machine.

Similar reference numerals indicate corresponding parts throughout the several sheets of drawing.

The various working parts of the machine are supported on a suitable frame which includes lower standards and frame members 13 and a table 15. The paper lifting, folding and other operating devices are all supported on frames or standards above the table 15, while the mechanism through which movement is imparted to the operating device is located below said table 15. This mechanism comprises principally a main shaft 9 mounted in bearings at one side of the frame, a second shaft 12 at the opposite side of the frame and a transversely disposed shaft 11 extending across the frame and connecting the two shafts 9 and 12 by suitable miter gears 10. The shaft 9 is provided near one end with a belt wheel 8,



which may be connected to any suitable source of power, so that the shaft 9 constitutes the main driving member and through which movement is imparted to every portion of the machine. As will be seen on reference to Fig. 13, the several shafts are provided with cams and eccentrics which are designated by reference letters hereinafter referred to, in order to more clearly distinguish them from the operating parts to which reference numerals are applied. (Figs. 5 14 to 17.)

Near one end of the machine is arranged a frame 57 that is mounted on a table 15 and is arranged to support a pair of laterally adjustable brackets 53, that are provided with horizontal slots for the passage of securing bolts 54 in order that the brackets may be locked in any adjusted position (Fig. 14). The inner ends of the brackets 53 carry vertically disposed guide bars 52, which form side or corner guides for a pile of sheets of paper *l*, which sheets are successively removed from the top of the pile and fed through the machine and during their passage are folded, cut, pressed and shaped to be delivered at the opposite end of the machine in the form of paper bags. In order to permit quick removal of the supply of paper sheets the guide bars 52 are provided with spring held flaps or strips 56 pivoted in such manner as to permit their outward movement in order that a quantity of sheets may be readily introduced within the guiding frame as shown in Fig. 14<sup>a</sup>. These flaps or strips are normally held in operative position by springs 423.

The pile of sheets of paper rests on a plate 50 that is supported at the upper end of a vertically movable rack bar 49, the latter being guided in a vertically disposed standard 51 supported by the frame 57 and with this rack bar engages a pinion 48 mounted on a shaft 47, said shaft carrying also a ratchet wheel 44 that is intermittently operated by a pawl 45 secured to the lower end of an arm 43, which receives motion in a manner hereinafter described, the function of this mechanism being to elevate the pile of sheets to compensate for the successive removal of the uppermost sheets of the pile. The ratchet wheel is also engaged by a locking pawl 46 that is held in operative position by a spring 433.

In order to feed the successive topmost sheets from the pile to the preliminary folding devices, a pneumatic suction head 20 is employed, said suction head being connected by a flexible tube 19 to an air pump 18 operated by a cam *a*<sup>2</sup>, mounted on the main driving shaft 9, the pump serving to create a partial vacuum at the suction head and the latter being perforated will elevate the sheets with which it is moved into engagement and provision is made for raising and

lowering the head and for feeding the same in a direction parallel with the length of the machine in order to convey the sheets to the folding mechanisms.

At the upper portion of the frame 57 is a pair of slightly spaced vertically disposed bars 24 (Fig. 14) upon which a vertically movable carriage 23 is guided and this carriage is connected by a link 25 to one arm of a lever 26 that is pivoted at a point intermediate its ends to the bracket 28, projecting from the frame. The outer arm of the lever 26 is connected to the upper end of a rod 27 which receives motion from a cam *a* on the shaft 9. The carriage 23 is provided with a pair of spaced horizontally disposed guide bars 22 upon which a carriage 21 is supported and the suction head 20 is secured to this carriage 21. To the carriage 21 is secured a vertically disposed slotted arm 36 (Fig. 17) and through the slot in said arm extends a block 37 that is carried by the lower end of a rocker arm 29, the latter being rigidly secured to a rock shaft 30 that is supported in bearing standards 31 arranged at the top of the frame 57. One end of the shaft 30 carries a rocker arm 32 which is coupled by a rod 33 to a vertical guide bar 35, the latter being arranged to slide in a guiding opening formed at the outer end of a bracket 34 projecting from frame 13, Fig. 14. This bar 35 is weighted and its lower end is provided with a suitable antifriction roller that is arranged to be engaged by a cam *a'* upon the shaft 12, the cam serving to elevate the rod 35 and thus impart movement to the carriage 21 in one direction while the weight causes the descent of the rod by gravity and thus moves carriage 21 in the opposite direction. The carriage 21 is further provided with a depending stop arm 38 which on the descent of the suction head 20 engages with the topmost sheet slightly in advance of the suction head in order to prevent the latter moving against the sheets with more force than necessary, but it is intended that the pressure of the suction head shall be comparatively light and thus tend to separate the topmost sheets rather than cause two or more sheets to cling together by the exertion of unnecessary pressure thereon. This mechanism, it will be observed, effects both vertical and horizontal movement of the suction head 20 so that the latter may move down into engagement with the successive topmost sheets and may elevate the same and then carry them toward the first of the paper feeding devices proper, these being shown in the form of feed rollers 67 and 68 (Fig. 17).

In some cases, it may be desired to momentarily render the suction feeding devices inoperative and for this purpose a stop arm 39 is arranged on a shaft 40 held in bearings on frame 57 (Figs. 14 and 17) and at one end of



the shaft is a handle 41 which may be turned in order to adjust the stop arm 39 to a position below the carriage 23 and thus arrest the downward movement of the latter. By this mechanism the feed may be temporarily stopped in case it is necessary to adjust or remove a sheet previously fed and the operation may be accomplished without stopping the whole of the machine.

At a point in advance of the frame 57 is a frame 74 carrying angle bar 75 which serves as a support for the forward members of the guides 52, within which the pile of sheets of paper is arranged and above this frame and supported by the frame 57 is a bracket 58 having a forwardly and downwardly extending arm 59 that forms a support for a slotted inclined folding table onto which the sheets of paper are successively fed to be engaged by the folding blades and the angular position of this table may be adjusted by a set screw 60 extending through a threaded opening in the lower end of the arm 59. In practice, the bracket 58 is provided with an arm 59 at each side of the inclined folding table as shown in Fig. 16 and said bracket further supports an arm 64 that extends transversely across the upper edge of the folding table and is spaced some distance from the latter. The bracket 58 is provided with bearing for two rollers 67 and 69, the shafts or arbors of which are extended at one side of the bracket and are united by a train of gears 76 as shown in Fig. 16. Above the rollers 67 and 69 is a saddle 73 that supports a pair of rollers 68 and 70, that coact respectively with the rollers 67 and 69 in the feeding of the sheets of paper toward the inclined folding table, the sheets passing on the table until downward movement is arrested by angle bars 63 serving as stops. In order to impart positive feeding movement to the rollers, the shaft 61 of the roller 69 is extended beyond the frame and carries a pulley 71 that is driven by belts 72 from a belt pulley 16 mounted on the main driving shaft 9 (Fig. 13), through the intervention of pulleys 187 mounted on a shaft 186, having bearings in standards 185 of the machine (see Figs. 29 and 86). The sheet is positively fed forward by the rollers and its edge emerging from the rollers 69 and 70 strikes against fingers 66 that are mounted on the arm 64 and the sheet is turned downward and slides on the slotted table until its lower edge strikes against the stops 63, the sheets being thus held in position to be engaged by the folding blades.

At a point in advance of the frame 57 is arranged a pair of standards 81 and 82 (see Figs. 18 to 21). These standards are provided with bearings for the support of a transversely disposed shaft 77, to which is secured a two-part disk 78, that serves as a support for a plurality of folding blades 79,

said blades being each arranged so that the active edge, or that edge which in passing through the slot of the folding table 62, carries with it the sheet to be folded, is disposed on a line approximately radial of the shaft. These folding blades are of any desired number, eight being shown in the present instance and their inner ends are firmly secured to the disk 78. As the shaft 77 is revolved, the blades are successively passed through the slot of the folding table and fold and carry with them the sheets of paper laid thereon, the movement being properly timed with respect to the operations of the suction feed mechanism. As these folding blades must be of considerable length when large paper bags are made, it is preferable to employ a preliminary guide 65 in order to insure the passage of the blades through the slot of the table. The guide 65 is secured to the arm or bar 64 and is in the form of a fork, its bifurcated legs serving as guides in order to direct the blades in to proper position with respect to the table slot.

At one end of the shaft 77 is secured a ratchet and detent wheel 83, through which a step-by-step rotative movement is imparted to the shaft, the periphery of said wheel being provided with notches 84 of a number corresponding to the number of folding blades. On the shaft 77 is pivoted a lever 85 which carries at its outer end a pawl 86 having a roller 87 for engagement with the notches 84, the roller being pressed toward the periphery of the wheel by a spring 92, that is mounted on the pivot, of the pawl 86. This lever 85 is connected by a cam rod 88 to the cam *b* and is operated by the latter. The wheel 83 is locked in adjusted position by a pawl 93 pivoted to the bearing standard 81 and provided with a roller 95 that is forced into engagement with the notches 84 of the wheel by a spring 94.

In order to release the two pawls from the notches 84 a cam 89 (Fig. 20<sup>b</sup>) is loosely mounted on the shaft 77 and is provided with cam faces 90 arranged to engage the rollers 87 and 95. This cam is connected by a cam rod 91 to a cam *a'* on shaft 12 and receives motion therefrom, the cam being rocked to and fro in order to alternately engage the rollers 87 and 95 and move them from engagement with the notches 84. The operation of this mechanism will be readily understood, the shaft 77 receiving a step-by-step rotative movement in order that the successive blades 79 may fold and remove the sheets from the inclined table 62 and at the end of each partial rotation of the disk 78, the parts are locked by the pawl 93 and held until the cam 89 releases the locking pawl and permits another partial rotation.

The lower portions of the frame members 80 are provided with openings 96, 97, 98 and 99, as shown in Fig. 18, for the passage of



the several folding and pressing members which operate upon the partly folded paper tubes at different steps of the movement of the disk 78. The disk 78 receives a step by step rotative movement to the extent of one-eighth a revolution at each operation and at the end of the first step of movement the upper edge of the folding plate 79 which has passed through the inclined folding table and withdrawn a sheet of paper therefrom will stop in alinement with the openings 96 of the frame 80. At this point the lower folded edge of the sheet rests on two arms 135 Figs. 22 and 26 that are mounted on a shaft 136 and adjusted to horizontal position before the movement of the sheet is completed. The adjusting of the arms is accomplished by means of a toothed pinion 137 mounted on shaft 136 and a toothed sector 138 which intermeshes with the pinion, the sector being connected by a cam rod 139 to a cam *g* mounted on the driving shaft 12. As soon as the folded paper sheet is seated on the arm 135, it is forced against one wall of the vertical slot or passage between the frames 80 by means of a plate 140 that is pivotally mounted on a horizontally disposed shaft 142. This shaft carries a rocker arm 144 that is connected by a cam rod 145 to a cam *e* mounted on the main driving shaft 9 and when a further forward movement is to take place, the plate 140 is first drawn back so that the sheet of paper may be released (Fig. 26). In order to permit the arms 135 to pass under the sheet the plate 140 is provided with openings 141 through which the ends of the arms are passed. Before a further step movement of the folding disk can be made, the arms 135 must be turned down to position shown in dotted lines in Fig. 26, the cams being properly timed to accomplish this movement in advance of the operation of the mechanism through which the folding disk 78 is moved. Projecting from one side of one of the frame members 80 is a pair of spindles 127 on which is mounted a horizontally movable carriage 126 carrying a shaft 125 to which is secured a forked arm 124 and from the arm projects an angular folding plate 123 that is arranged to engage that edge of the sheet of paper projecting above the folding blade 79 and force the same through the opening 96 and over the upper end of said folding blade. To the shaft 125 is secured a rocker arm 128 that is connected by a cam rod 129 to a cam *f* mounted on the driving shaft 12, this cam serving to effect rocking movement of the shaft and the folding member 123 while the carriage as a whole is reciprocated on the rods 127 through the medium of a link 130 and lever 132 from a cam *f'* mounted on the driving shaft 12 (Fig. 22). The lever 132 is pivoted on a bracket 133 and is connected with the cam by a rod 134 in order to impart

positive movement in both directions while the rocking movement imparted to the shaft 125 is effected positively in one direction, the return movement being accomplished by a tension spring 131 (see Fig. 22).

The approximately vertical face of the folding blade 123 serves to support the projecting edge of the sheet of paper during the application of the paste and then operates to move the projecting edge of the paper over the folding blade and bend the same down over the edge of the paper at the opposite side of the blade and press the same into contact with this edge of the paper whereby a longitudinal seam is completed and the front and rear faces of the vertical portion of this folding blade are so arranged or are at such an angle to each other that in both operative positions the working faces will be vertical.

In order to apply paste to the projecting edge of the partly folded sheet, a gumming stamp 100 (Fig. 26) is employed. This stamp is mounted on a horizontally disposed shaft 101 carrying pinion 102 that intermeshes with a toothed sector 103, the latter being mounted on a shaft 104 that is disposed parallel with the shaft 101. The two shafts are mounted in bearings in a horizontally movable carriage 110, that is slidably supported on rods 111 carried by a bracket or standard 112 forming a part of the frame. This carriage is connected to the upper end of a lever 114, that is mounted at a point intermediate its ends on a bracket 115 projecting from one side of the main frame, the lower end of the lever carrying a roller which bears against an operating cam *d* on the shaft 9 and is held there-against by a spring 120. The lever is connected to the carriage by a link 113, the upper edge of which is provided with teeth for the reception of a pawl 116. The pawl is mounted on a shaft 122 that is provided at one end with the hand lever 121, so that when necessary the pawl may be thrown down for the purpose of engaging in the teeth and preventing a forward movement of the gumming stamp in case it is desired to stop the operation of this portion of the machine and thus temporarily stoppage may be effected while the main portion of the machine continues in operation. To the shaft 104 of sector 103 is secured the arm 105 and this arm is supported by a block 106, slidably mounted in a horizontally disposed slot arranged in an arm 107 at the upper end of a vertically movable bar 108. The bar 108 is guided within a bearing 109 and is raised and lowered by means of a cam *d'* on the main driving shaft 9. When the paste applying stamp 100 is in the vertical position as shown in Fig. 22, it engages during its forward movement with a paste roller 117, said roller being immersed in a paste reservoir 118 and



the roller is constantly revolved by means of a belt pulley 17 on the shaft 9 through intermediate transmission pulleys 119 and suitable belts. When the carriage 110 comes forward the stamp 100 still in the vertical position, moves over and receives paste from the roller, but before reaching the upstanding edge of the sheet of paper, the stamp is turned through an arc of ninety degrees and is then pressed against the paper while the angular folding plate 123 serves as a support for the rear face of the sheet. The paste applying stamp then moves backward and the longitudinal seam is completed by the forward and downward movement of the plate 123 as previously described. When the folding disk 78 has advanced another step the folded tube of paper is in alinement with the opening 97 (Fig. 18) of the frame 80 and the longitudinal seam made at the previous stopping place is pressed by a stamp 146 (Fig. 36). This pressing stamp the position of which is indicated in Fig. 86 is carried by a stem 147 guided in bearing openings in the standard 112 and operated by a link 148 and bell crank lever 149 that is pivotally mounted in a bracket 151 projecting from the frame member 15. The lever is connected by a weighted cam rod 150 to a cam *c* mounted on the driving shaft 9, the cam effecting movement of the stamp in one direction while the weight of the cam rod effects the return movement of said stamp. The function of the stamp 146 is merely to assist in uniting the parts of the seam. At the next step of the movement of the disk 78, the folding plate 79 still carrying the seamed paper tube is stopped with its lower end opposite the opening 98 of the frame 80 as shown in Fig. 18 and is there acted upon by the mechanism for stamping or cutting out the lower end of the paper tube, this mechanism being shown more clearly in Figs. 32, 33, 34 and 37.

To the bedplate 15 of the machine (Fig. 37) is secured a plate 154 upon which is mounted a matrix 152 having a die opening of the general contour illustrated at the top of the paper tube (Fig. 4) and this matrix is adapted to receive a punch or male die 153 that is slidably mounted in a block 153<sup>a</sup> carried by the plate 154 at a point opposite the matrix 152, the space between the two being sufficient for the passage of the folding plate 79 and the folded paper tube carried thereby. The male die or punch is carried by a bar 155 that is guided in a bracket 160 secured to the bedplate 15 and at the outer end of the bar is a link 156 connected to one arm of the bellcrank lever 157 that is pivoted on a lug 159 projecting from the frame, the opposite arm of said bellcrank lever being connected by a cam rod 158 to a cam *h* on the driving shaft 9. This mechanism operates immediately after the stop-

page of the folding blades 79 opposite the opening 98 and cuts from the end of the tube a recess of such nature as to permit the proper folding of the end of the tube for the purpose of forming a square bottom bag. At the next stage of the operation, that is to say, when the folding disk 78 is rotated a one-eighth revolution, the blade 79 comes opposite the opening 99 of the frame plate 80 and the longitudinal seam in the tube is again acted upon by a pressing stamp. In this case, a stamp 161 (Figs. 35 and 86) is employed, the stamp being carried by stem 162 connected by link 163 to a lever 165 that is pivotally mounted on a lug 167 projecting from the frame. The lever 165 is connected by a cam rod 166 to a cam *i* on the driving shaft 9 and the cam rod is weighted for the purpose of returning the pressing stamp in its operation. The function of this stamp is the same as that of the stamp 146, being merely to press the pasted seam tightly together. At the next step of the operation, that is to say after the folding disk 78 has completed another one-eighth revolution, the folding plate 79 carrying the pasted and cut tube is presented to the horizontal position shown to the right of Fig. 18 and at this point the tube is withdrawn from the folding plate 79 by the mechanism illustrated in Figs. 28, 29, 30 and 31. To the base plate 15 is secured a bracket 168 having a horizontally disposed arm in which is an elongated slot 169. The lower arm is provided with horizontal grooves forming guides for the sliding carriage 171 that is connected by a link 172 to a lever 173 and the lower end of the lever is connected by a rod 174 to a cam *k* on the transverse shaft 11 and through which horizontal reciprocatory movement is imparted to the carriage 171. The carriage 171 carries a two part clamp 175 and 176, the member 175 being rigidly secured to the carriage and having an arm projecting at right angles to the carriage while the second member 176 is arranged to slide upon this arm and is provided at its inner end with a roller 177 adapted to engage a stationary cam 170 that is rigidly secured to the bracket 168. The movable clamping member 176 is engaged by a spring 178 that tends to hold it in contact with the clamping member 175 and the two jaws of the clamp will remain in a closed position, illustrated in Fig. 31, until at the extreme outward movement of the carriage, the roller 177 is directed into contact with the cam 170 whereupon the clamping member 176 is moved outward in order to open the jaws. The bracket further carries a cam 179 that is disposed near the limit of inward movement of the clamp and is also engaged by the roller 177 for the purpose of opening the jaws of the clamp. This cam 179 is pivoted on the bracket 168 and is operated through



a rod 180 and link 181, from a bell crank lever 182 that is pivoted on a bracket 184 (see Fig. 29). The bell crank lever is connected by a rod 183, to a cam  $l'$  on the driving shaft 9, the cam effecting movement of the bell crank lever in one direction and the cam rod being weighted in order to effect the return movement. The cams and the operating parts are so timed that when the carriage moves forward the cam 179 is in position to be engaged by the roller 177, so that the members of the clamp will be opened and the end of the paper tube will be received between the jaws 175 and 176. The jaws being still open, the cam 179 is retracted and the jaws closed upon the tube after which carriage 171 is moved to the rear and the clamps are carried back together with the tube until the roller 177 strikes the stationary cam 170 and the jaws are opened releasing the tube. This mechanism serves to carry the pasted and cut tube into the slot of a turn table 195 that is arranged at the next step (Figs. 38 to 44). The mechanism shown in Figs. 38 to 44 inclusive operates to turn the pasted and cut tube from a substantially horizontal position to a vertical position.

The frame 188 is provided with bearings 197 for the reception of a horizontally disposed shaft 196 at one end of which is secured a turn table 195. This turn table is provided with plates arranged to form slots for the reception of the edges of the pasted tube and the plates are separated from each other to an extent sufficient to permit the passage of the clamps 175 and 176 as the latter carry the tube into the turn table. The shaft is provided with a crank 199 that is connected by a cam rod 200 to the cam 1 mounted on the transverse shaft 11 and serving to move the turn table through an arc of ninety degrees. The paper tube is turned around so that its rear end after a quarter rotation of the shaft 196 is inserted between two short guide bars 203 and 204 that are mounted on the main guide bars 205 and 206 fixed on the table 15 and spaced from each other to an extent sufficient to permit the free passage of the tube. The turn table 195 carries the stud 202 that is arranged to engage an adjustable stop screw 201 carried by the frame in order to insure the stoppage of the turn table when the paper tube has been moved to vertical position. The two guide bars 203 and 204 have their inner walls arranged in alinement with the inner walls of the main guide bars 205 and 206 in order to form a spread channel or passage 424.

After the turn table and paper tube have been moved to a vertical position the upper end of the tube is engaged by a pushing pin 194 that is secured to the lower end of a vertically movable bar 193, the latter being carried by a bar 189 arranged to move with-

in a guide at the upper portion of the frame 188. The bar 189 is connected to one end of a lever 190 that is mounted on a link 191 carried by the frame 188 and the opposite end of the lever is connected by a rod 192 to a cam  $l'$  mounted on the driving shaft 12. The paper tube is forced down into the slot 424 in a position between a pair of centering fingers 208 that are carried by a pair of vertically disposed shafts 207 mounted in bearings formed in the bar 206. These shafts carry rocker arms 209 having slotted end portions that are engaged by a pin carried by one end of a bar 210. This bar is connected by a bellcrank lever 211 mounted on a bracket 213 to a cam rod 212 that receives movement from a cam  $m$  mounted on a driving shaft 9. The return movement of the bar 210 is effected by means of a weight attached to the cam rod 212 as shown in Fig. 38 and when this occurs the fingers 208 are moved from engagement with the sides of the tube. The paper tube now arranged within the slot or channel 424 receives a step by step movement through the mechanism shown in Figs. 81 to 85 inclusive and at each step of the movement is operated upon by mechanism for the purpose of folding and pasting the projecting end of the tube and forming the same into a square bottom.

The guide bar 205 which forms one wall of the slot or channel 424 carries an angle bar 394 so arranged as to form a recess between the upper horizontal web of said angle bar and the upper surface of said bar 205. In this recess is arranged an inverted U-shaped conveyer bar 392 within which is a flat bar 393, the latter resting directly on the guide bar 205 Figs. 54 and 84. The conveyer bar 392 is connected to the operating lever 399 by means of a pin 397 and a link 398, this lever being moved to and fro through the medium of a cam rod 400 from a cam  $n$  mounted on the transverse shaft. The lower edges of the vertical webs of the conveyer bar 392 are provided with small bars or strips 395 which rest on small rollers 396 mounted on the bar 205 in order to avoid sliding friction during the movement of said bar 392. This bar 392 is provided with recesses for the reception of the inner ends of bent grippers 407 and 408, arranged in pairs, these grippers being pivotally mounted on pins 409 and 410 that are carried by the bar and one pair of grippers is employed at each stopping place in order to properly hold the paper tube during the action of the several folding, pasting and pressing mechanisms. The intermediate portions of the bar 392 between the recesses form solid walls 414 which coact with the roughened faces of the grippers for the purpose of firmly holding the paper tubes in place.

The pins 409, 410, on which the grippers are secured extend through the horizontal



web of the conveyer bar 392 and are provided at their lower ends with small cranks or rocker arms 421 and 422, which are connected to each other by springs 413 in such manner that the gripping ends of said grip levers will be forced in a direction of the solid portions 414 of a conveyer bar. Pins 419, 420, are also employed on the grippers and said pins extend through arcuate slots 411 and 412 of the horizontal web of the conveyer bar 392 and carry at points below said web antifriction rollers 426 and 427. As the grip levers must move outward from the channel 424 on the return movement of the conveyer bar it is necessary to release them after the forward movement has been completed and in similar manner when the return movement has been completed the grip levers must again come into play, that is to say, they must again press the paper tube against the solid portion 414 of the conveyer bar.

The flat bar 393 is arranged loosely within the conveyer bar 392 and said bar 393 is provided with openings 415 and 417 for the reception of the actuating rollers of grip levers 407 and 408 respectively and these rollers 426 and 427 are arranged to engage with the walls of these recesses, one recess having a cam face 416 for engagement with roller 426 while the other has a cam face 418 for engagement with the roller 427.

During the forward movement of the conveyer bar 392 a projection 404 on the flat bar 393 engages the lever 402 that is pivoted on a pin 403 at the moment the conveyer bar (Fig. 81) has completed its movement, and the lever 402 is at this time so moved that the flat bar 393 is moved backward by said projection 404 while the conveyer bar remains stationary. This effects the engagement of the cam faces 416 and 418 of the recesses 415 and 417 with the rollers 426 and 427 and the grip levers are moved out of the channel 424 and the parts are held in this position with the grippers in released position during the return movement of the conveyer bar. When a conveyer bar 392 has completed its return movement, the lug or finger 405 on the bar 392 engages the end of the lever 402 and the latter is moved forward slightly so that the rollers 426 and 427 are released from the slots or indentations 428 and 429 of the recesses 415 and 417 and the grippers are again pressed against the paper tube by the springs 413. The paper tube is again moved forward by the conveyer bar 392 until stopped at the next station, the operation repeated and the paper tubes advanced step by step along the channel 424. The lever 402 is operated by means of a cam rod 401 from a cam  $n'$  mounted on the transverse shaft 11.

At the first stopping point the upper end of the paper tube which projects above the

guide bars 205, 206, is acted upon by the mechanism shown in Figs. 45 to 54, for the purpose of opening and initially folding the tube in the formation of the square bag bottom. The mechanism employed for opening out the tube includes a pair of suction nozzles 221, the ends of which are oblique to the axes of the tubes as shown in Fig. 50<sup>a</sup> and these ends of the suction nozzles are arranged to engage against the opposite sides of the paper tube to draw the same open when a partial vacuum is created within said tubes. The upper ends of the nozzles 221 are carried by blocks 216 that are guided in arcuate slots 215 formed in a flat plate 214 that is supported by the frame. These blocks are pivotally connected to the lower ends of a pair of links 217 the upper ends of which are connected to one end of a lever 218 pivotally mounted in a bearing standard 198, the opposite end of said lever being connected by a rod 219 to a cam  $o^2$  for the purpose of effecting movement of the suction tubes or nozzles through an arc of approximately ninety degrees. The tubes or nozzles 221 are connected by pipes 220 with exhaust bumps 222 which are operated by cam rods 223 from cams  $o$  and  $o'$  respectively (Fig. 45).

As the paper tube is opened out by the operation of the suction nozzles, a pair of scoop shaped folders 225 (Figs. 50 to 54) enter the top of the paper tube. These folders are carried by arms 226 projecting from blocks 227 and the latter are guided in arcuate slots 229 formed in a vertically movable carriage 228 and are connected to the lower ends of a pair of links 231. The upper ends of the links are connected to one end of the lever 232 that is pivoted on standard 245, the opposite end of the lever being engaged by a cam rod 233 that receives movement from a cam  $o^2$  mounted on the driving shaft 12. The carriage 228 is in the form of a plate the opposite edges of which are arranged between guides 230 secured to the vertical portions of a frame member 246 (Fig. 50<sup>b</sup>).

After the walls of the paper tube have been slightly separated by the action of the suction nozzles the lever 232 is operated and the carriage 228 is lowered until it rests on stops formed by a pair of set screws 234 carried by brackets projecting inward from the frame member 246. The folders 225 enter the top of the tube during the downward movement of the carriage and on the further descent of the lever 232 these folders will travel in arcuate paths in slots 229 and in this manner fold the upper end of the tube outward, this being the initial step in the folding of the bottom of the bag. During this preliminary folding the paper tube is held in the channel 424 by a clamping plate 235 (Fig. 54), said plate being mounted at



the top of the guide bar 206 and being operated by a lever 236 pivotally mounted on said guide bar by a short shaft 244. This lever is moved in one direction by a spring 238 that tends to force the clamping plate into engagement with the paper tube. Movement in the opposite direction is effected by the bar 237 which is engaged by a horizontally disposed bar 239, the outer end of which is connected by a link 240 to a bellcrank lever 241 pivoted on a bracket 243 carried by the frame. The bellcrank lever is connected by a cam rod 242 to a cam  $p$  mounted on the driving shaft 9.

After the return of the nozzles and the folders 225 and after the clamping plate 235 has been moved from engagement with the paper tube, the latter is moved along the channel 424 to the next stopping point where the bottom is folded quite flat and the overlapping portion 5 of the bottom is brought into approximately vertical position by the mechanism illustrated in Figs. 55 to 60. At this second step of the bottom folding operation two narrow folders 250 are employed. These folders are mounted in arcuate slots 249 formed in a vertically movable carriage 248 in such manner as to permit movement of each folder through an arc of ninety degrees, the points of the folders forming the centers of rotation. The carriage 248 is provided with a pair of contact screws 252 and the folders 250 have projecting lugs 251 which engage with said screws in order that the highest positions of the folders may be exactly determined. The carrying blocks of the folders 250 are connected by links 256 to a lever 258 that is pivoted on standard 245 and is operated by a cam rod 259 from a cam  $q'$  on the driving shaft 12. The carriage 248 is mounted in vertical guide standards 257 and carries lugs 255 which engage with adjustable stop screws 254 that are carried by brackets 247 projecting from the standards 257 and limit the downward movement of the carriage. Two small projections 253 of the height of the flap 5 of the bottom of the paper bag are arranged at the points of the folders 250 for the purpose of bringing the flap 5 into vertical position and the flap is folded to this vertical position by two revoluble side folders 266. The folders 266 are mounted on arms 265 (Fig. 58) which are pivoted on pins 268, the latter projecting from the vertically movable carriage 260 (Fig. 56). The carriage 260 is mounted on vertically movable bars 261, the bases 262 of which are secured to the bed plate 15 of the machine, the upper ends of said bars being connected by a cross bar 263. The bar 263 projects laterally, as shown in Fig. 59 and carries a pair of rollers 264 against which the upper angularly bent arms 267 of the folder arms 265 engage. The arms 267 carry small

bracket arms 273, the ends of which are drawn toward each other by a helical tension spring 274.

The vertical movement of carriage 260 is effected through a link 269 and lever 270 mounted in a bearing bracket 271, said lever being engaged by a cam rod 271 that receives motion from a cam  $q$  mounted on the main driving shaft 9. The levers 265 are so turned that their folders 266 are caused to separate and to approach each other to accomplish the vertical folding of the flap 5. During the descent of the carriage 266 and the operation of the folders the paper tube is pressed against the guide bar 205 by means of a clamping plate similar to that employed at the previous folding stage.

After the paper tube has been folded and the folders have assumed their initial position, said tube is carried by the mechanism previously described along the channel 424 to the gumming or paste applying mechanism, shown in Figs. 61 to 65, and at this point the bottom being completely folded is provided with a layer of paste as indicated by the shaded portion of Fig. 65.

The paste applying stamp 275 is mounted on a carriage 276 that slides horizontally on bars 277. These bars 277 are carried by a vertically movable carriage 278 which is arranged to slide on vertical bars 279 and vertical movement is imparted to said carriage 278 by a lever 281 connected by a link 280 with the carriage. The lever is pivoted on a bracket 287 and is operated through a cam rod 282 from a cam  $r$  mounted on the driving shaft 12. The horizontal movement of the gumming stamp 275 is effected by means of a rod 289, the end of which is fitted within a slot 288 of a lever 285, the latter being pivoted on the bracket 287 and being moved by a cam rod 286 from a cam  $r'$  mounted on the shaft 12. In order to prevent the operation of the paste applying stamp 275 while the rest of the machine continues to work, a catch 284 is pivotally mounted on a bracket 300 carried by the frame and is provided with a handled lever 283 so that the catch may be adjusted to engage a notch on the link 280 and prevent the descent of the latter.

The paste applying stamp is passed over a roller 297 that is partly immersed in paste or gum contained in a vessel 298, said roller receiving an intermittent rotative movement from a rack bar 290 supported by the carriage 276 and a gear train including gears 291 and 293 and an intermediate pinion 292. The gear 293 is secured to the shaft of the paste applying roller so that the latter may be turned in order to raise the paste from the reservoir in position to be applied to the stamp 275. The stamp 275 is first moved horizontally forward and passes over the paste applying roller and is then lowered



after the rack bar 290 has passed beyond the gear 291 and thus no longer forms an obstruction to the descent of the stamp, the latter moving downward and applying to the folded bottom of the bag a layer of paste, the outline of which is indicated by the shaded portion of Fig. 65.

In order to prevent the raising of the partly folded bag as the paste applying stamp ascends, a stop or holding block 294 is arranged to engage with an unpasted portion of the partly folded bottom. This block 294 is arranged at one end of a lever 295 that is pivoted on a bracket 299 carried by the frame, the opposite end of the lever being connected to a cam rod 296 that receives motion from a cam  $k^2$  mounted on the main driving shaft 9.

After the application of the paste the partly formed bag is again moved along the channel 424 to the next step stages XIII to XIV, Fig. 2, where the bottom is closed by means of the mechanism illustrated in Figs. 66 to 71. In carrying out this operation a number of clamp plates and folders are employed, two of these clamp plates 312, and 313, being movable in the direction of the length of the channel 424. These clamp plates are mounted on levers 310 and 311 respectively, said levers being pivoted on a shaft 302 arranged parallel with the channel 424. The undersides of the hubs of these levers are toothed forming racks that are engaged by pinions 308 and 309 (Fig. 66<sup>c</sup>) arranged beneath the hubs and intermeshing with each other. The pinion 308 is mounted on a shaft 307 carried in bearing standards 301 and 303 and to the shaft is secured a rocker arm 305 which is coupled by a rod 305<sup>a</sup>, and the coupling 306 to a vertically movable bar 304, which receives vertical movement from a cam  $k'$  on the shaft 9. When the rod 304 is raised or lowered by this cam the shaft 307 is turned and the pinions 308 and 309 are turned in opposite directions respectively and the levers 310 and 311 are moved toward or from each other. The clamp plate 313 projects somewhat beyond the clamp plate 312 and when these clamp plates are moved toward each other they hold two corners of the paper tube so that the other two corners may be folded down over the pasted central portion of the bottom of the bag. In addition to these clamp plates two folders 336 arranged in recesses 430 in the guide bars 205 and 206 are brought into action these folders moving at a right angle to the direction of movement of the clamp plates 312, 313, and serving to fold the corners of the bag bottom lying across the channel 424 over the center part of the bottom of the bag. Folders 336 are carried by arms 335 depending from a horizontally movable carriage 332 and the guiding members of this carriage

are mounted in a vertically movable carriage 318. The carriage 318 is guided in vertical bars 319, the lower ends of which are supported by standards projecting from the bed plate 15 and the upper ends of said bars are connected by a horizontally disposed cross bar 320 which latter also forms a support for a lever 322 employed for raising and lowering the carriage. One end of the lever 322 is connected by links 321 with the carriage 318 and the other end is connected to a cam rod 323 which is operated from a cam  $s$  on the shaft 12 for the purpose of imparting vertical movement to the carriage.

The lateral or horizontal movement of the bottom folders 336 is effected by means of a cam 331 that is arranged between a pair of rollers 333 mounted on the two carriages 332 by which the folders 336 and their arms 335 are supported. The two carriages 332 are connected by helical tension springs 324 which tend to maintain the two rollers 333 in engagement with the cam 331. This cam 331 is carried by a vertically disposed shaft 330 that is mounted in bearings in the upper cross bar 320 and at its upper end is a beveled gear 329 that intermeshes with a toothed sector 328 carried by a shaft 327 mounted in bearings formed in said cross bar 320. To the outer end of the shaft 327 is secured a crank or rocker arm 326 which is connected by a rod 325 to the vertically movable rod 324, said rod being actuated by a cam  $s'$  mounted on the driving shaft. The movement imparted by the cam  $s'$  is for the purpose of turning the cam 331 backward or forward to the extent of ninety degrees and when moved in one direction, that is to say, until its length is parallel with the length of the channel 424, the carriages 332 will be drawn together by the springs 334 and on the next movement, the parts assuming the position shown in Fig. 70, the carriages 332 will be forced apart and the folders 336 will be carried with them.

During the operation of the folders, the movement of the clamp plates 312 and 313 is completed before the folders 336 are advanced, but said clamp plates 312 and 313 start on the rearward movement before the folders 336 have completed their forward movement. When the closing of the bottom of the paper bag is completed, the folders are returned to their initial position, the folders 336 being spread apart and then raised while the clamp plates 312 and 313 each during the folding operation are pressed against the bottom of the paper bag by springs 37, or lifted by levers 314, 315, which engage against rollers 316 and 317, depending from the folder carrying levers 310, and 311. The levers 314 and 315 are mounted on a shaft 302 having bearings in the standards 301 carried by the frame and



the lever 314 is extended, its outer end being connected to the cam rod 316, which receives motion from a cam *t'* mounted on the main driving shaft 9. The bottom of the paper bag is now closed and said bag is conveyed along the channel 424 to the next stage, where it is pressed flat by a stamp 338 (Fig. 75). This stamp is carried by a lever 339 mounted in bearings in a standard 340 and connected by a cam rod 341 with a cam *u* mounted on the main driving shaft 9. The paper bag now passes from this last stage to the next stopping point near the end of the channel 424 from which it is drawn out and conveyed in to a storage or distributing trough 369. The bottom of the paper bag before being drawn out of the channel is pressed flat against the main body of the bag at an intermediate stage and is finally conveyed to a point where it rests on a plate 383 (Fig. 74), the latter turning a quarter of a revolution and conveying the bag into a storing trough 369. The mechanism for accomplishing this work is illustrated in Figs. 72 to 80.

The bed plate 15 carries three spaced standards, 350, 351 and 352, that are arranged in line with each other transversely of the machine and serve as supports for a slidable bar 345 having at one end a bracket 346 that is connected by a link 347 to one end of a lever 348. The lower end of the lever is pivoted on a bracket 349 and receives motion from a cam *v* on the main driving shaft 9. The extent of movement of the bar 345 is determined by an angular stop 367 secured to the bar and arranged to engage an adjustable set screw 366 that is carried by a small bracket 365 secured to the standard 351. To the bar 345 is secured a laterally projecting arm 353 carrying bearings 354 for the support of a short shaft 355 arranged parallel with the length of the channel 424. On the shaft 355 is secured a clamping arm 356 which co-acts with a fixed clamping arm 431 projecting from the arm 353. The fixed clamping member is disposed within the recess 432 that is formed in the upper surface of the guide bar 205. At one end of the movement of the bar 345, the fixed arm 431 of the clamp passes under the body of the paper bag while the movable arm 356 passes over the bag and is pressed thereagainst by a spring 358. The spring is connected at one end to a rocker arm 357 carried by the shaft 355 and at the opposite end is secured to yoke 359 projecting from the bracket 346. Before the bottom of the bag is gripped by the clamps 356 and 431, the arm 356 of the clamp must first be turned to open position and this is effected by the following mechanism.

On the free end of the lever 357 is arranged an antifriction roller 361 which on the return movement of the bar 345 engages

a stop 363 that is revolvably mounted on a pivot 364 carried by an angular bracket 362 projecting from one side of the bar 345 (Fig. 80). When engaging this stop the lever 357 is turned and the clamping arm or jaw 356 is moved to open position. As soon as the roller 361 has passed the stop 363, which takes place at the end of the return movement of the bar 345, the roller again springs downward and the bar or jaw 356 passes the bottom of the paper bag on the arm 431. When the forward movement of the bar 345 takes place, the paper bag is drawn slightly out of the channel 424 and then a temporary stoppage occurs. At this point a narrow pressing stamp 342 (Fig. 78) is rapidly pressed against the bottom of the bag in order to fold the bottom flap against the tubular portion of the bag. The pressing stamp 342 is mounted on a lever 343 that is operated by means of a cam *w* upon the main driving shaft 9 through the medium of a cam lever 344. The operation of the stamp is but momentarily and after the folding is accomplished the bar 345 continues its movement and the paper bag being held between the clamping members 456 and 431 is carried away until it is moved free from the channel 424 and is laid on a plate 383. The plate 383 is mounted on a revoluble yoke 384 that is carried by a revoluble shaft 386 mounted in bearings in standards 289 and operated through the intermediary of a crank 387 and cam rod 388 from the cam *x* on the driving shaft 12.

Before the completion of the forward movement of the bar 345 the arm 356 of the crank has been moved to release the paper bag, this being accomplished by the roller 361 in encountering a cam 375 mounted on a standard 385 that is supported by the bed plate 15. This cam is adjustable as shown in Fig. 79 for the purpose of properly timing the releasing mechanism.

The plate 383 receives movement from a horizontal to a vertical position, being moved through an arc of ninety degrees, and the paper bag resting thereon is carried up into a horizontally disposed receiving trough 369. The bag being received within the trough is held in vertical position by a forked arm 378 which is lowered during the introduction of the bag. The forked arm is carried by an angular bar 379 that is pivotally connected with one end of the lever 380 the opposite end of the lever being pivoted to the bracket 381 projecting from the main frame and this lever is engaged by the cam *z* mounted on the main shaft 12, the cam effecting forward movement of the fork while movement in the reverse direction is accomplished by means of a coiled tension spring 382.

In order to guide the paper bags laterally after they have been removed from the chan-



nel 424, a plate 368 having tapered lower edge is arranged at one side of the inner wall of the distributing or storage trough 369. This plate carries pin 371 guided in an arcuate slot 370 formed in one of the side walls of the trough 369 and the rear edge of the plate is pivoted on a pin 374 carried by bracket 373, said plate being normally depressed by a helical tension spring 372. As the shaft 355 must move under this plate the shaft is provided with a grooved roller 360 on which the lower edge of the plate rests and as the shaft moves rearward the roller lying under the inclined edge of the plate raises the same until the roller passes beyond a point at the lower edge of said plate. In the distributing trough is arranged a slidable weight 377 that offers some resistance to the entrance of the paper bags so that the latter may be firmly held in upright position.

The principal portion of the driving mechanism of the machine is illustrated in Fig. 13 and includes three shafts 9, 11 and 12, arranged in the same horizontal plane and mounted in suitable bearings 14. The main shaft 9 is driven directly by a belted pulley 8 and imparts movement to the shaft 12 and shaft 11 through miter gears 10, the arrangement being such that all of the shafts revolve at equal speed. Near these shafts are arranged cams *a* to *z* previously described and said shafts also carry the pulleys 16 and 17, the parts being properly arranged in accordance with the mechanism supported by the bed plate 15. At each revolution of the shaft, a single sheet of paper is lifted off the block and a finished paper bag is conveyed into the storage trough, while simultaneously partly finished paper bags are conveyed from stage to stage of the folding blades and the channel 424 to be operated upon by the mechanisms which fold, paste and cut the tube and afterward accomplish the folding and pressing of the bottom and the delivery of the finished bag into the trough. In order to make paper bags of different sizes on the same machine, the folding plates 79 of the disk 78 are removable and the channel 424 between the bars 205 and 206 may be adjusted to various depths by the insertion of bars of different height in the channel for the support of the paper tube.

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

1. The combination with a slotted folding table, of means for feeding sheets onto the table, a revoluble folding disk, folding plates carried thereby and arranged to successively pass through the slot and carry the sheets therethrough, means for stopping the disk after each partial rotation, mechanisms

arranged opposite the various stopping points of the folding plates and co-acting therewith to fold over and paste down the edge of the partly folded sheet to form a tube; to press the seam flat, and to cut or recess the end of said tube, and means for finally withdrawing the successive tubes from the plates of further operations.

2. The combination with a slotted table, of a sheet stop for arresting movement of the sheets, spring fingers for preventing upward displacement of the sheets, a revolubly mounted folding plate for engaging the successive sheets, and a pair of plate guiding devices arranged above said table and having inclined walls for centering said folding plate in advance of its engagement with the sheet.

3. The combination with a slotted folding table, of a revoluble disk, a series of folding plates carried thereby, means for moving said plates to engage the sheet and traverse the same through the table, means for holding the sheet clamped upon the plate with one edge of the sheet projecting beyond the plate, means for applying adhesive to one side of the projecting edge, a folding member, and means for moving the folding member against the opposite side of the projecting edge, over the edge of the folding plate and downward on the opposite side of the folding plate to thereby form a tube.

4. The combination with a slotted folding table, of a revoluble folding disk, a series of folding plates carried thereby and adapted to engage successive sheets of paper and traverse the same through the slotted plate, an adhesive applying device, and a folding member one surface of which serves as a platen to support the paper during the adhesive applying operation, and means for moving said folding member to first fold the adhesive supplied portion of the paper over the edge of the successive folding plates, and then press the same over said plate and into contact with another portion of the sheet, the opposite surface of the folder acting during the pressing and folding operations.

5. The combination with a slotted folding table, of a folding plate movable through the slot to form a preliminary fold in the paper, an adhesive supplying bar, means for reciprocating the same toward and from the plate to supply adhesive to a portion of the paper beyond the edge of the plate, a folding member, a means for moving the folding member over the edge of the folding plate and downward on the opposite side of the folding plate, and thereby force the adhesive surface of the paper into contact with another portion.

6. The combination in paper bag machinery, of a folding plate for the reception of a tube blank, one end of the plate being



recessed, and coacting dies for engaging and cutting that portion of the paper tube covering said recess.

7. The combination in paper bag machinery, of a recessed tube forming plate, and cutting dies coacting therewith to form recesses in one end of the tube.

8. The combination with paper bag machinery, of a slotted folding table, a folding plate movable through the slot of the table, means for supplying an adhesive to one edge of the sheet carried by the plate, and for forming a tube from the sheet, means for intermittently traveling said plate, and die cutting means for recessing one end of the tube, means for pressing the overlapping edges of the tube together, and means for drawing the tube from the plate.

9. The combination in a paper bag machine, of a folding plate for the formation of a preliminary fold in the paper, means for supplying an adhesive to one edge of the sheet, means for overlapping the edges of said sheet and pressing the same together to form a tube, means for recessing one end of the tube, and means for withdrawing the finished tube from such folding mechanism.

10. The combination with a means for forming and pasting a flat tube, of means for withdrawing the tube from the forming devices, a receiving means, and means engaging and turning the tube and presenting the same to the receiving means.

11. The combination with a folding plate, of means for forming a tube therearound, gripping jaws for engaging the tube, means for traversing such gripping jaws, and means for closing the jaws on the tube and for opening the same to deliver said tube after the withdrawing operation.

12. The combination with a folding plate, of means for forming a tube therearound, a pair of gripping jaws, a carrier for said jaws, means for closing the jaws on the tube, and means for opening the jaws to release the tube after the withdrawing operation.

13. The combination with a pair of bars, spaced to form a receiving slot, of a tube forming means, means for removing the tube

therefrom, a turn table for receiving and turning the tube at an angle to its original position, means for forcing the tube endwise from the turn table into the slot, a plurality of fingers for adjusting the position of the tube in the slot, and means for folding and pasting the tube while the latter is held in said slot.

14. The combination with a pair of bars, spaced to form a receiving slot, of a tube forming means, means for feeding the tube into the slot, a clamping plate for engaging and holding the tube in said slot, and folding means for operating on the projected end of the tube.

15. The combination with a pair of bars spaced to form a receiving slot, of a tube forming means, means for feeding the tube into the slot, a clamping plate for engaging and holding the tube in position, means for releasing the plate and for imparting a step by step feed to the tube longitudinal of said slot, and folding means disposed at the various stopping places of the tube and adapted to act on the projecting end thereof.

16. In a machine of the class described, folders for the formation of a plurality of flaps, an adhesive applying stamp for simultaneously applying adhesive to all of the flaps, a carriage for effecting vertical movement of the stamp, a pinion supported thereby, and a rack connected to the stamp, the gearing connections serving to impart movement to said stamp in a direction at an angle to the direction of movement of the carriage.

17. In a machine of the class described, the combination with a pair of bars spaced to form a receiving block, of a traversing bar, clamping fingers arranged in pairs on said bars, springs tending to throw the clamping fingers of each pair toward each other, and cams for retracting said clamping fingers and releasing the articles being fed.

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

OTTO HESSER.

Witnesses:

AUGUST DRAUSZ,  
RUDOLF LOERZBATH.