

No. 869,664.

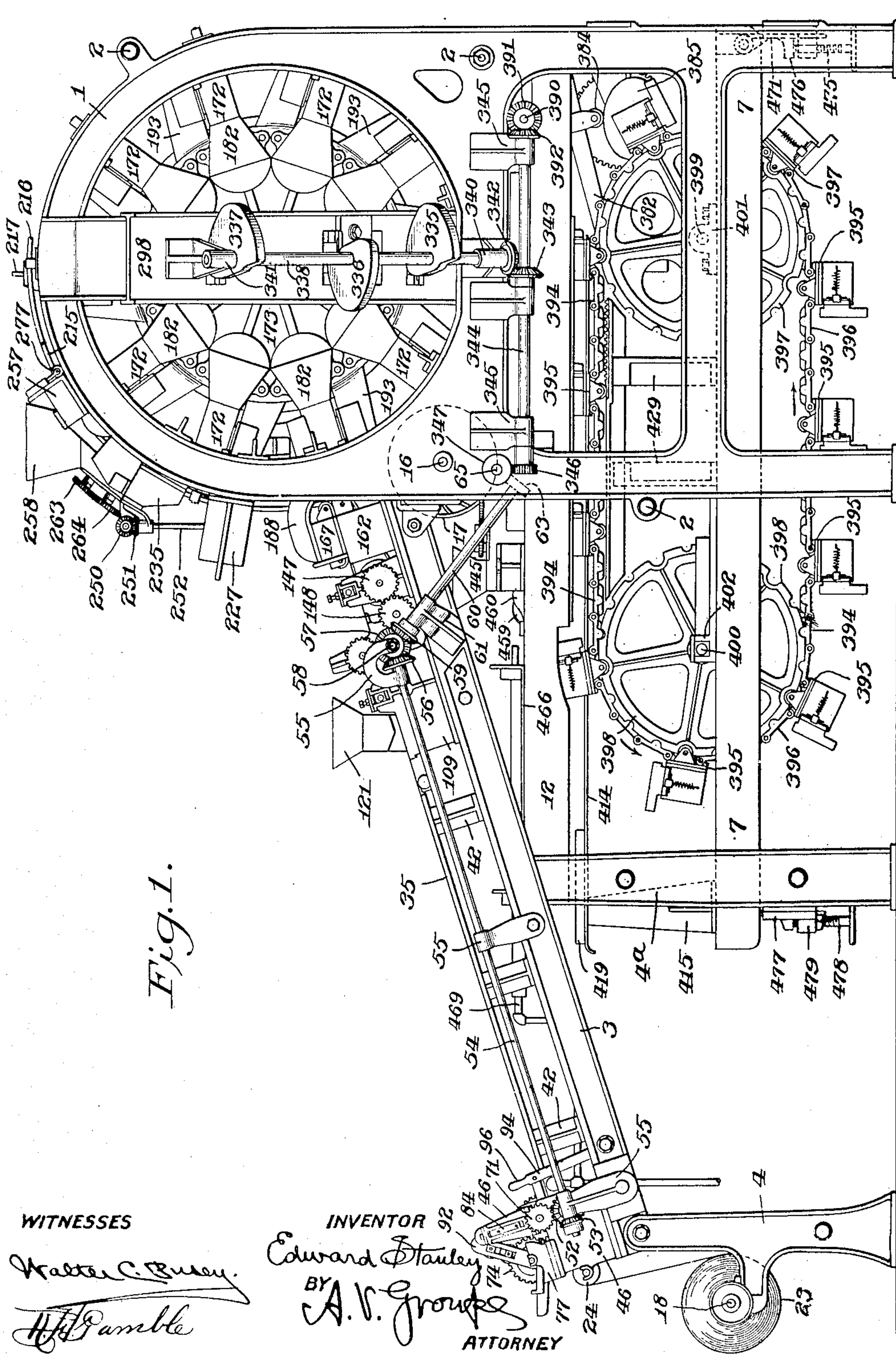
PATENTED OCT. 29, 1907.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 1.



WITNESSES

Walter C. Busby.
H. H. Parnell

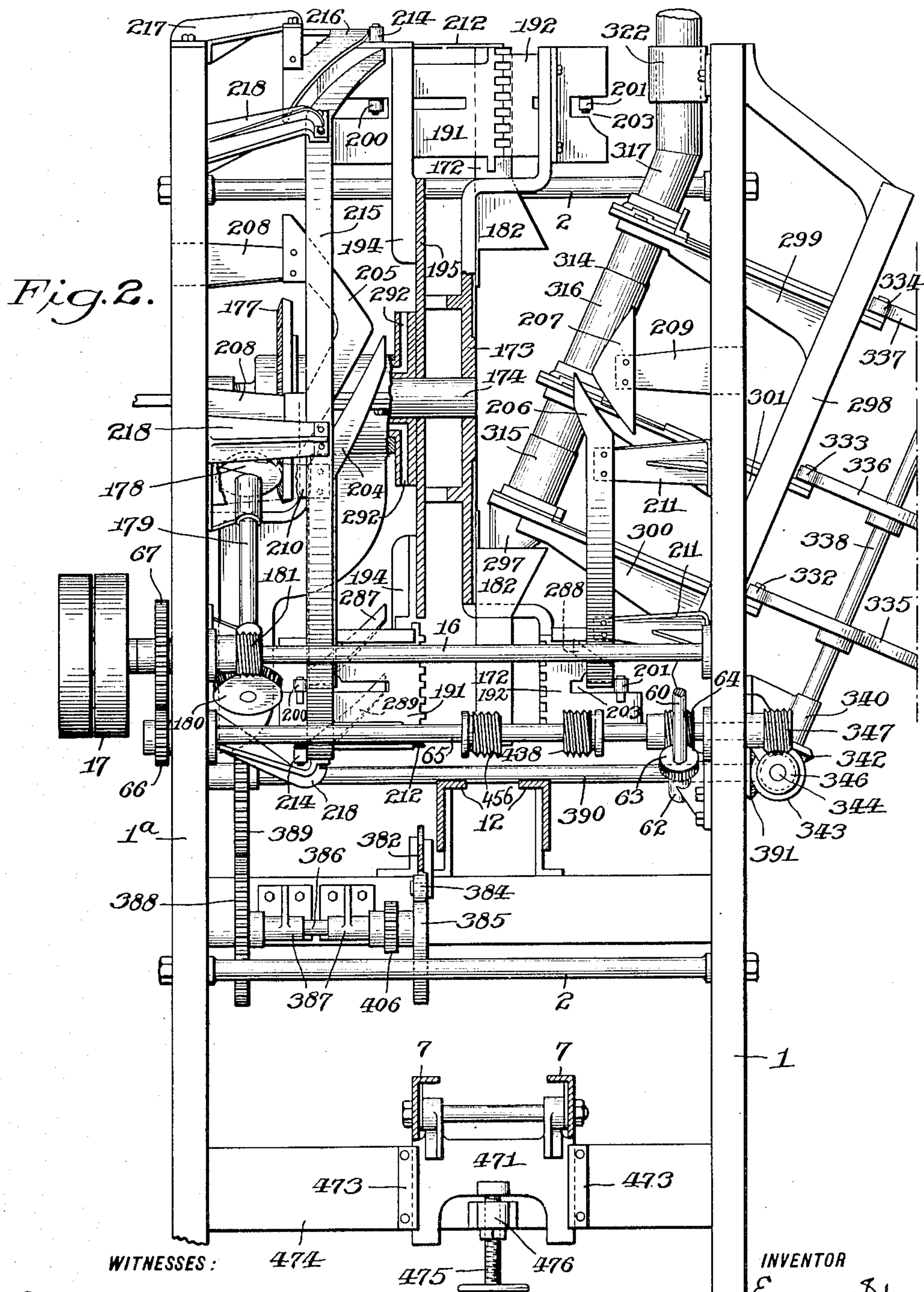
INVENTOR

Edward Stanley
BY
A. V. Group
ATTORNEY

PATENTED OCT. 29, 1907.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 2.



Walter C. Busby
H. H. Gamble.

INVENTOR
Edward Stanley
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A. V. Grouse
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No. 869,664.

PATENTED OCT. 29, 1907.

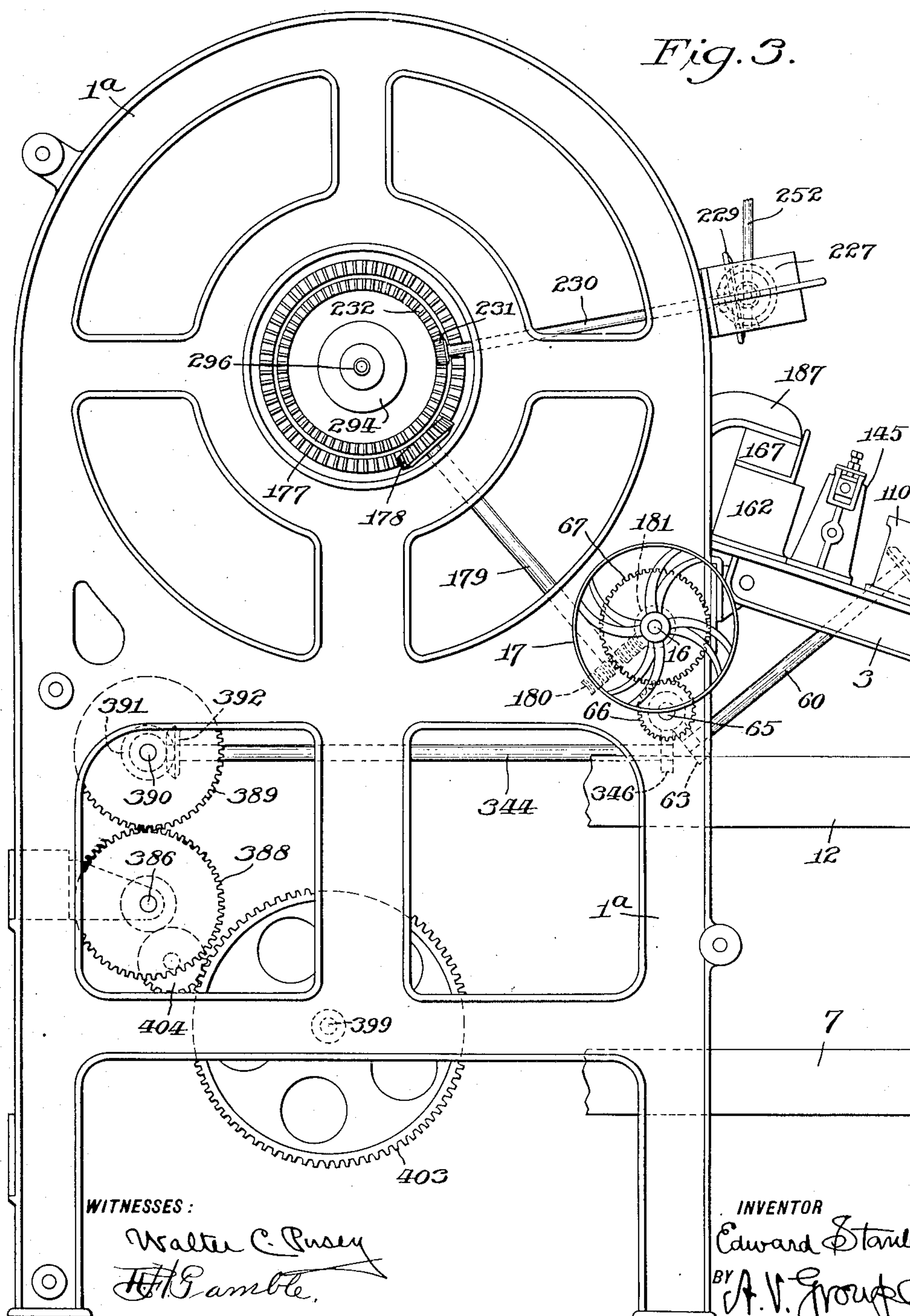
E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 3.

Fig. 3.



WITNESSES :

Walter C. Pusey
H. H. Gamble.

INVENTOR

Edward Stanley

BY A. V. Grouse

ATTORNEY

No. 869,664.

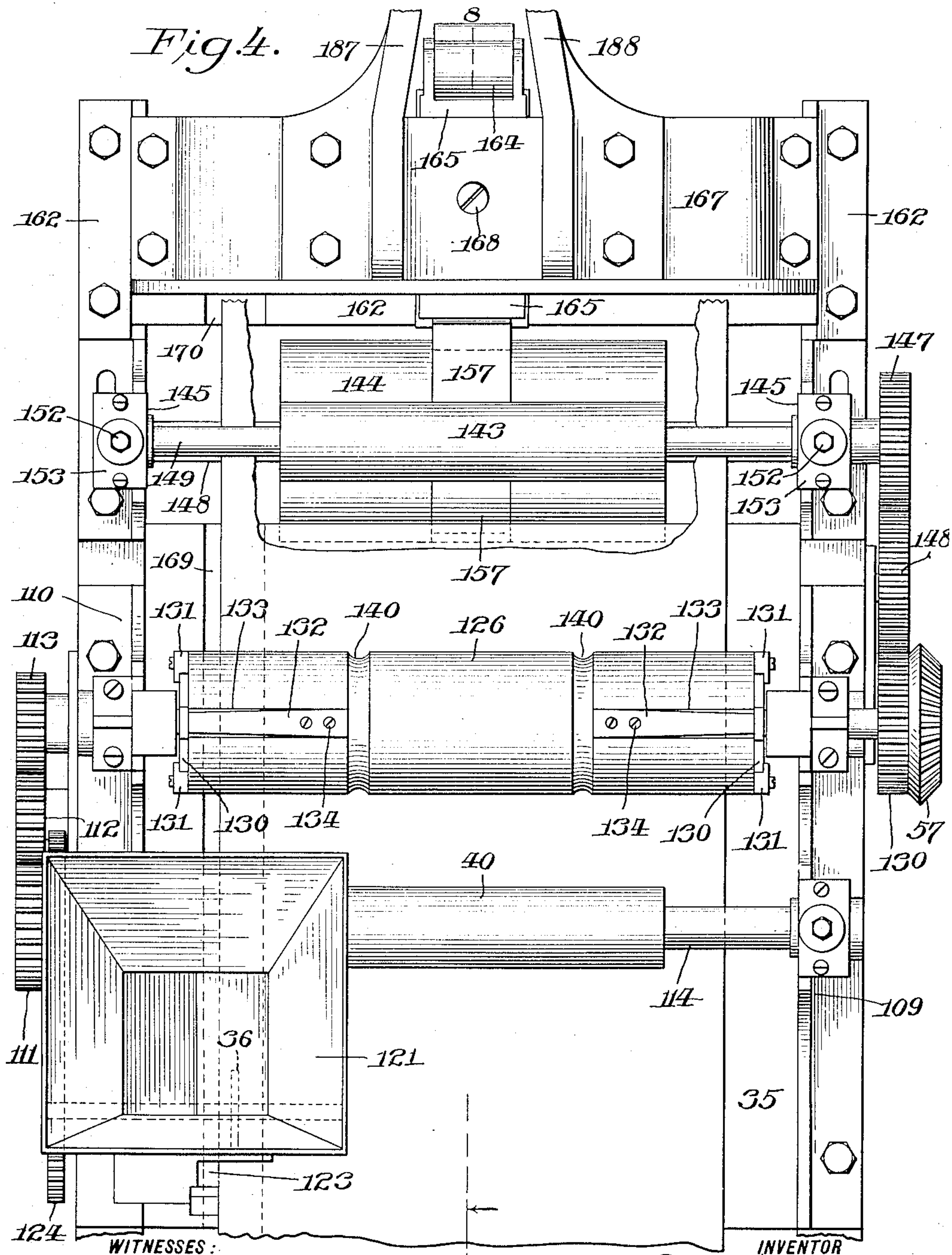
PATENTED OCT. 29, 1907.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 4.



Walter C. Bussey.
H. J. P. amble

INVENTOR
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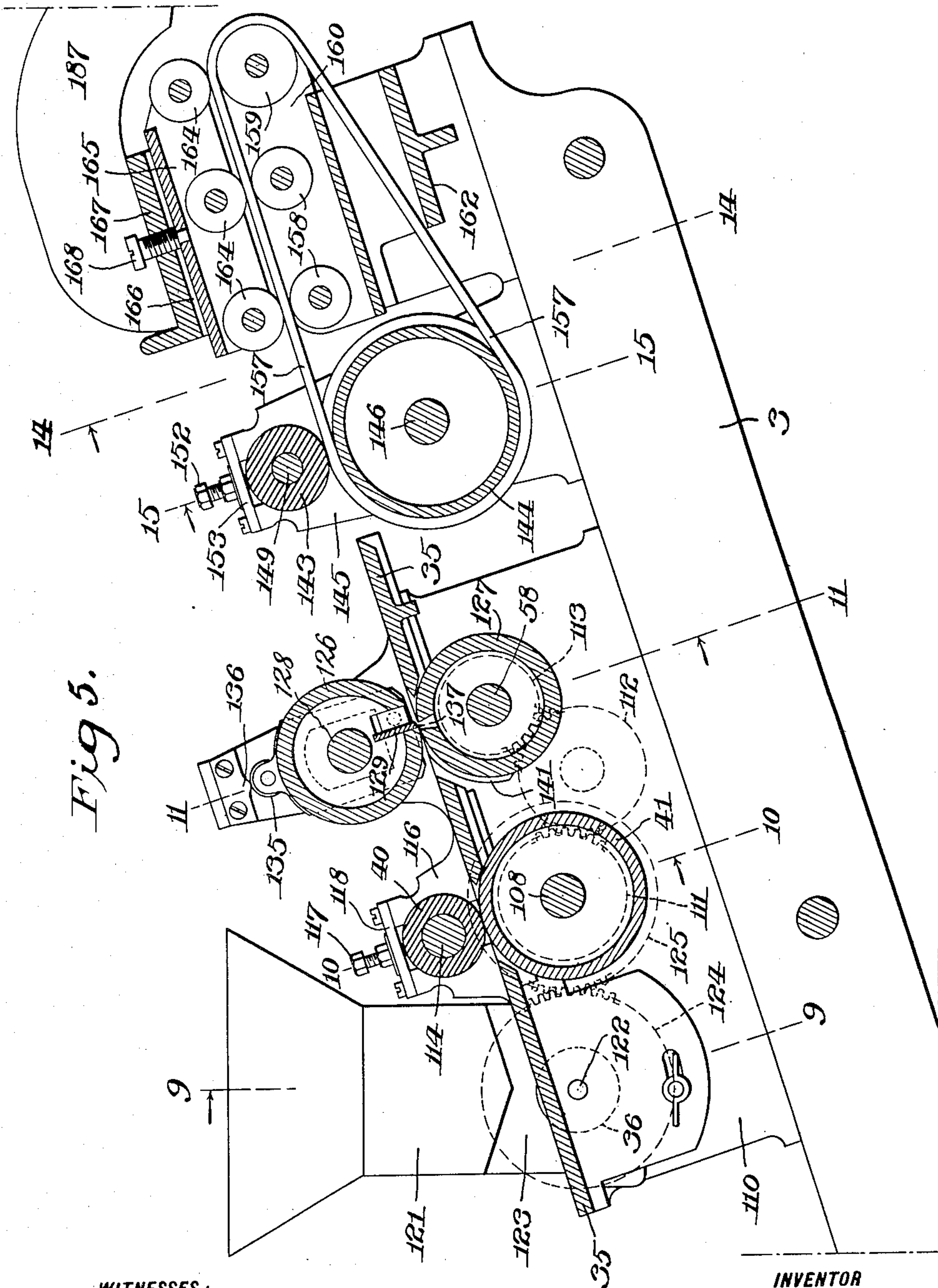
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E. STANLEY.
PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 5.

Fig 5.



WITNESSES:

Walter C. Rusey.
H. S. Gamble.

INVENTOR

Edward Stanley
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ATTORNEY.

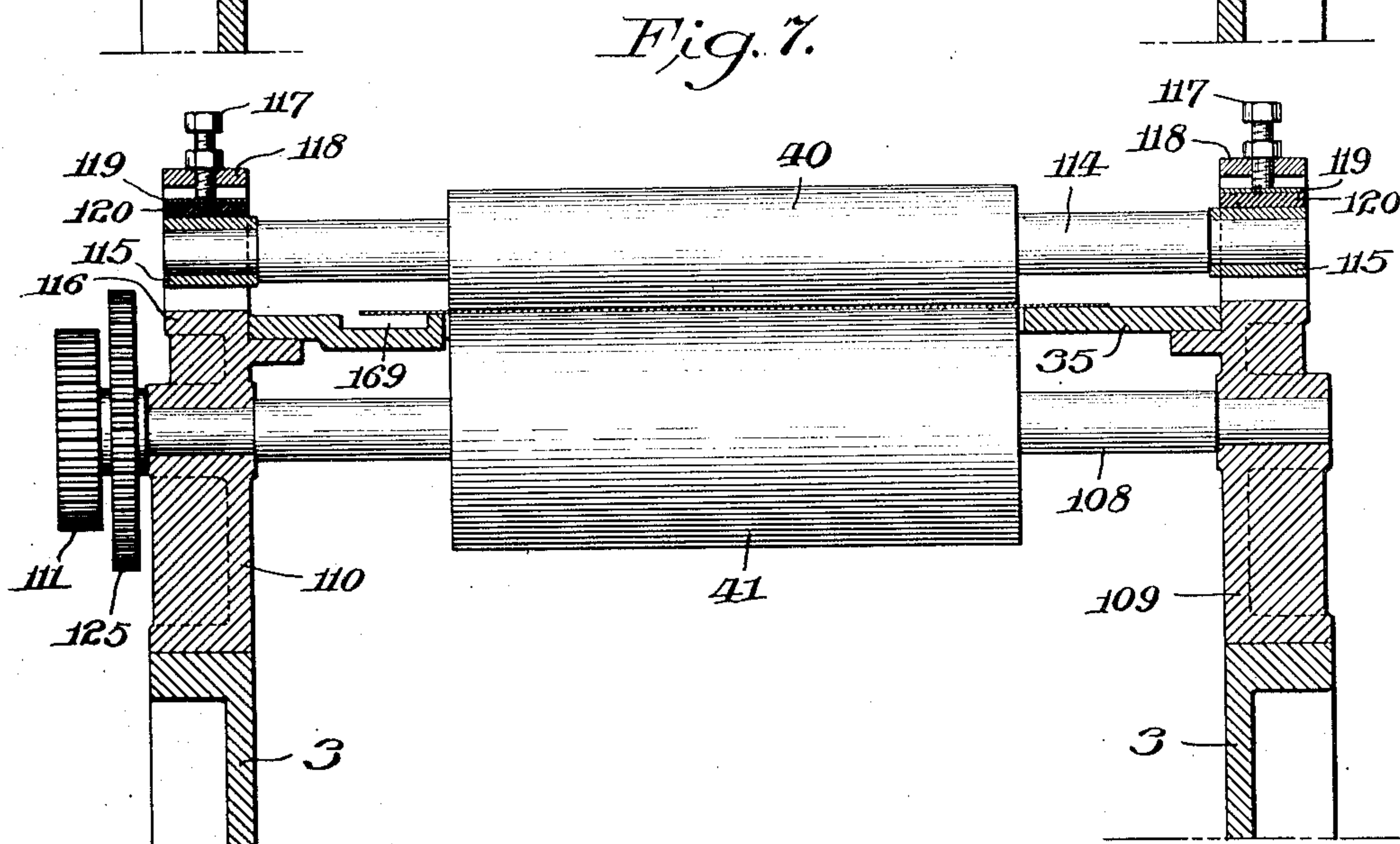
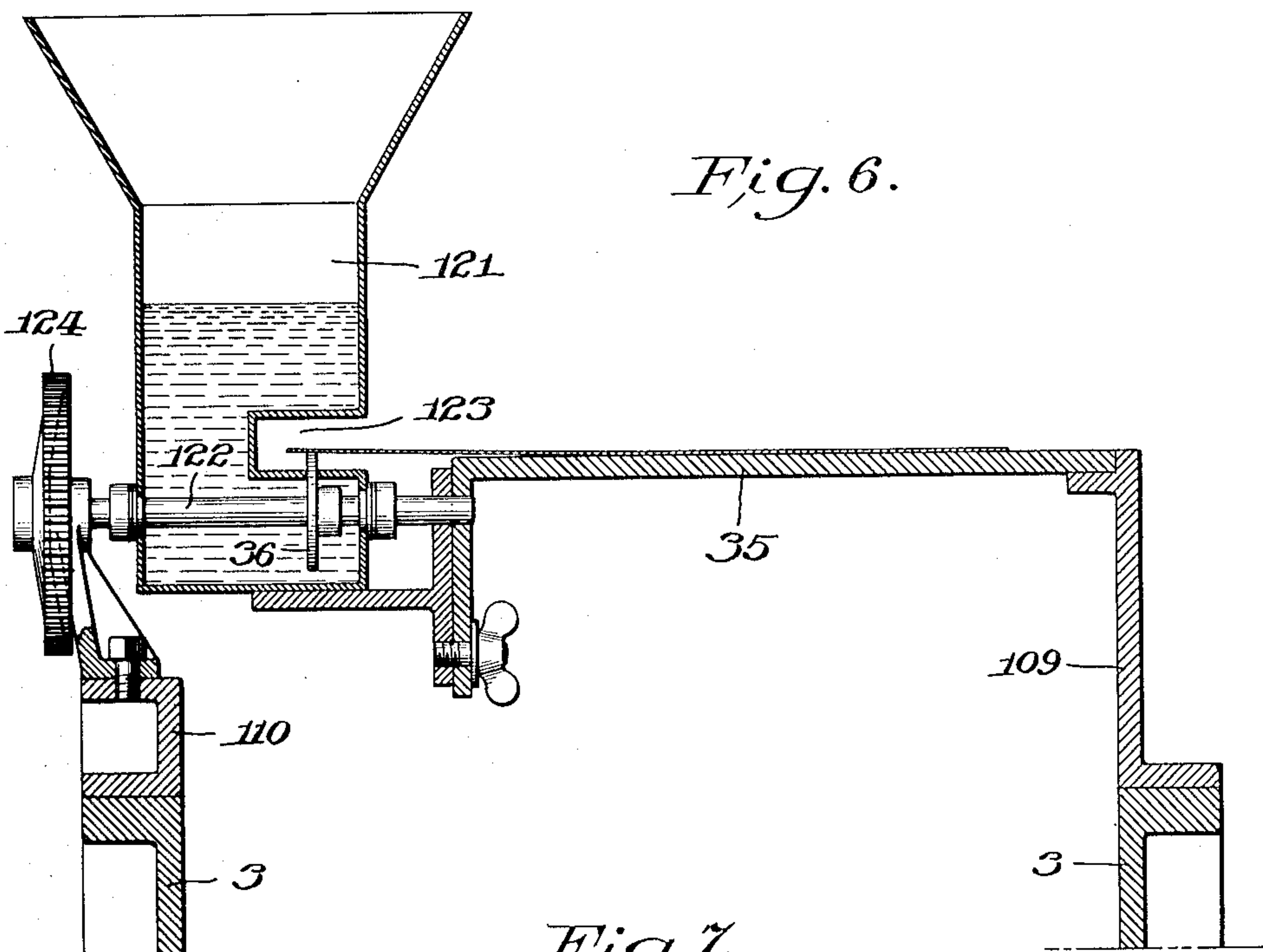
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E. STANLEY.
PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 6.



WITNESSES:

Walter C. Rusey
H. H. F. Amble.

INVENTOR

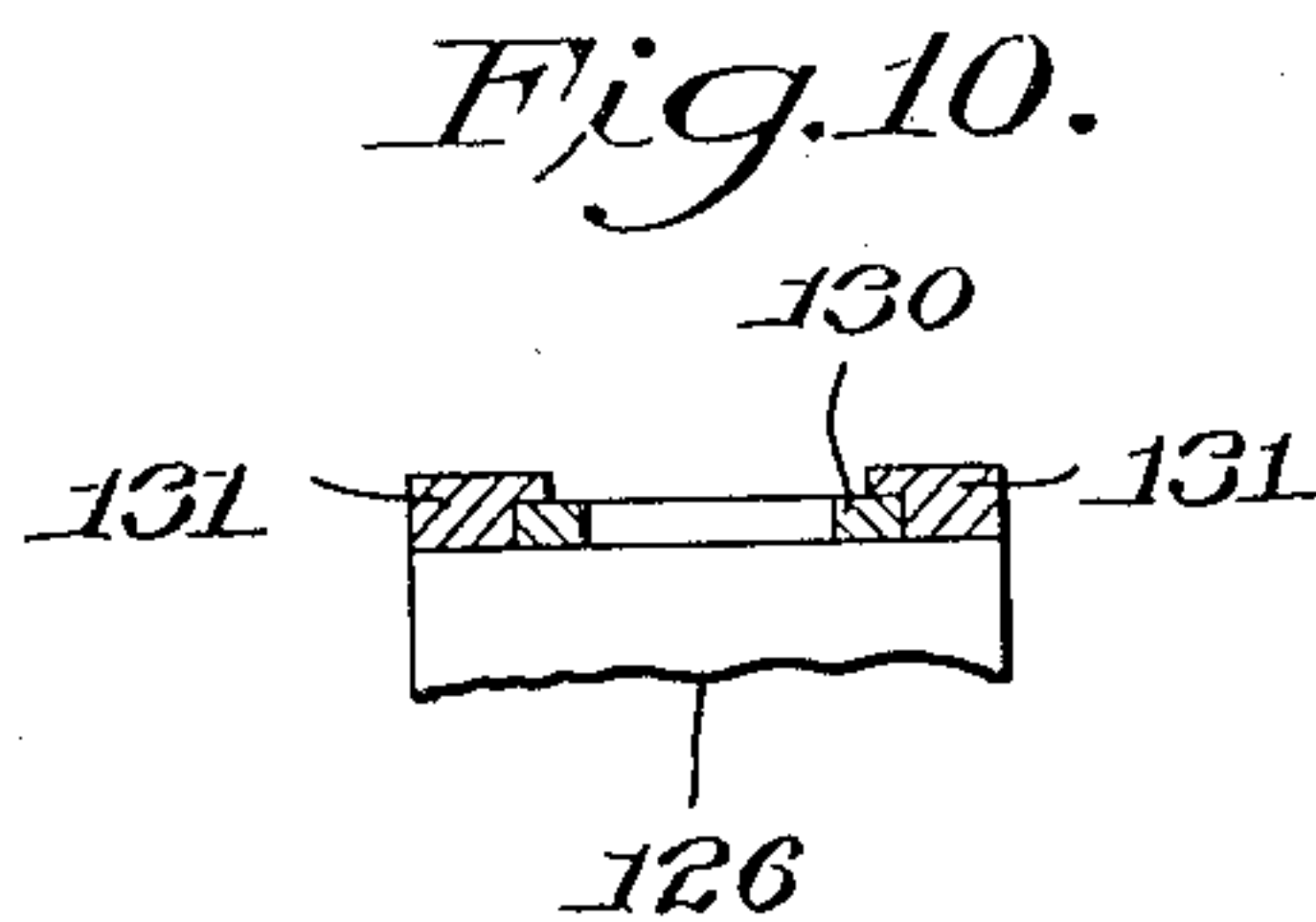
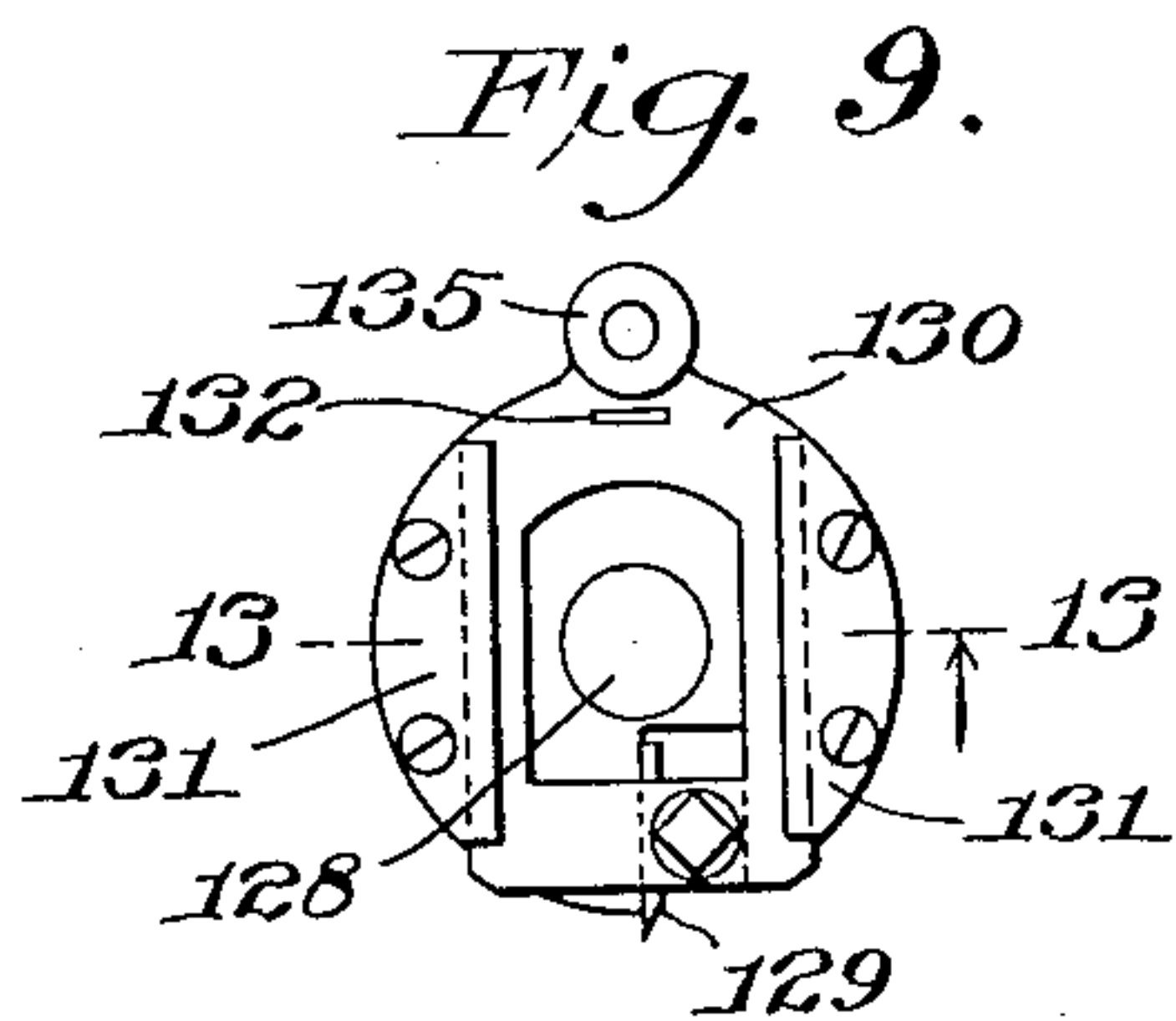
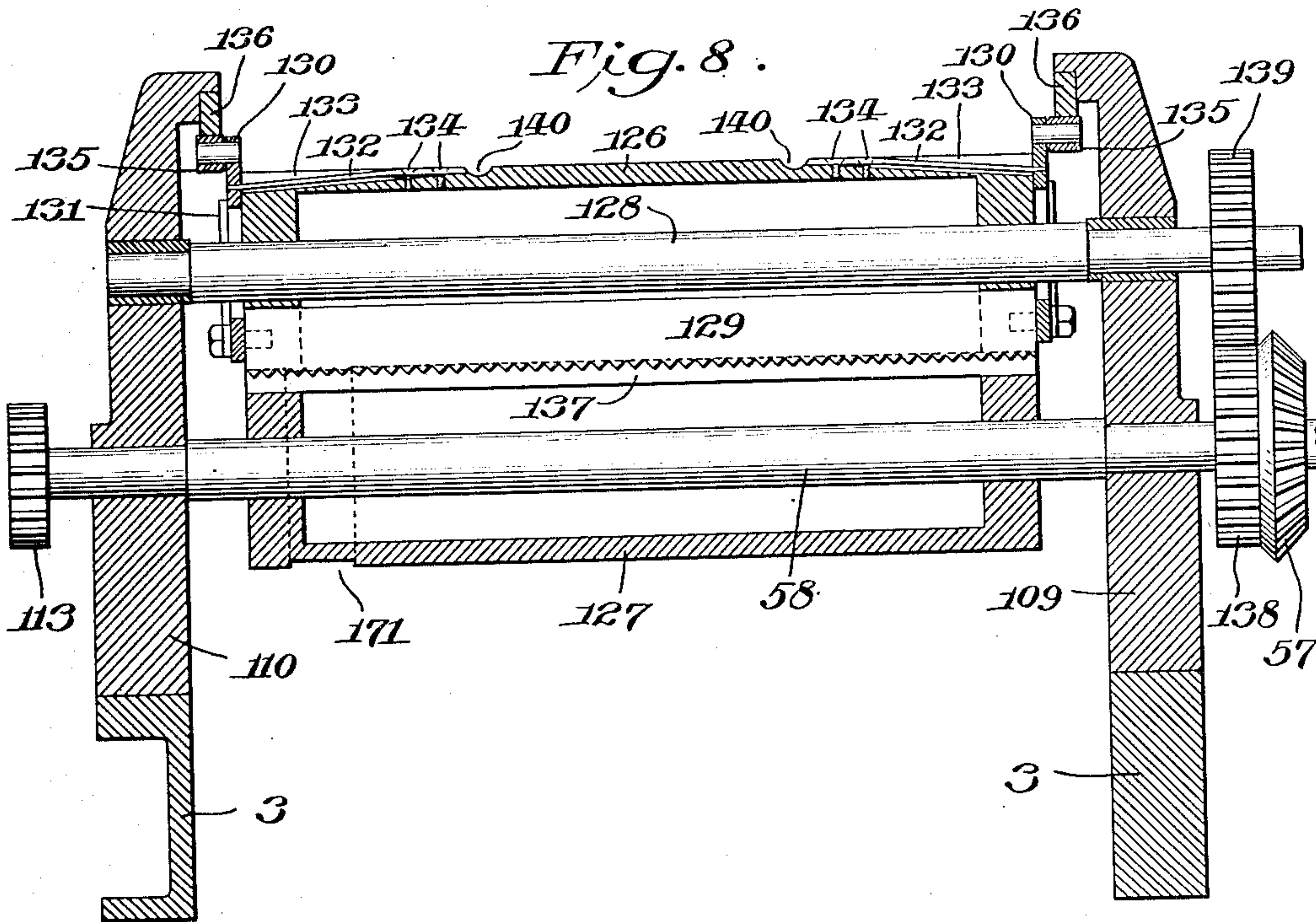
Edward Stanley
BY
A. V. Grouse
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PATENTED OCT. 29, 1907.

E. STANLEY.
PACKAGING MACHINE.
APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 7.



WITNESSES:

Walter C. Rusey
H. H. Parnell.

INVENTOR

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No. 869,664.

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E. STANLEY.
PACKAGING MACHINE.
APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 8.

Fig. 11.

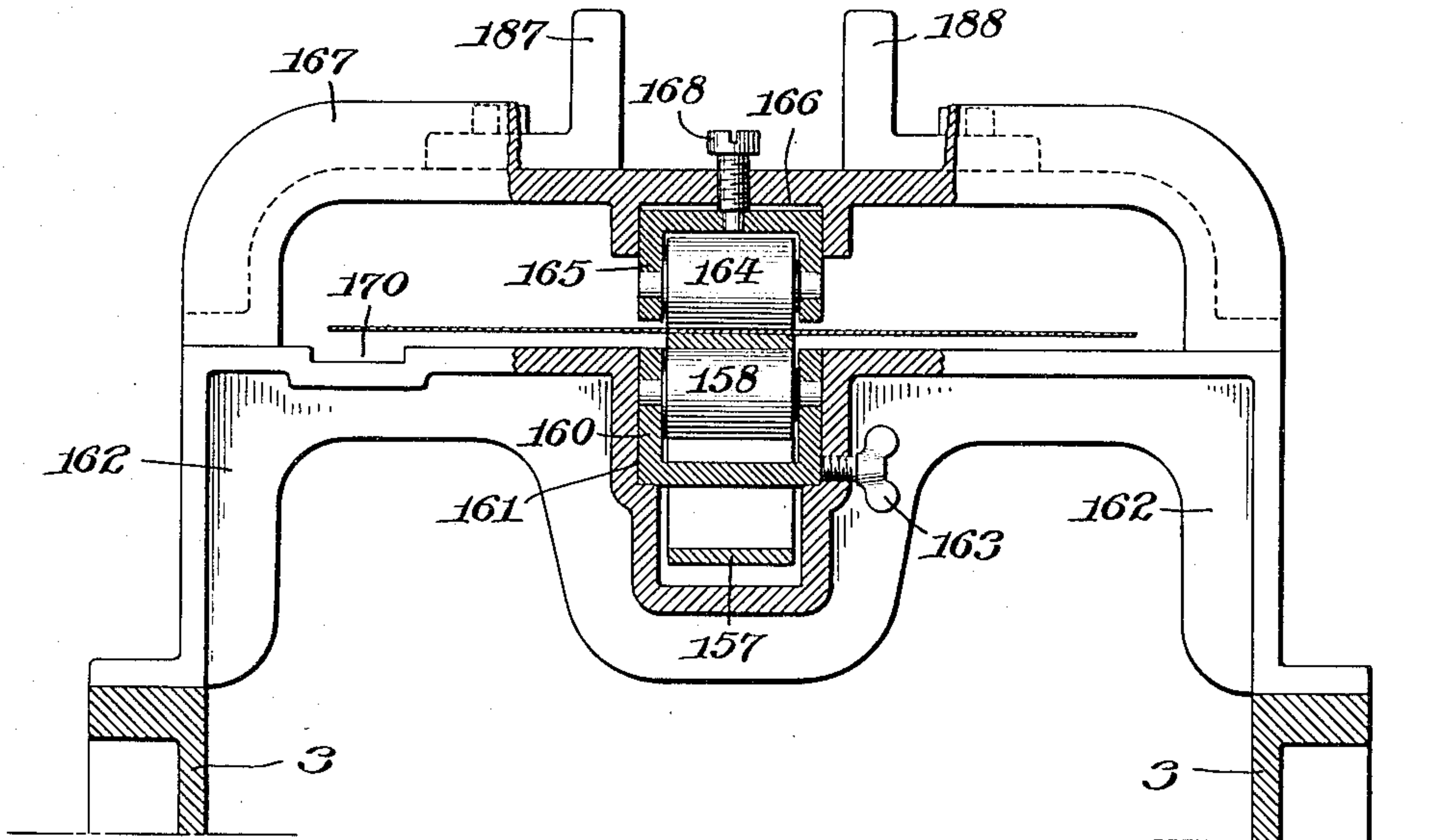
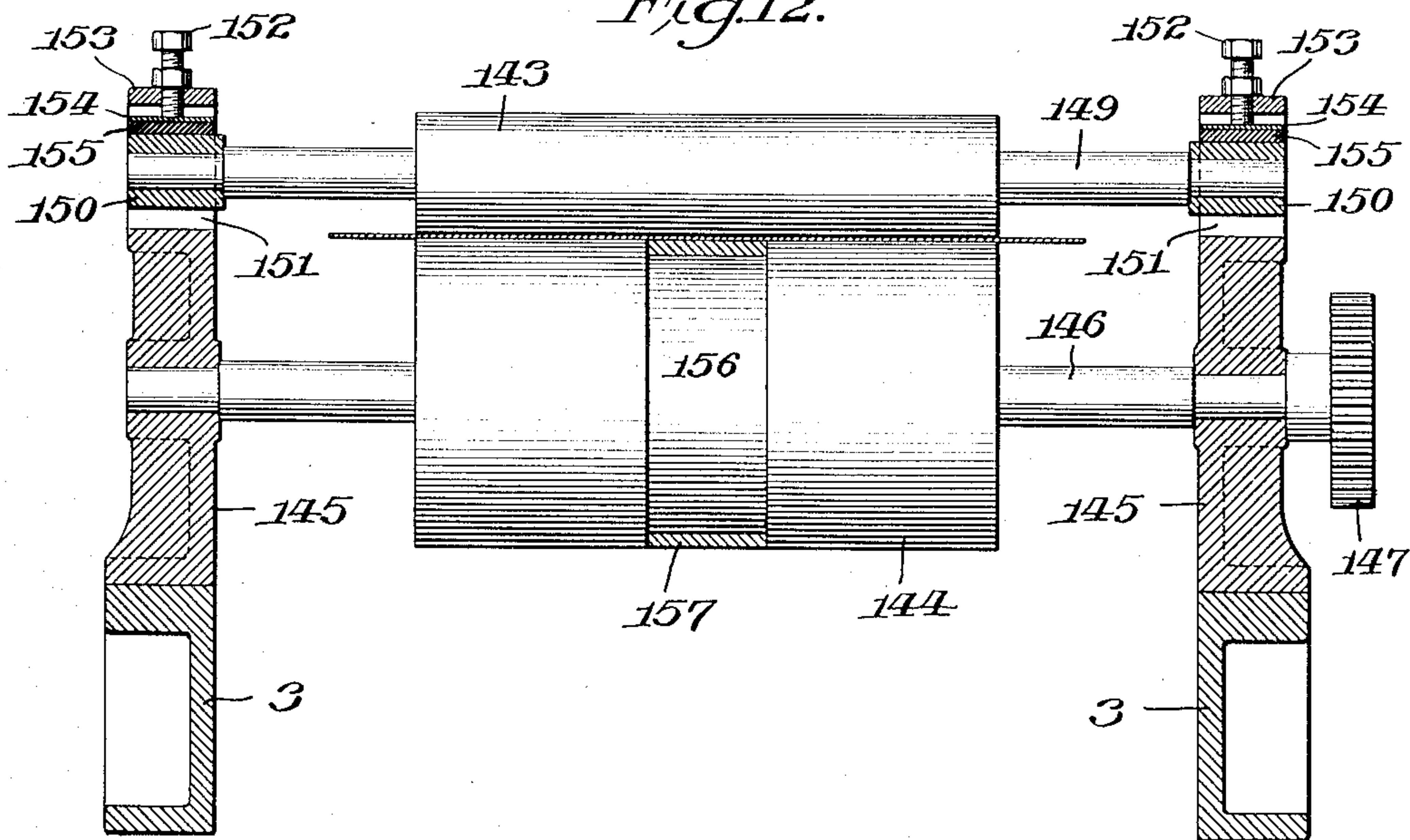


Fig. 12.



WITNESSES:

Walter C. Puley.
H. P. Pumble.

INVENTOR

Edward Stanley
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ATTORNEY.

No. 869,664.

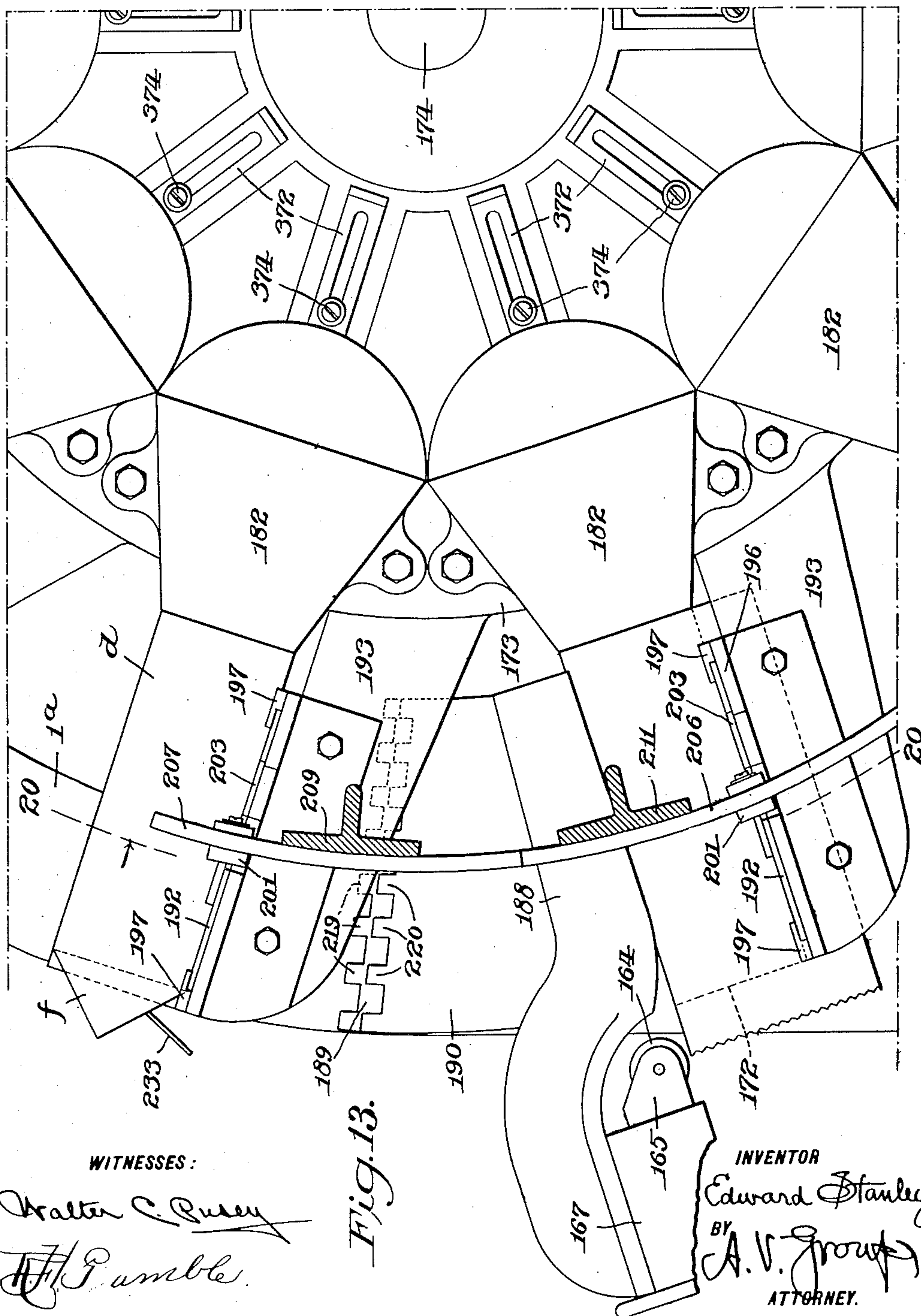
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PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 9.



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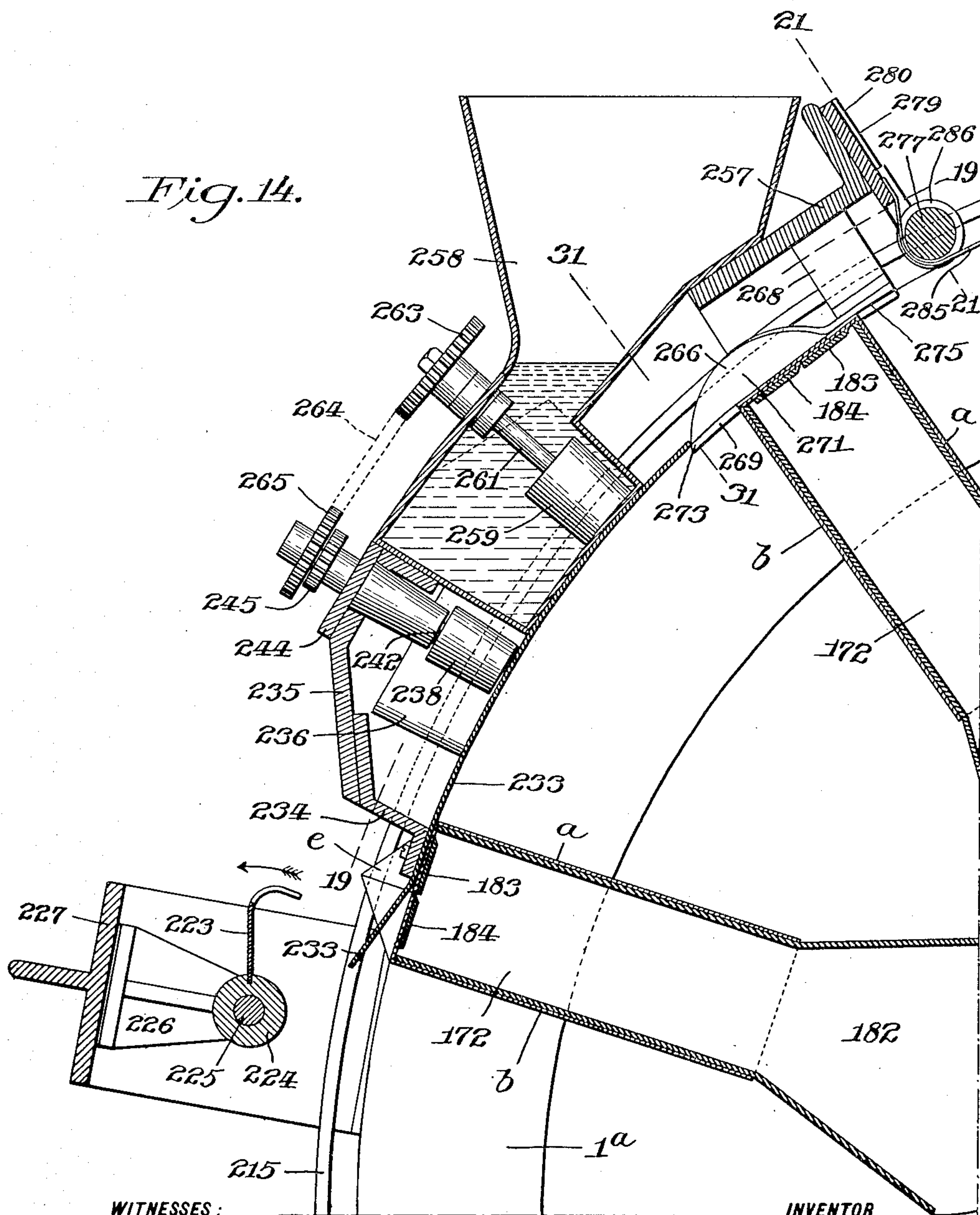
E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 10.

Fig. 14.



WITNESSES:

Walter C. Pusey.
H. E. Gamble.

INVENTOR

Edward Stanley
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ATTORNEY.

No. 869,664.

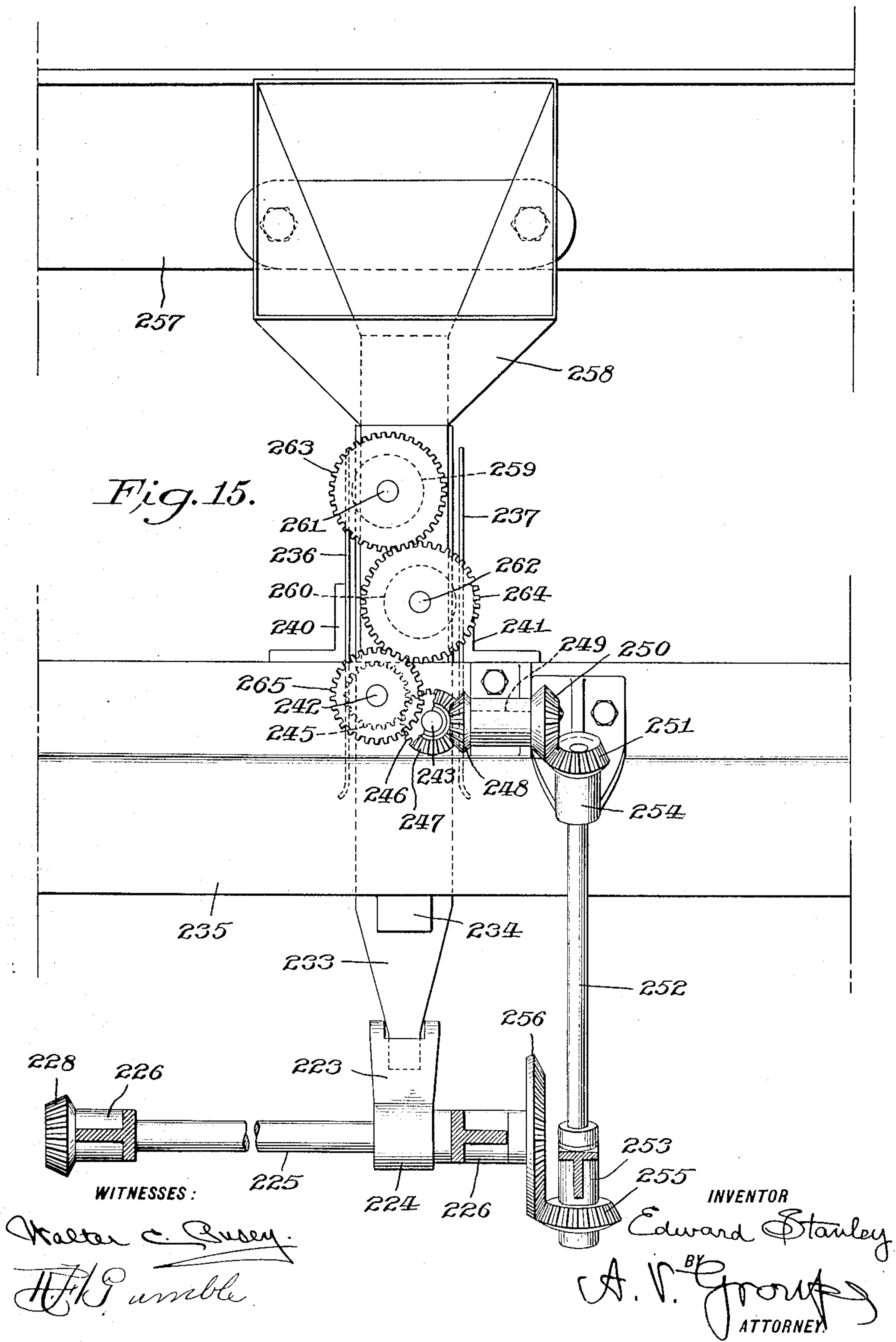
PATENTED OCT. 29, 1907.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 11.



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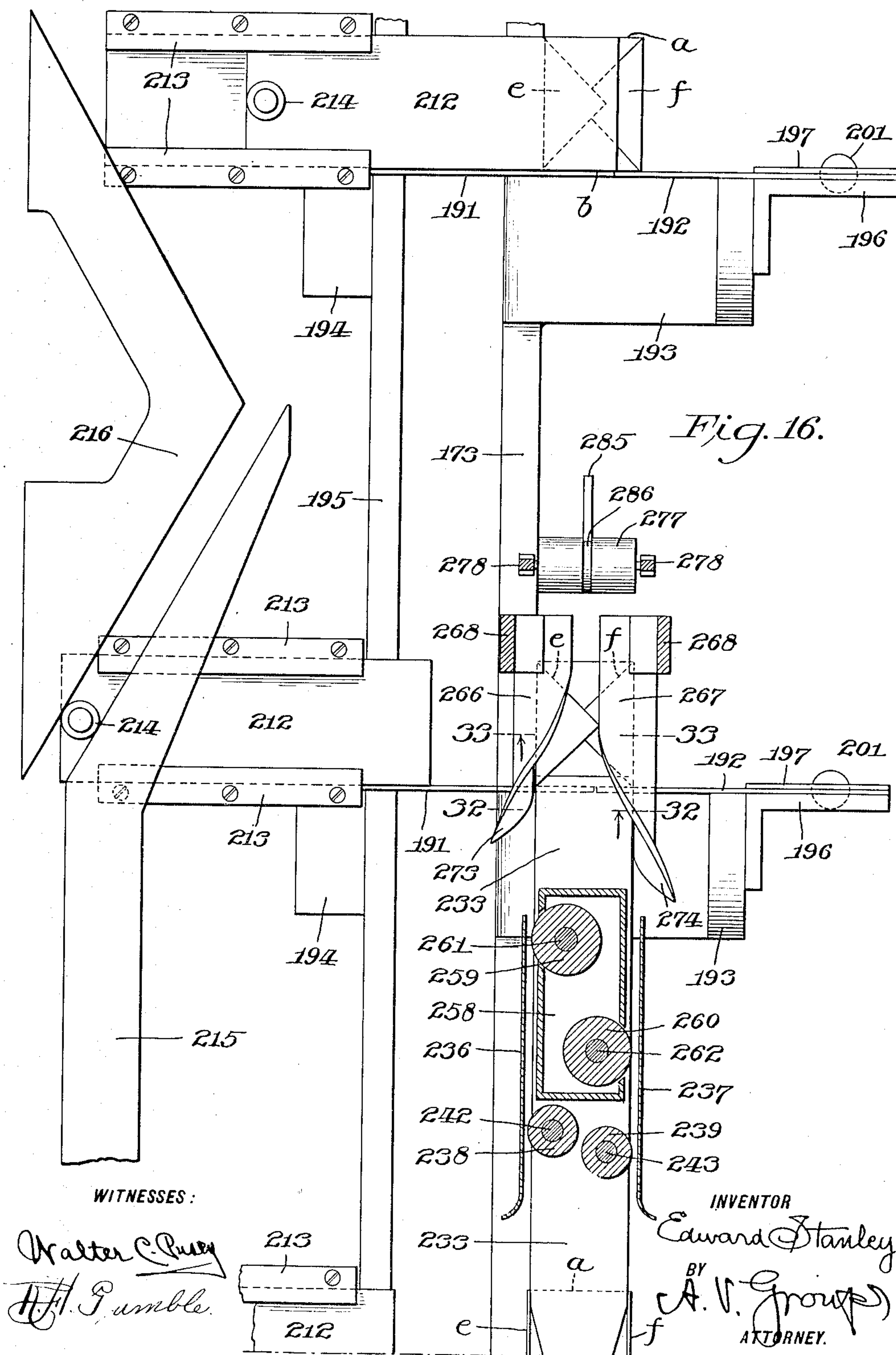
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E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 12.



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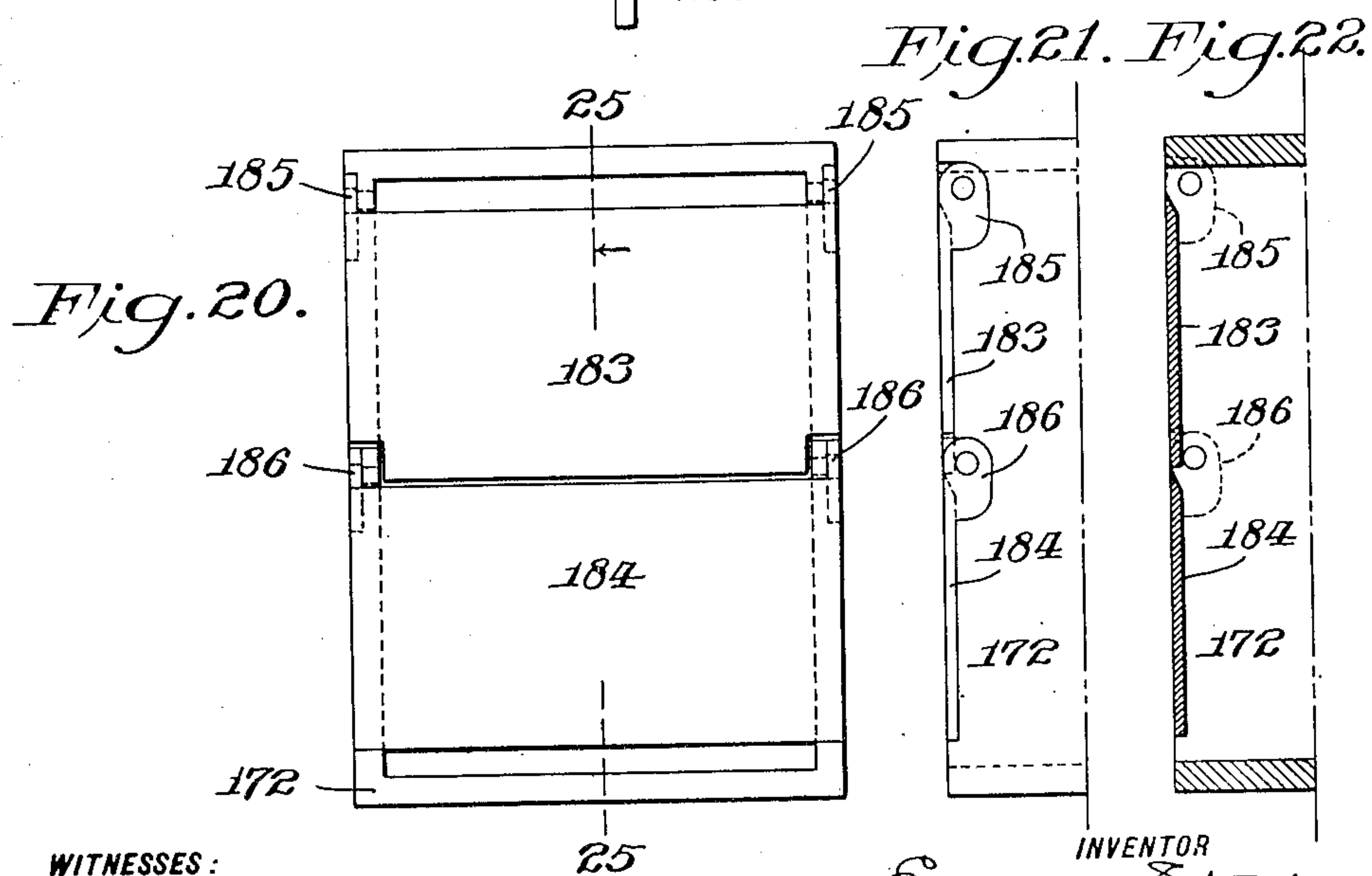
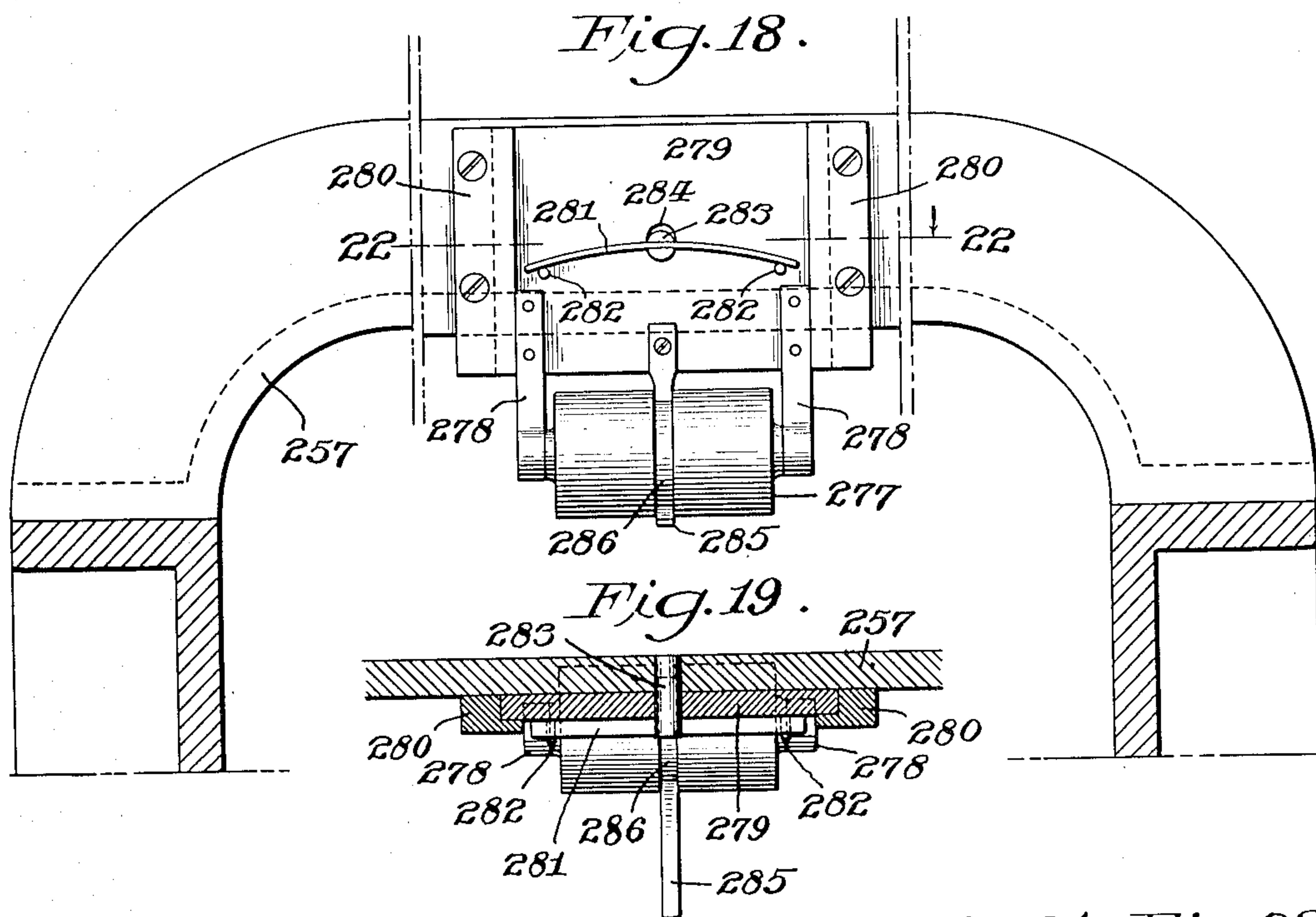
PATENTED OCT. 29, 1907.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 14.



WITNESSES:

Walter C. Pusey
H. J. Gamble

INVENTOR

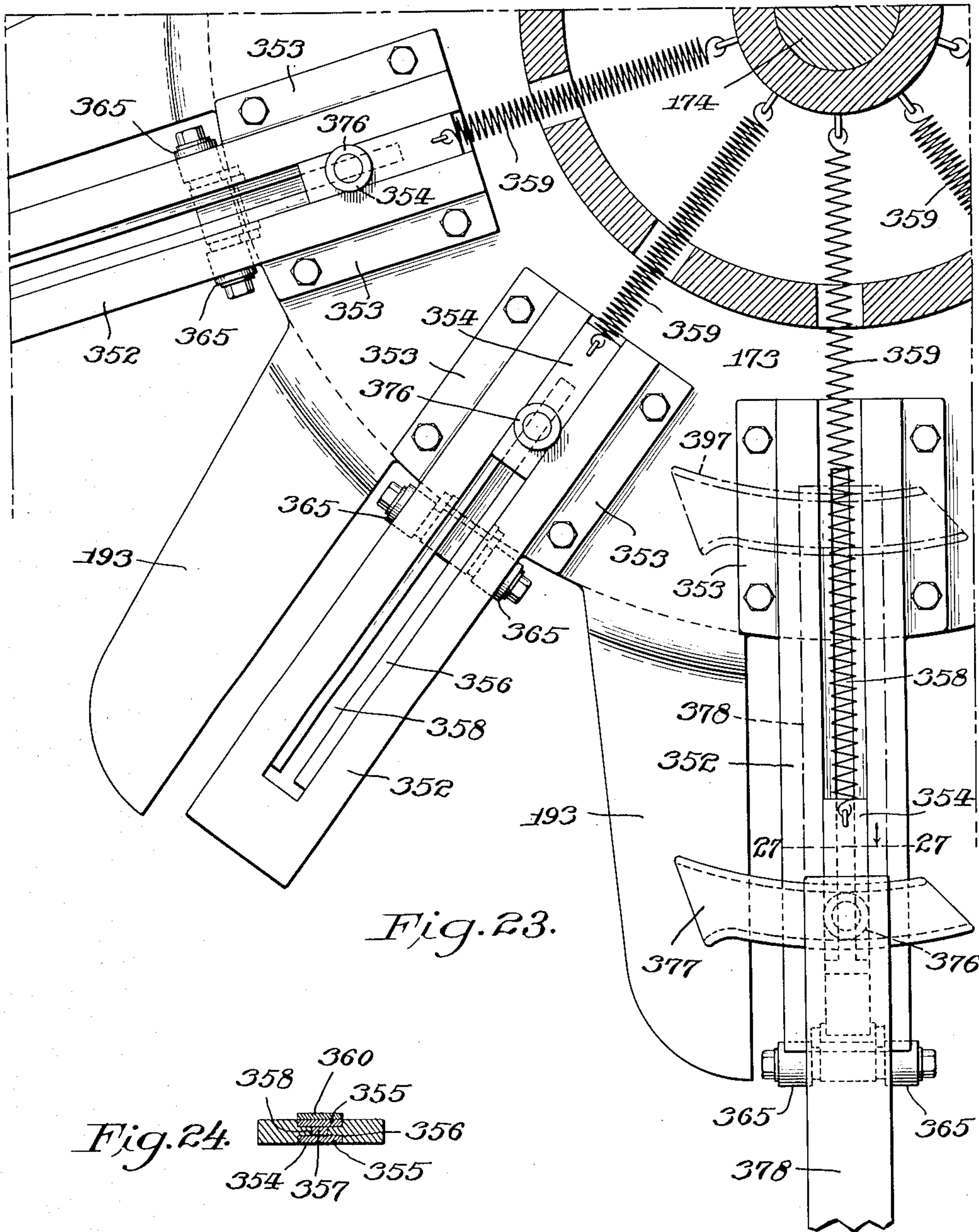
Edward Stanley
BY
A. V. Grouse
ATTORNEY.

No. 869,664.

PATENTED OCT. 29, 1907.

E. STANLEY.
PACKAGING MACHINE.
APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 15.



WITNESSES:

Walter C. Busby
H. J. Gamble

INVENTOR

Edward Stanley
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No. 869,664.

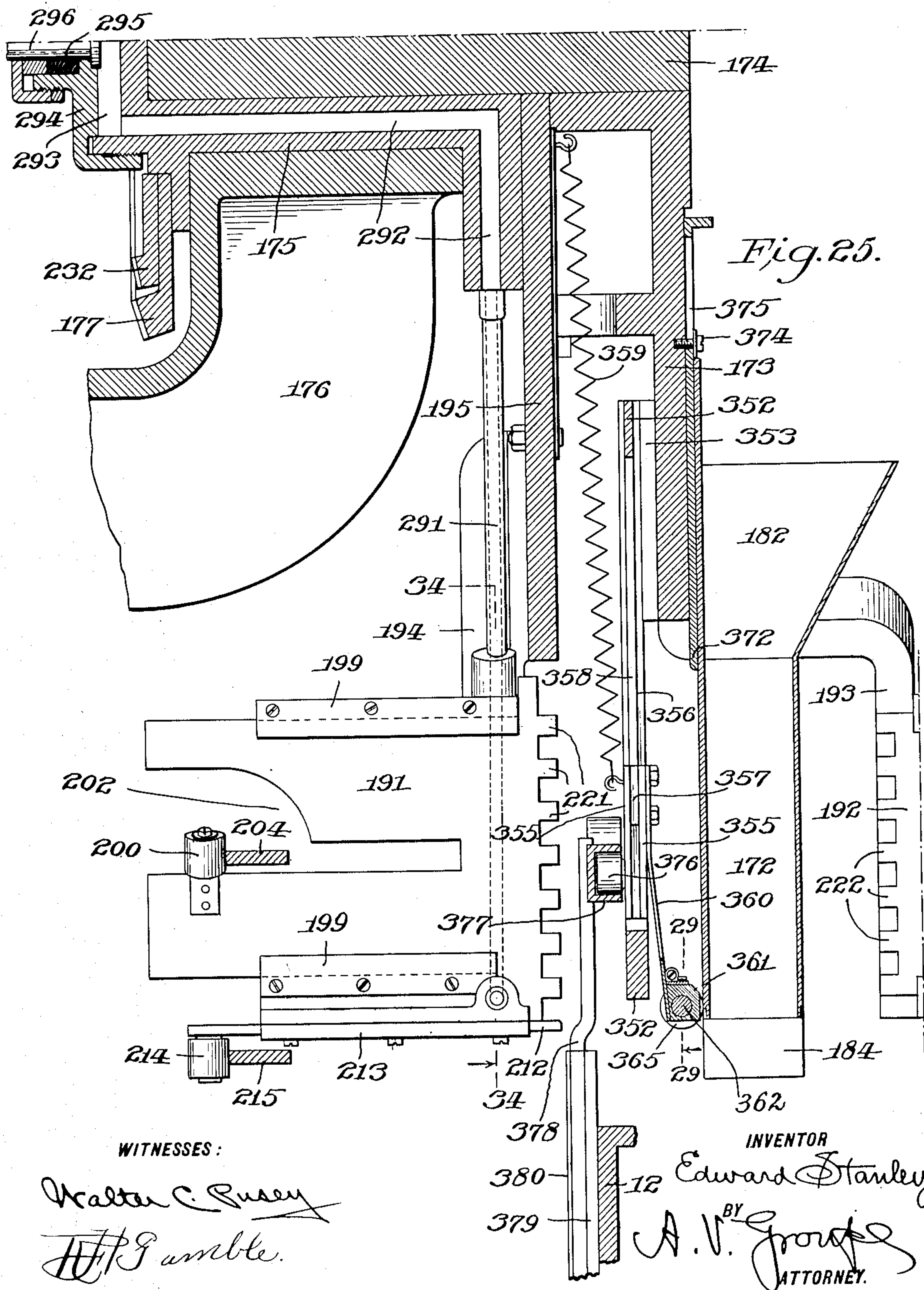
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E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

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PATENTED OCT. 29, 1907.

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PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

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Fig. 27.

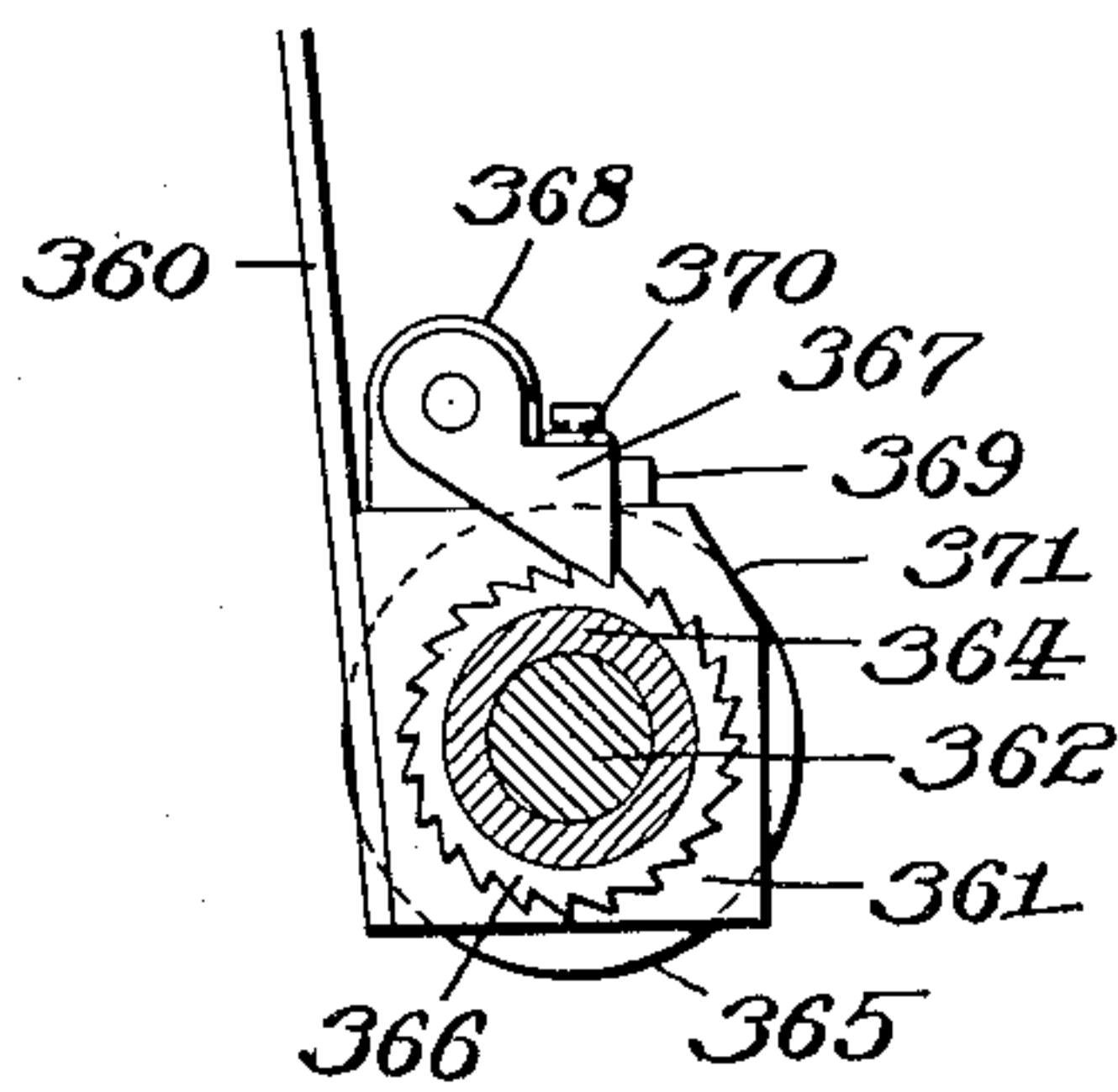


Fig. 26.

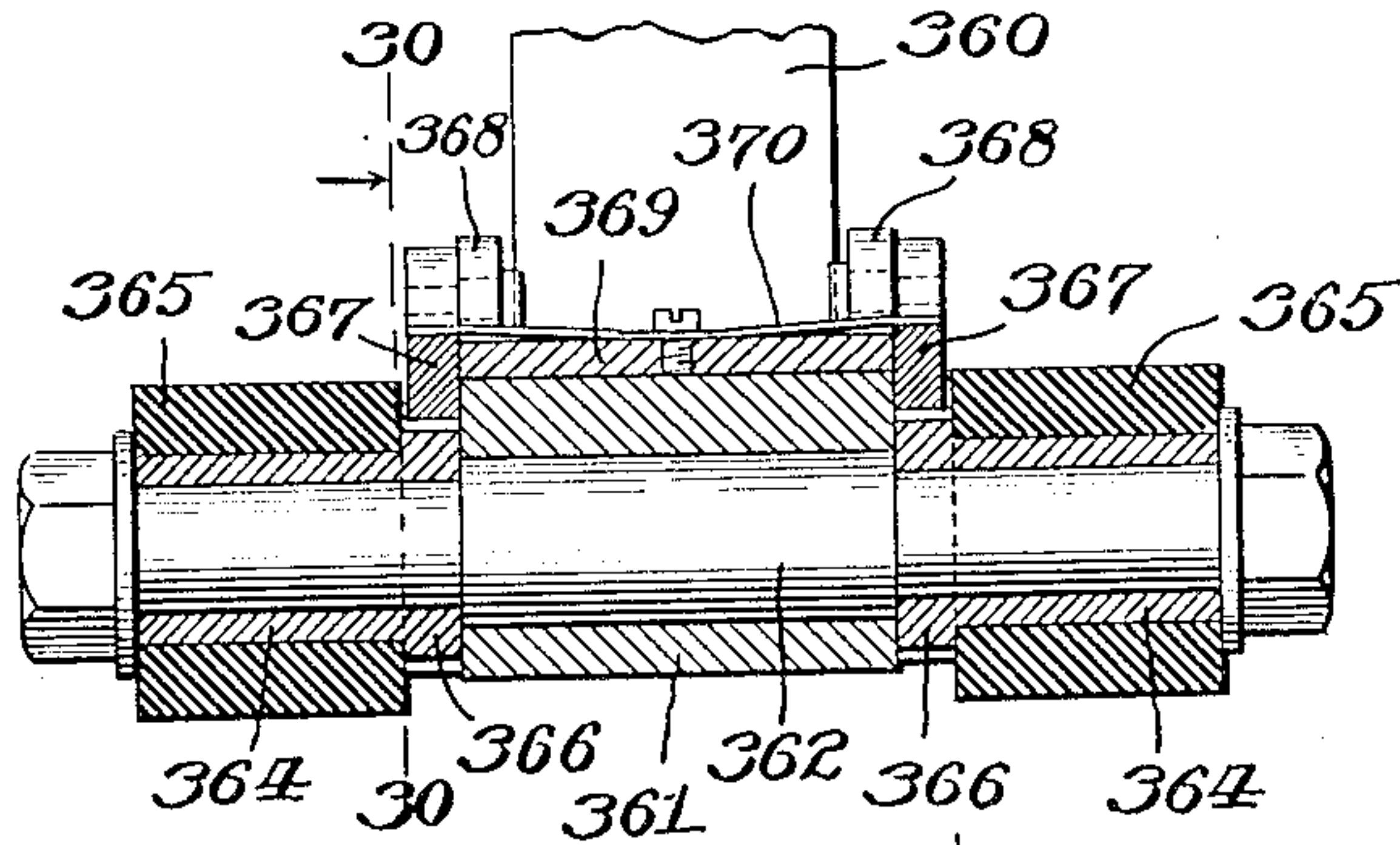


Fig. 28.

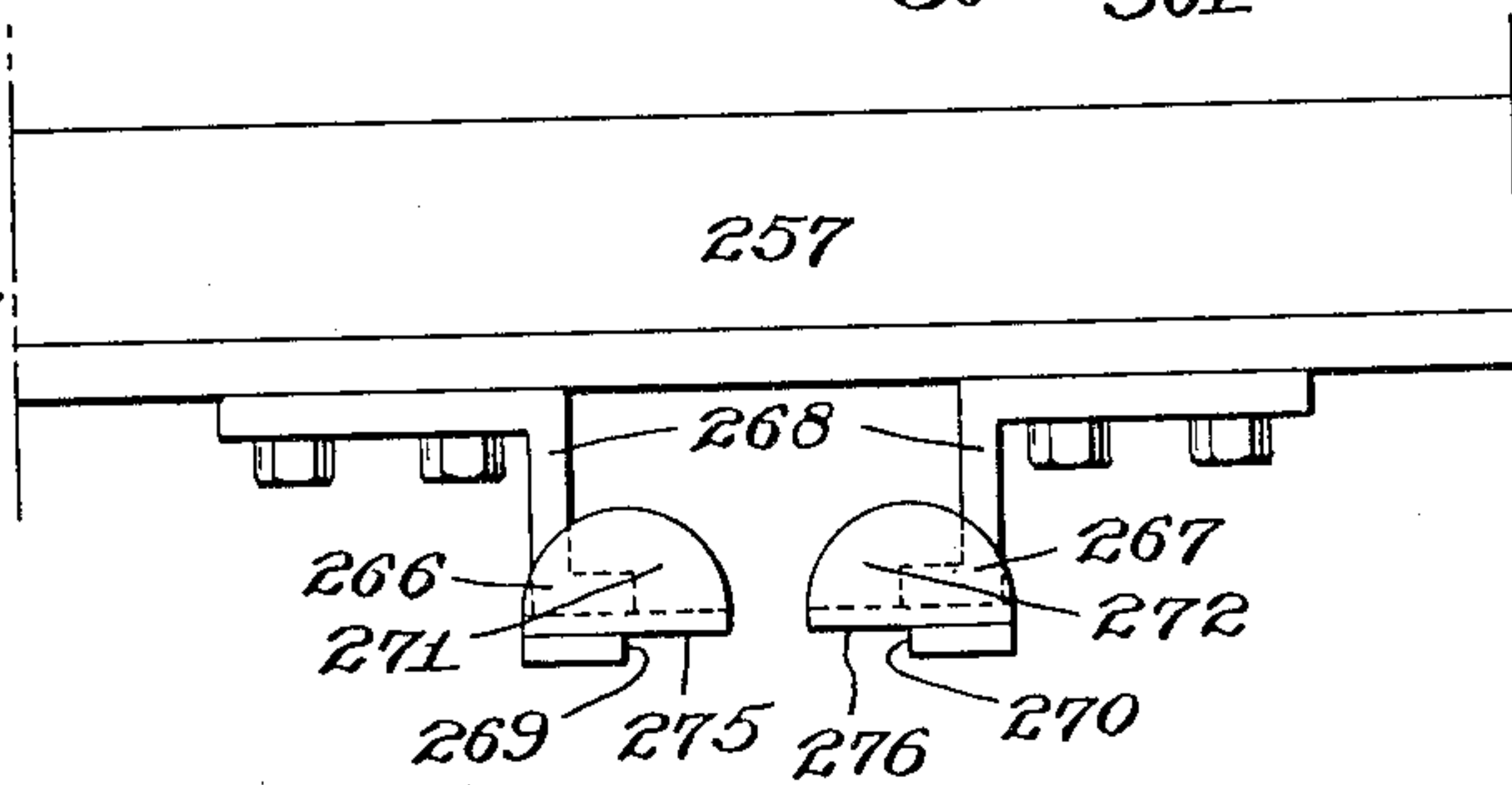


Fig. 29.

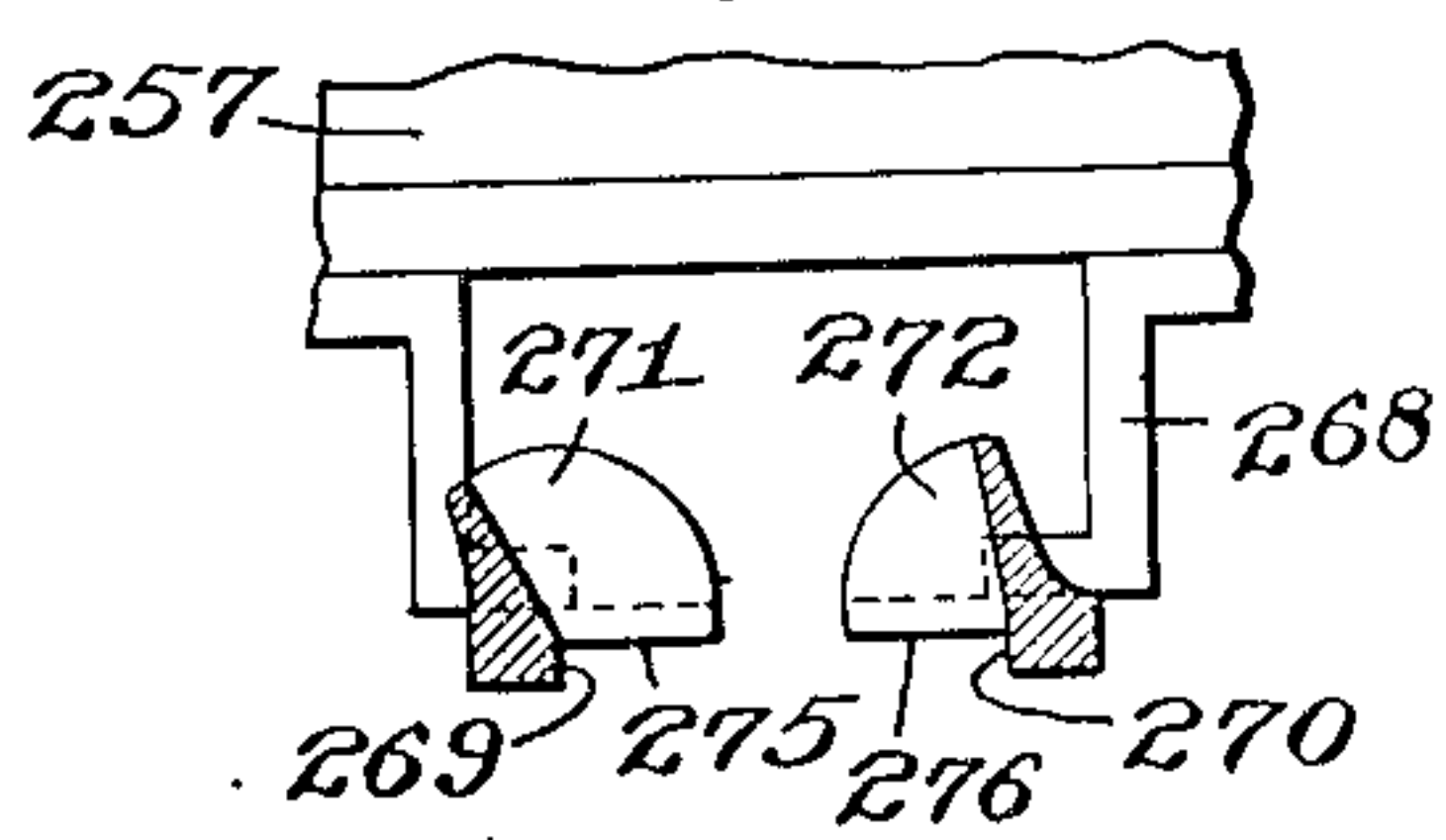


Fig. 30.

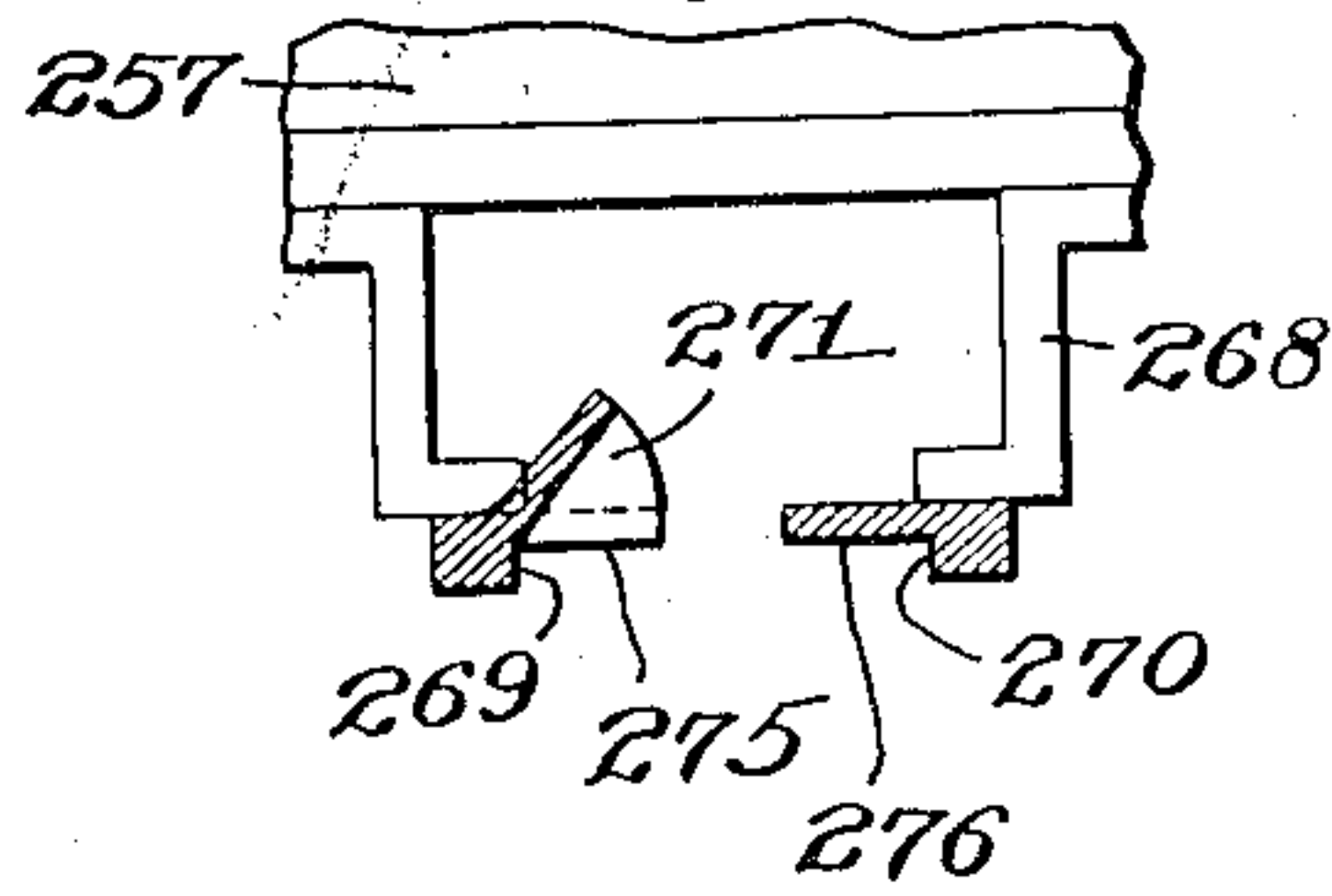
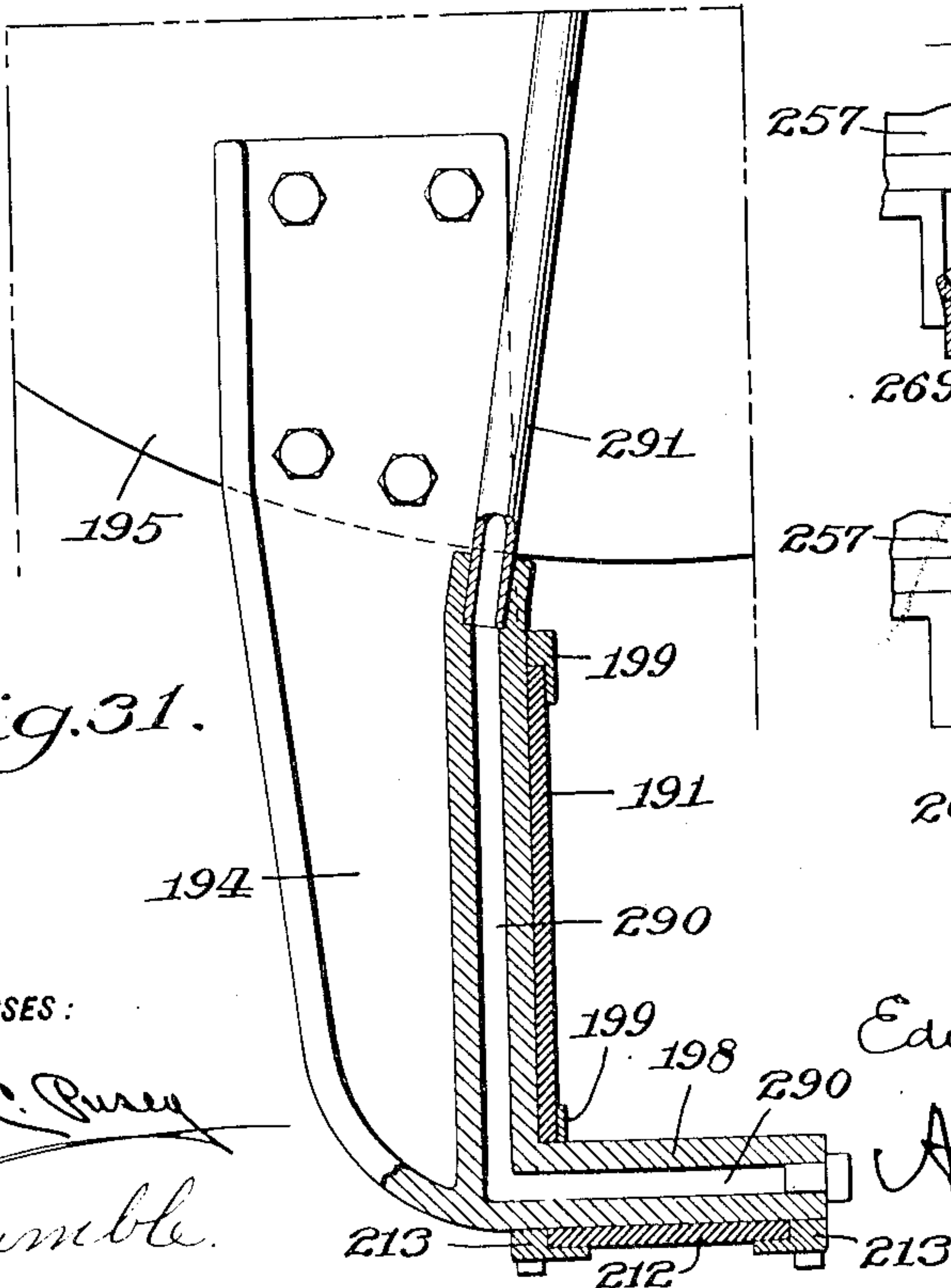


Fig. 31.



WITNESSES:

Walter C. Pusey
H. J. Pumble.

INVENTOR

Edward Stanley

BY

A. V. Group

ATTORNEY.

No. 869,664.

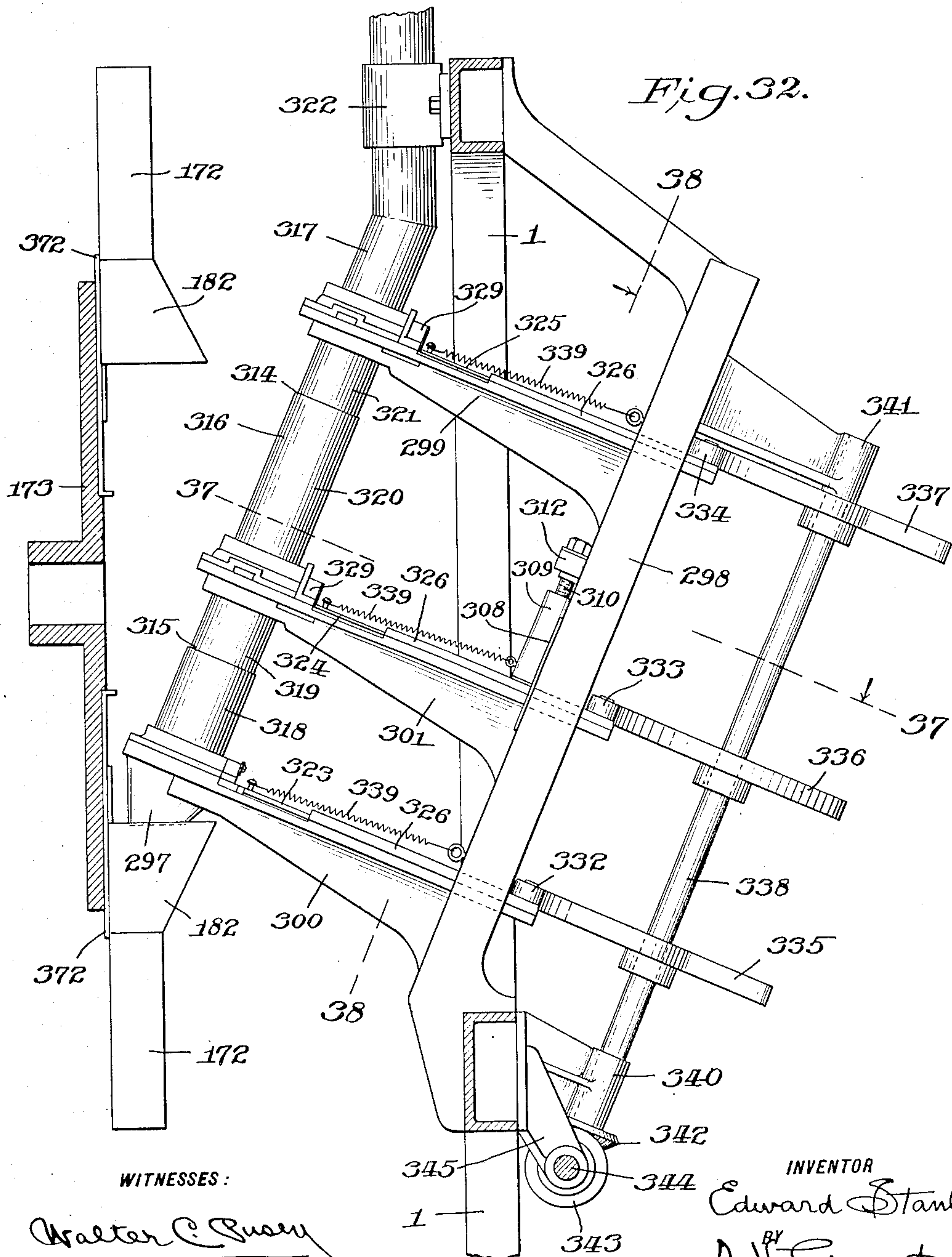
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E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 18.

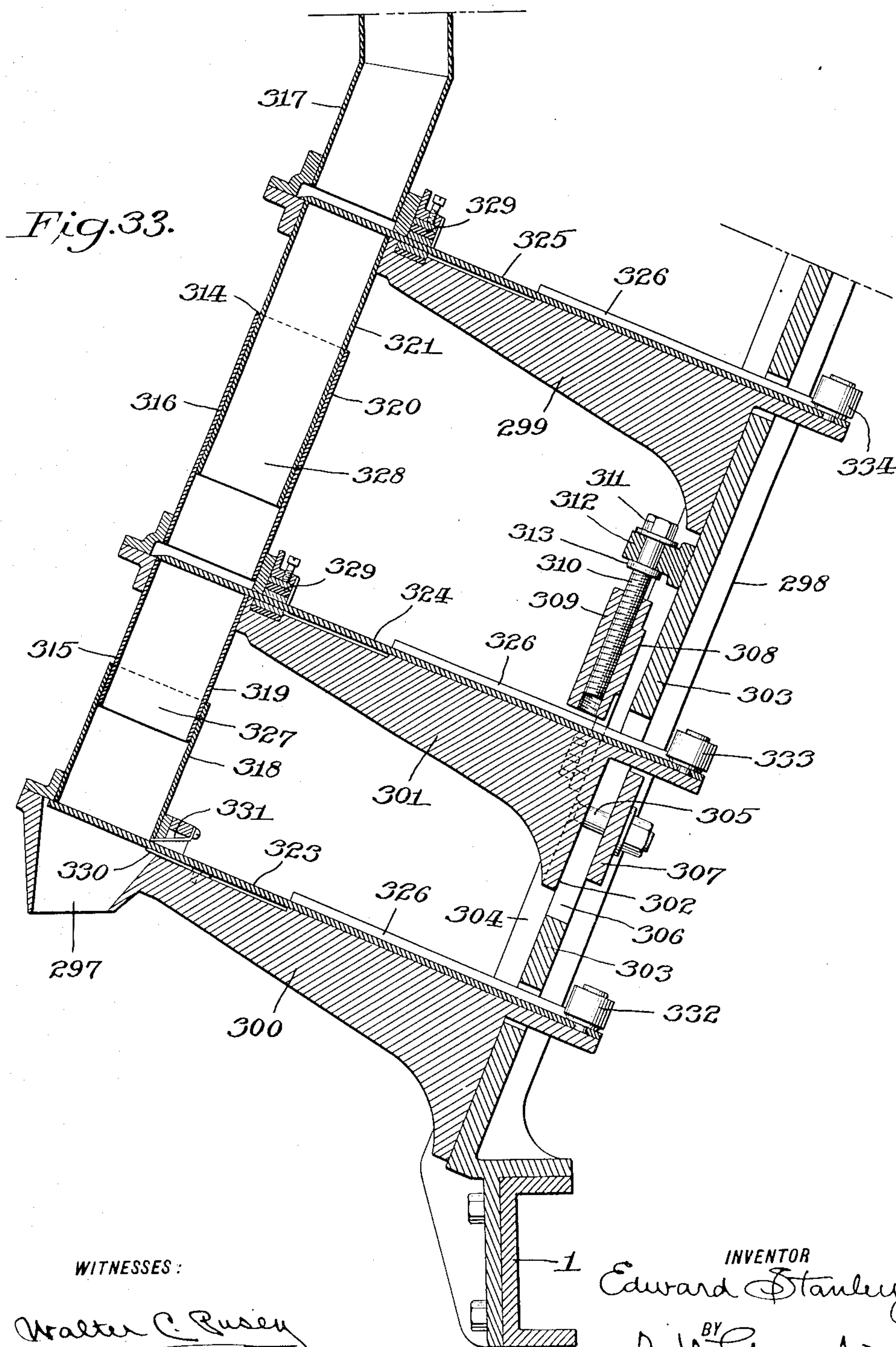


No. 869,664.

PATENTED OCT. 29, 1907.

E. STANLEY.
PACKAGING MACHINE.
APPLICATION FILED JUNE 19, 1903.

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No. 869,664.

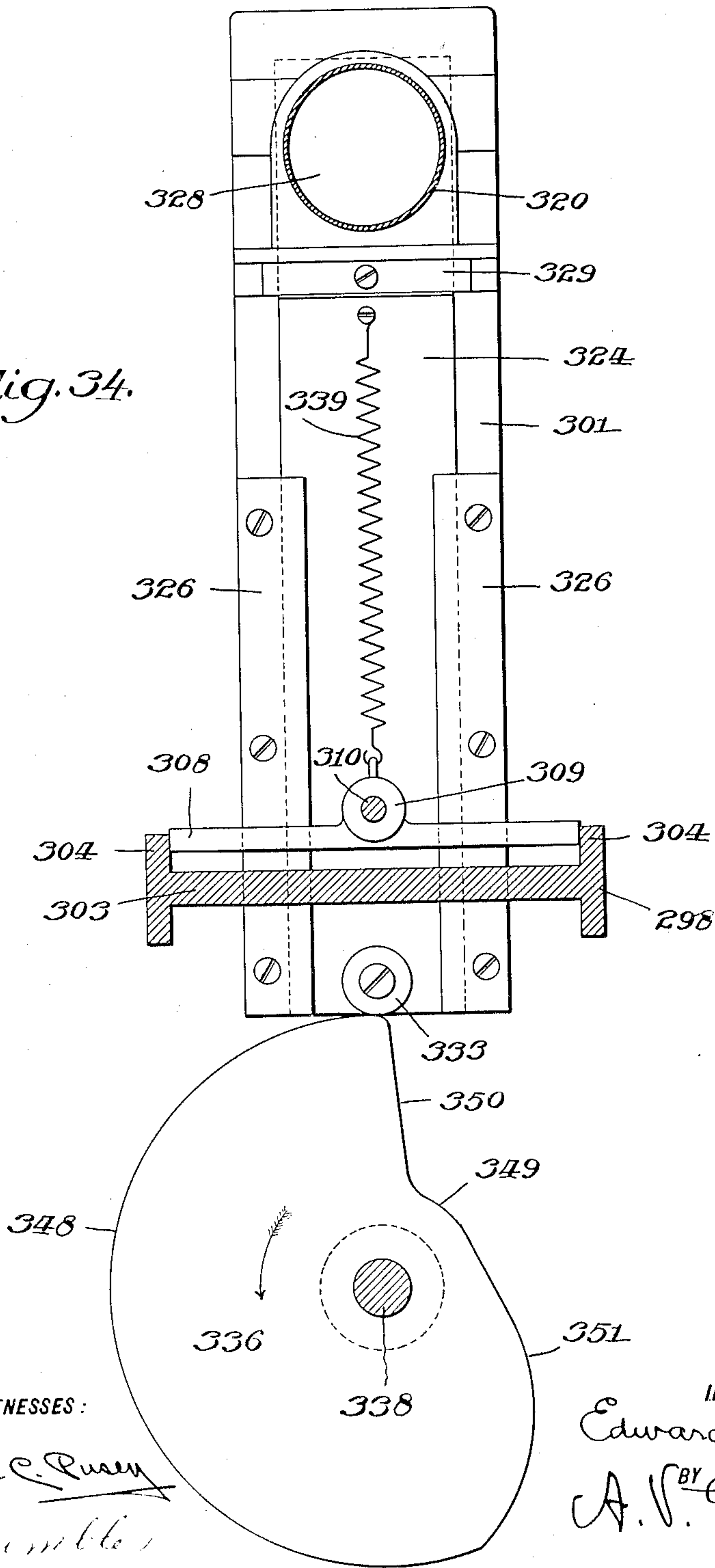
PATENTED OCT. 29, 1907.

E. STANLEY.
PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 20.

Fig. 34.



WITNESSES:

Walter C. Rusey
A. H. Gamble

INVENTOR

Edward Stanley

BY
A. V. Grouse
ATTORNEY.

No. 869,664.

PATENTED OCT. 29, 1907.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 21.

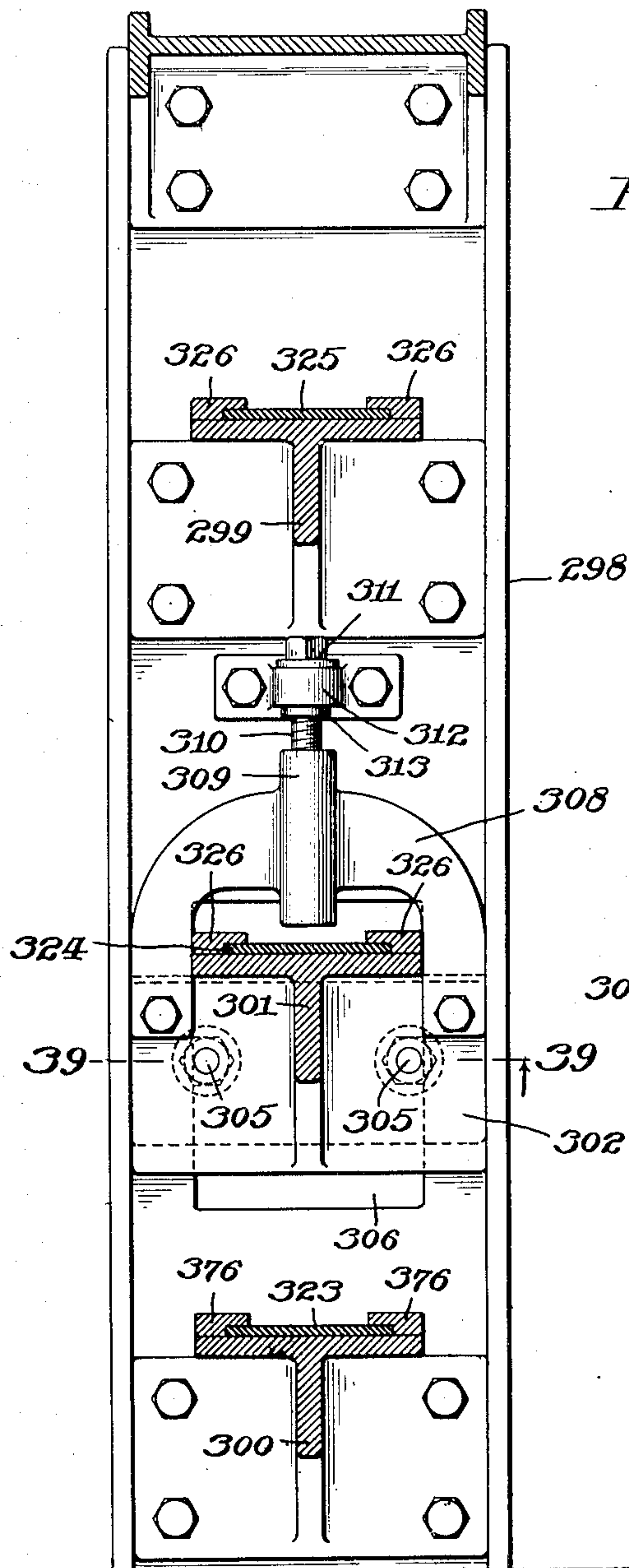
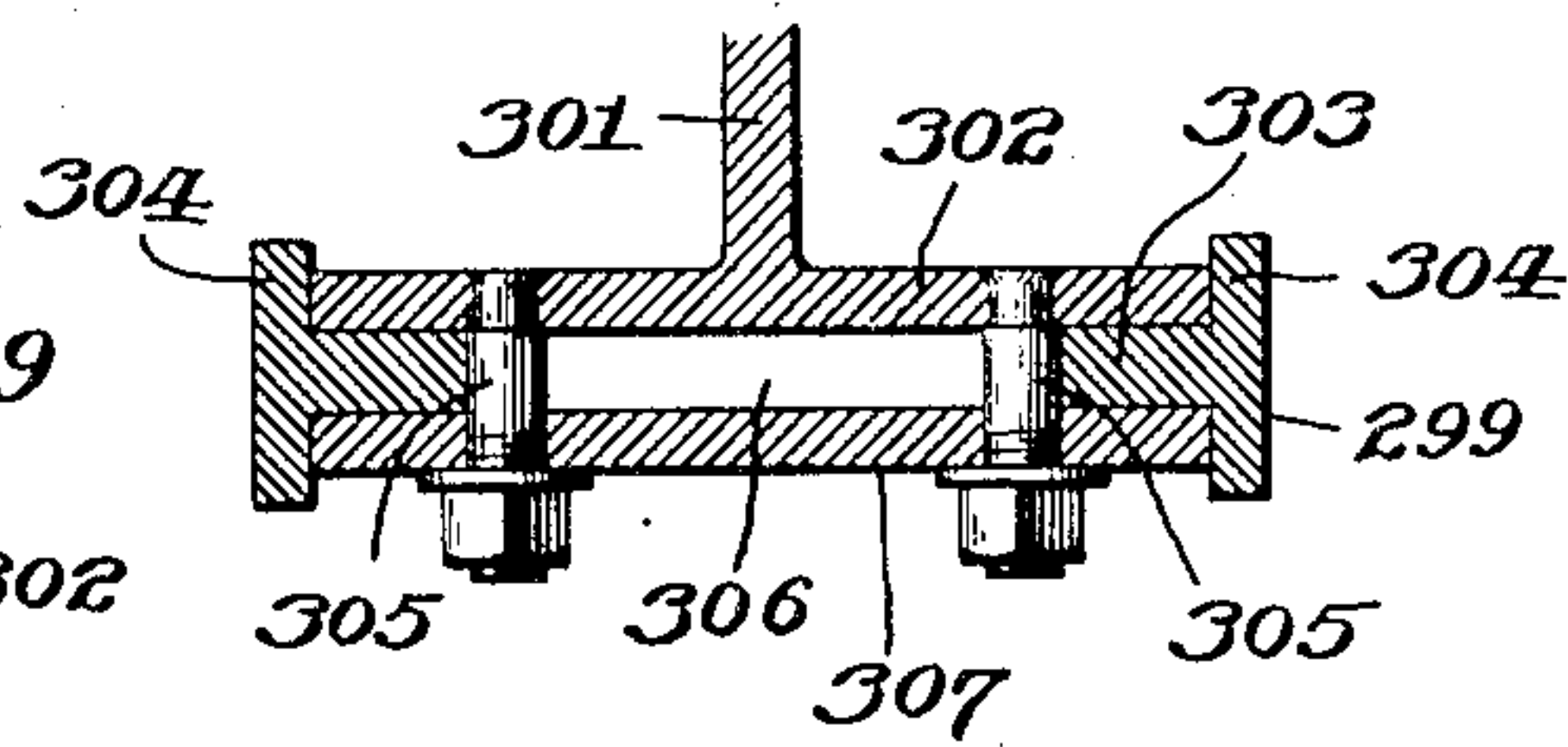


Fig. 35.

Fig. 36.



WITNESSES:

Walter C. Bussey
H. L. Lambie.

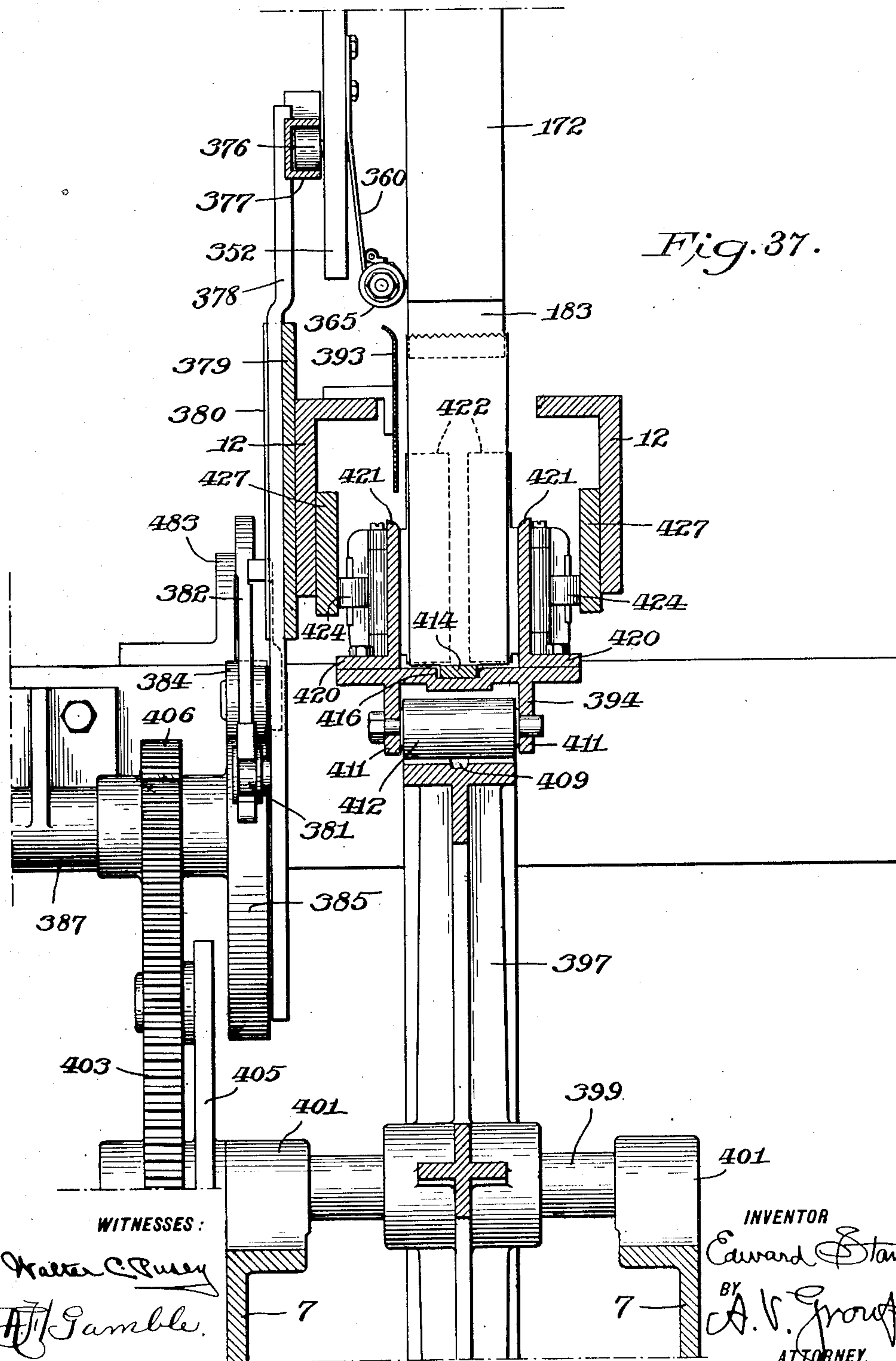
INVENTOR
Edward Stanley
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A. V. Grouse
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No. 869,664.

PATENTED OCT. 29, 1907.

E. STANLEY.
PACKAGING MACHINE.
APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 22.



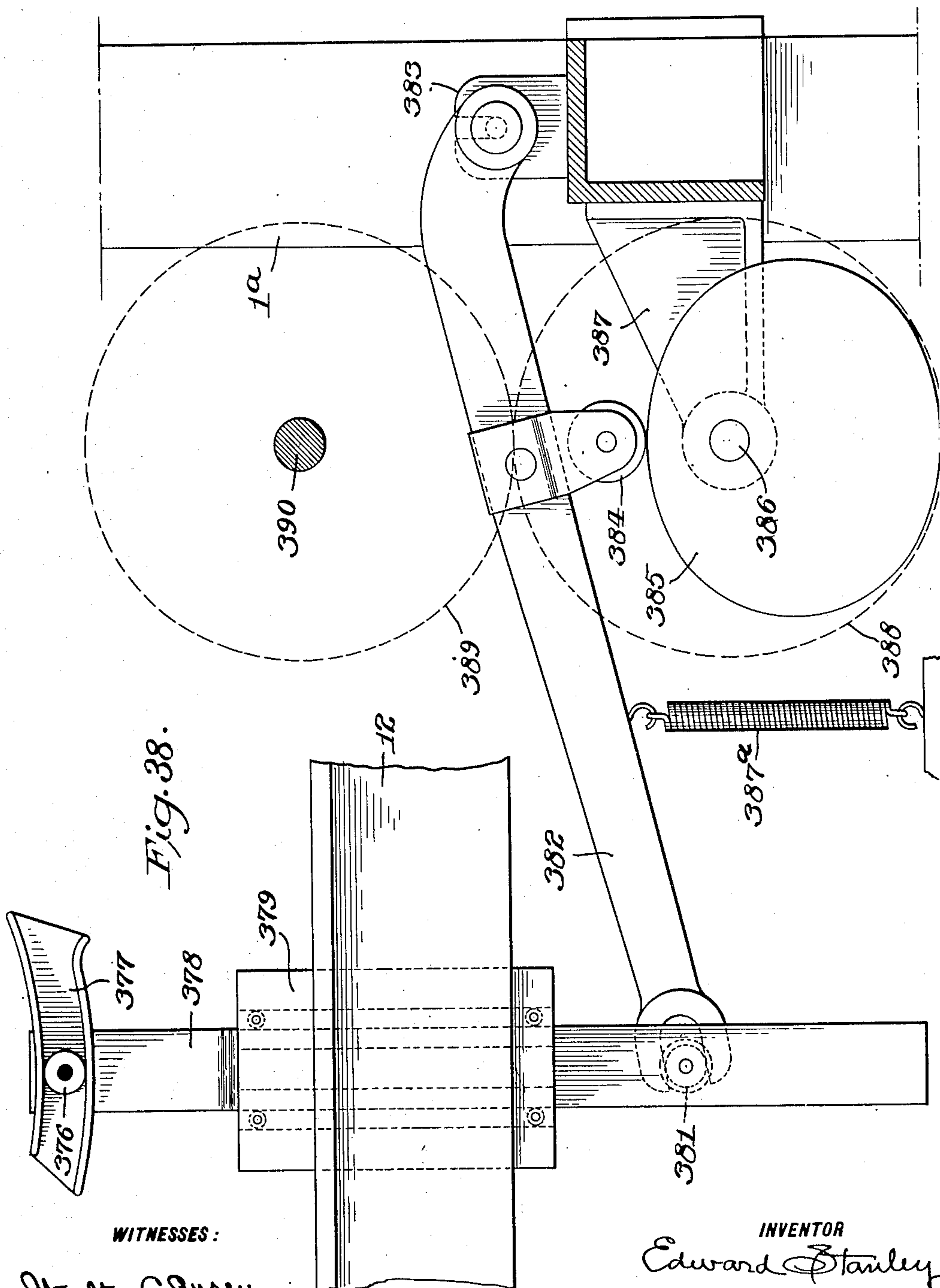
No. 869,664.

PATENTED OCT. 29, 1907.

E. STANLEY.
PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 23.



WITNESSES:

Walter C. Pusey
H. Gamble

INVENTOR

Edward Stanley
BY
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ATTORNEY.

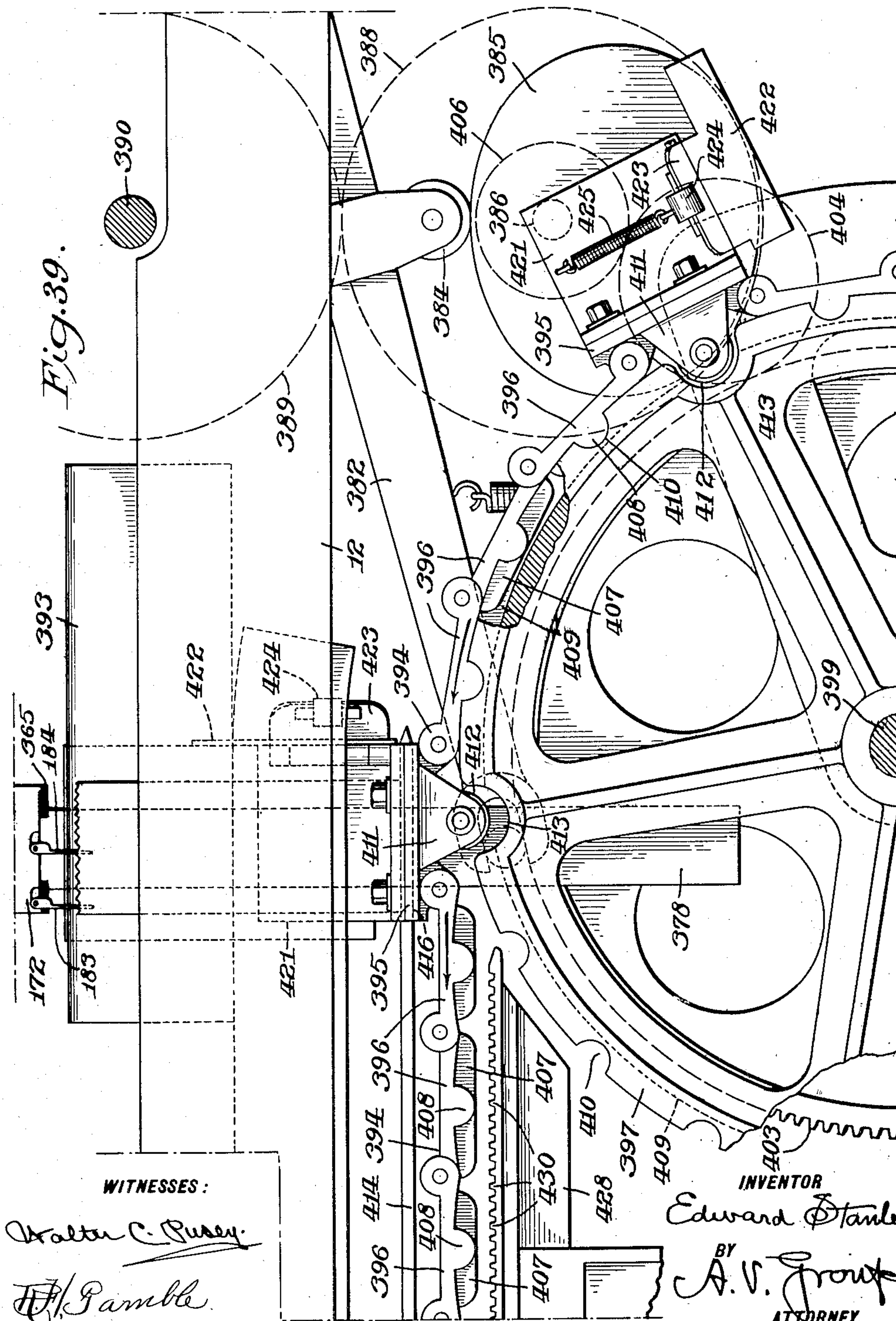
No. 869,664.

PATENTED OCT. 29, 1907.

E. STANLEY.
PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

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No. 869,664.

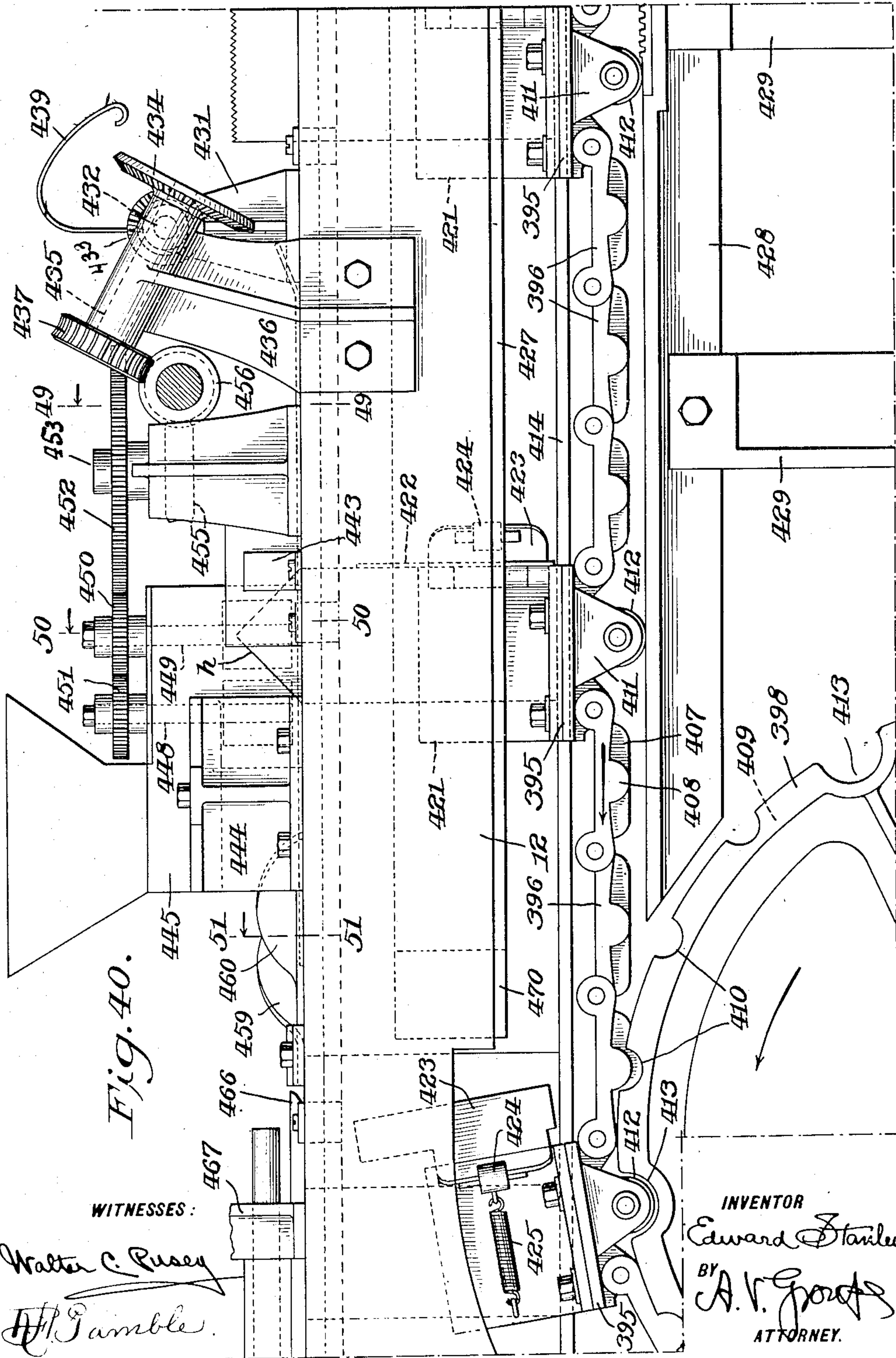
PATENTED OCT. 29, 1907.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 25.



WITNESSES:

Walter C. Rusey
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No. 869,664.

PATENTED OCT. 29, 1907.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 26.

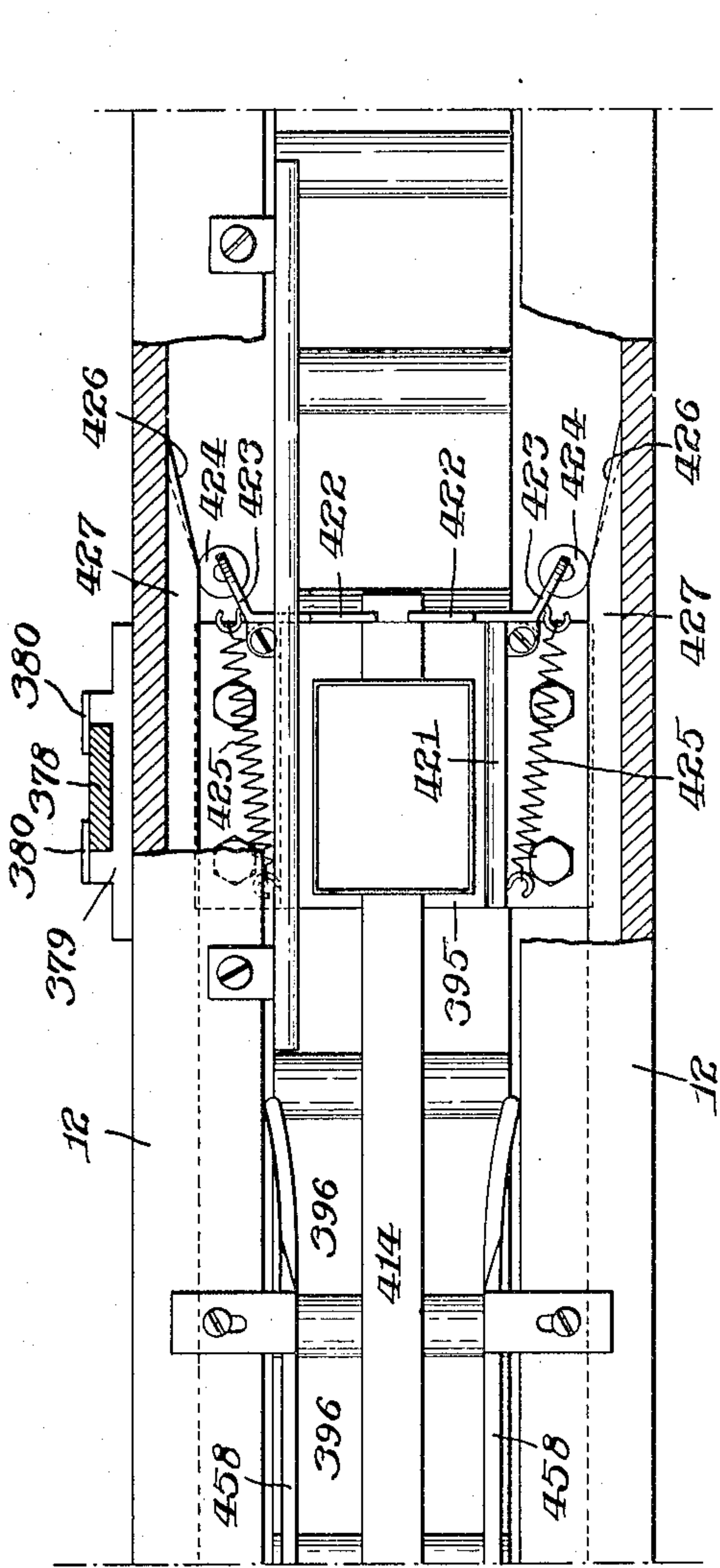


Fig. 41.

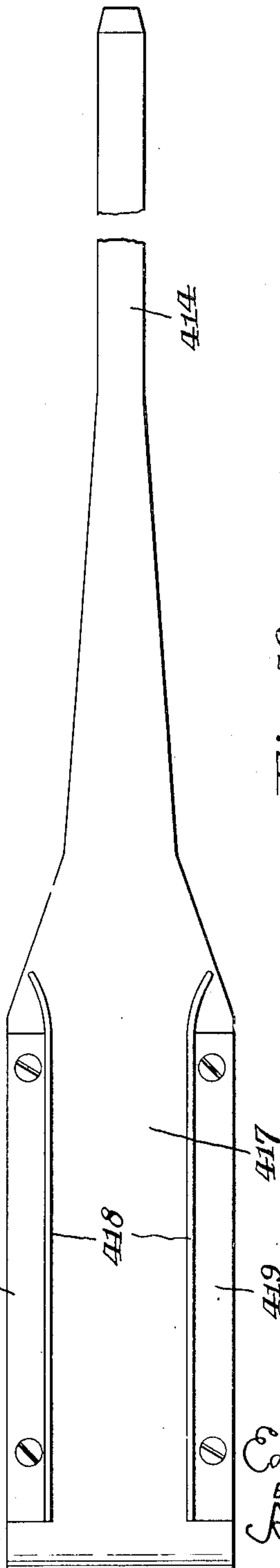


Fig. 42.

WITNESSES:

Walter C. Pusey
H. G. Gamble.

INVENTOR

Edward Stanley
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ATTORNEY.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 27.

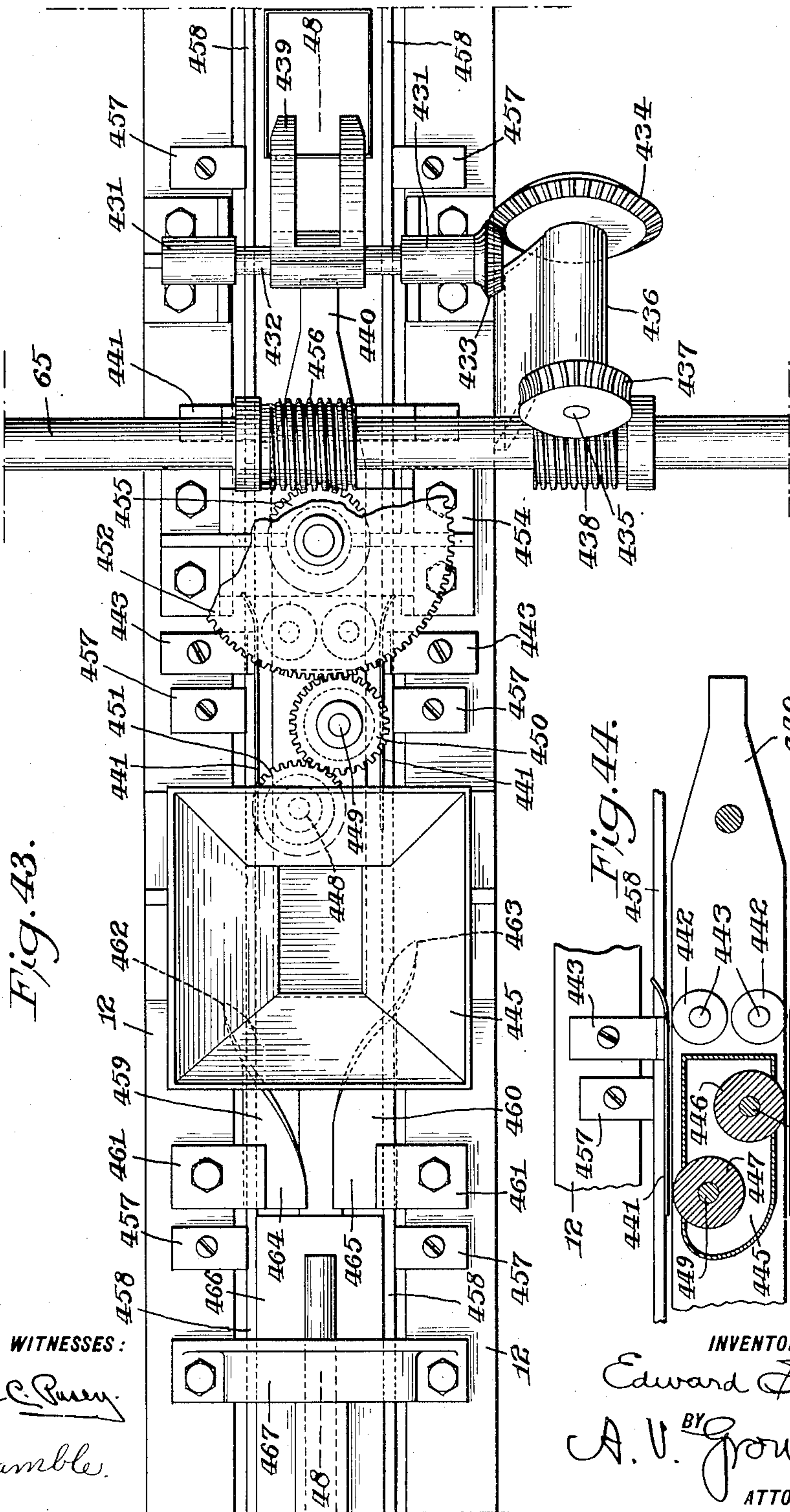


Fig. 43.

WITNESSES:

Walter C. Rusey.

H. C. Gamble.

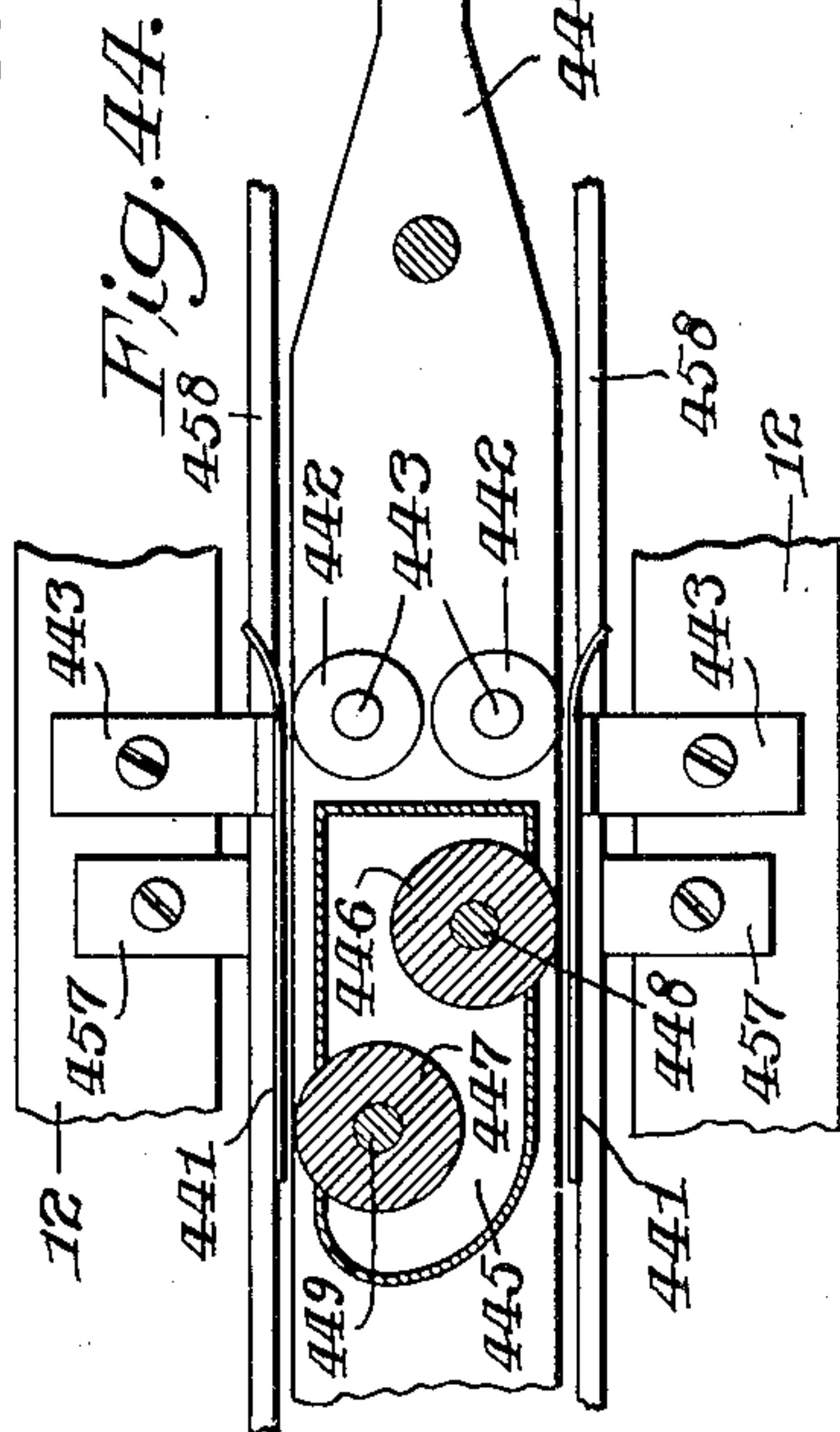


Fig. 44.

INVENTOR

Edward Stanley

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No. 869,664.

PATENTED OCT. 29, 1907.

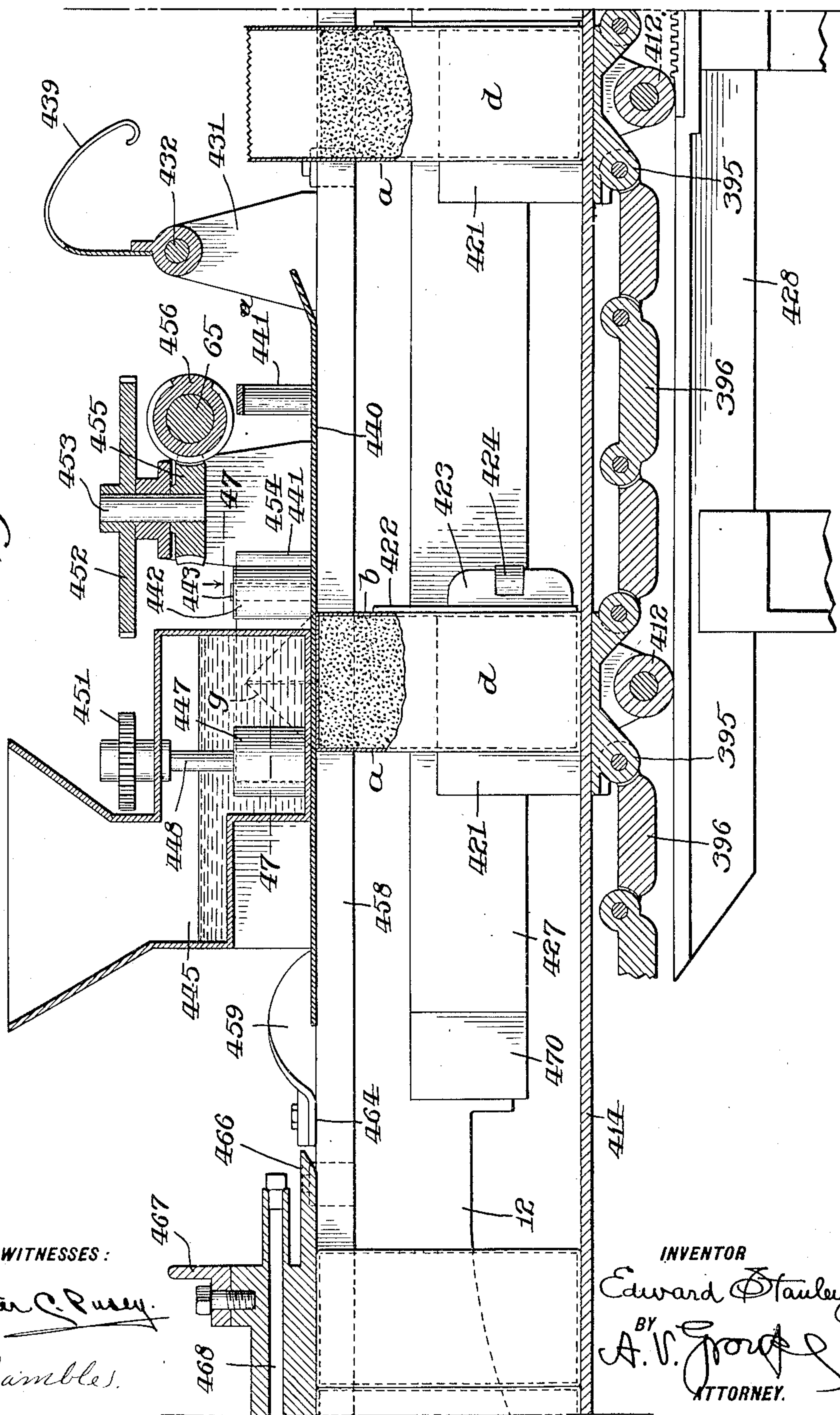
E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 28.

Fig. 45.



WITNESSES:

Walter S. Pusey.

W. H. P.amble.

INVENTOR

Edward Stanley

BY

BY
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ATTORNEY.

ATTORNEY.

E. STANLEY.

PACKAGING MACHINE.

APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 29.

Fig. 46.

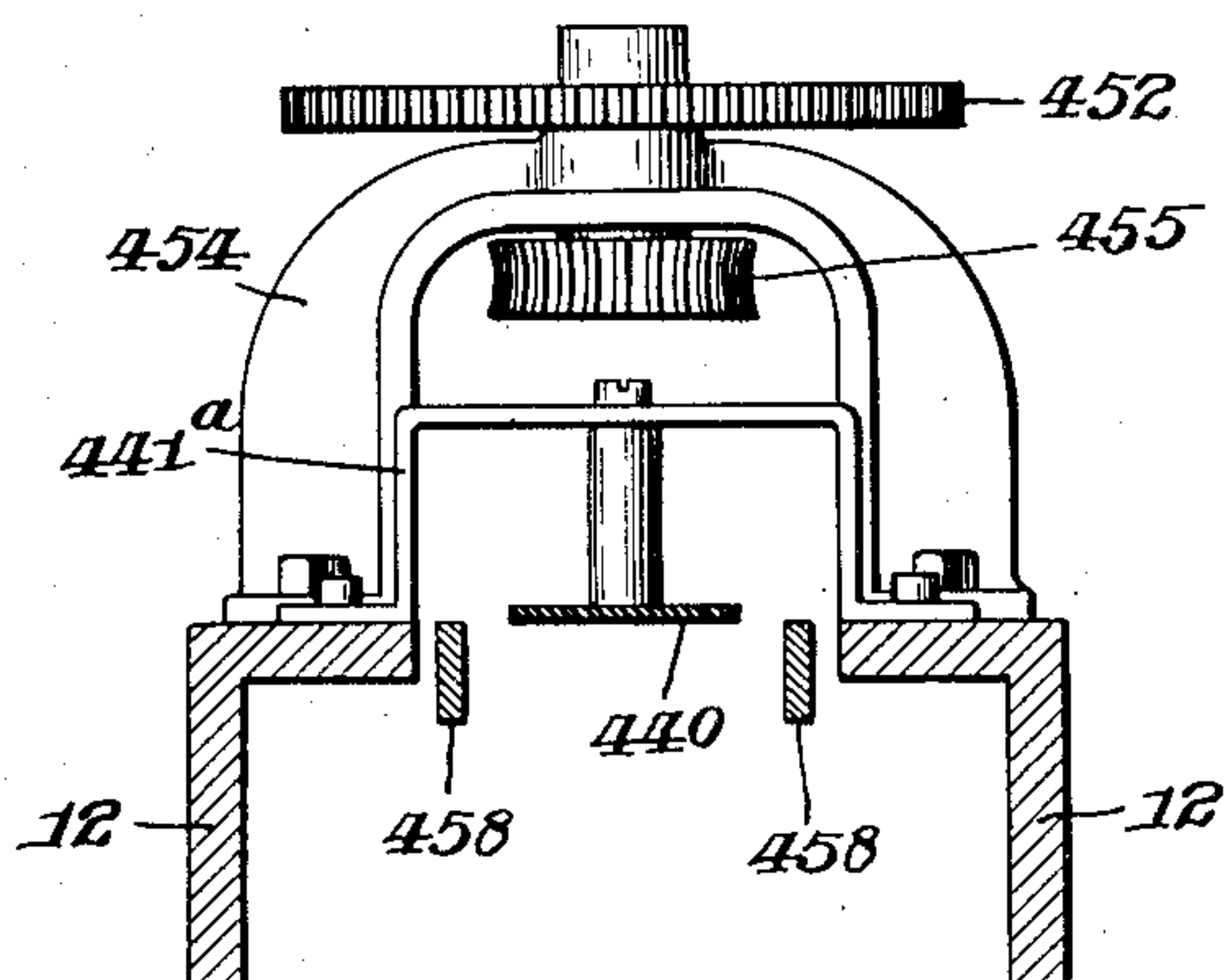


Fig. 47.

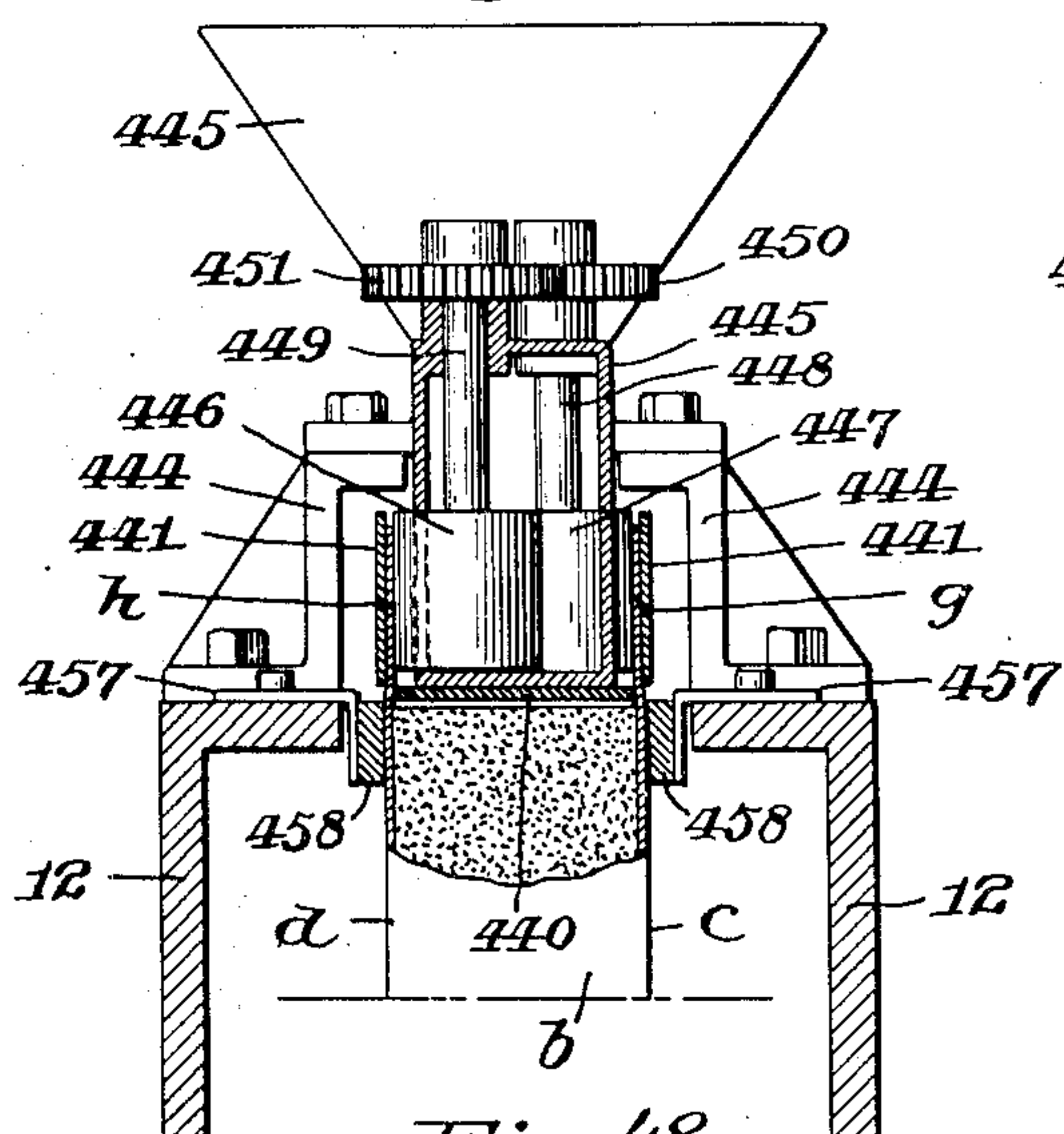
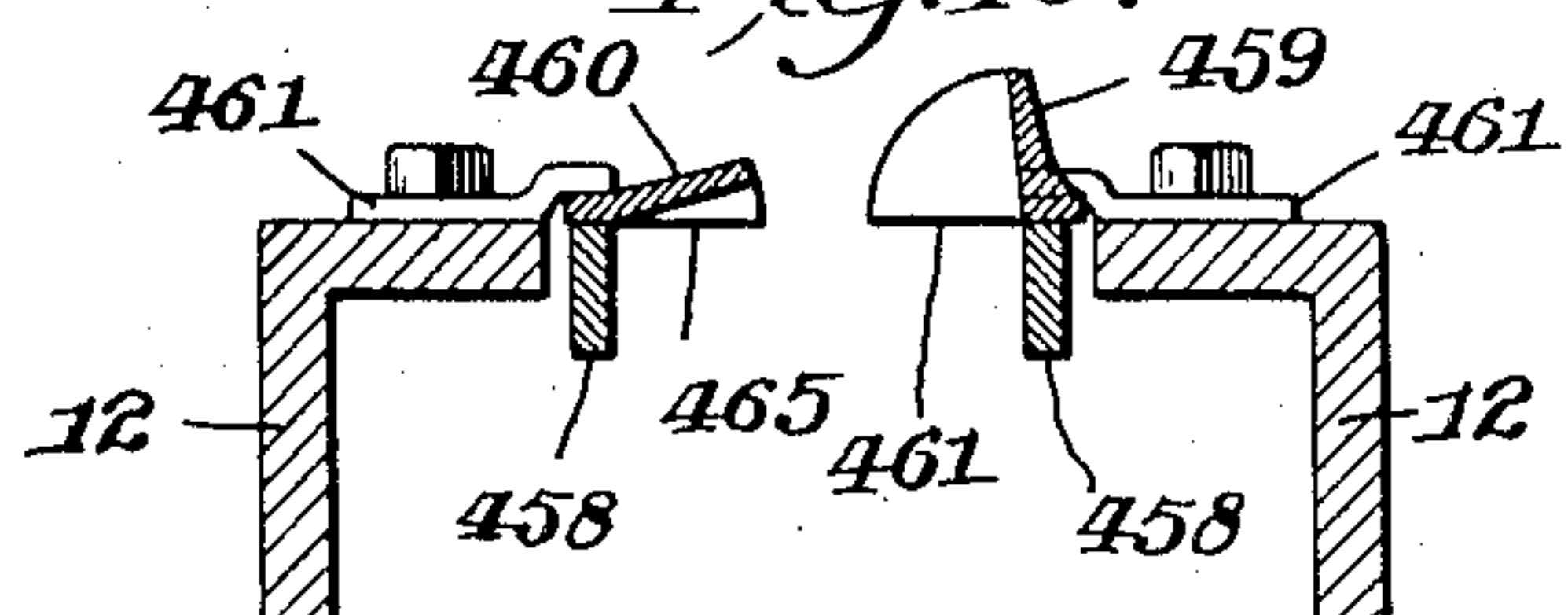


Fig. 48.



WITNESSES:

Walter C. Bussey
H. J. Samble

Fig. 49.

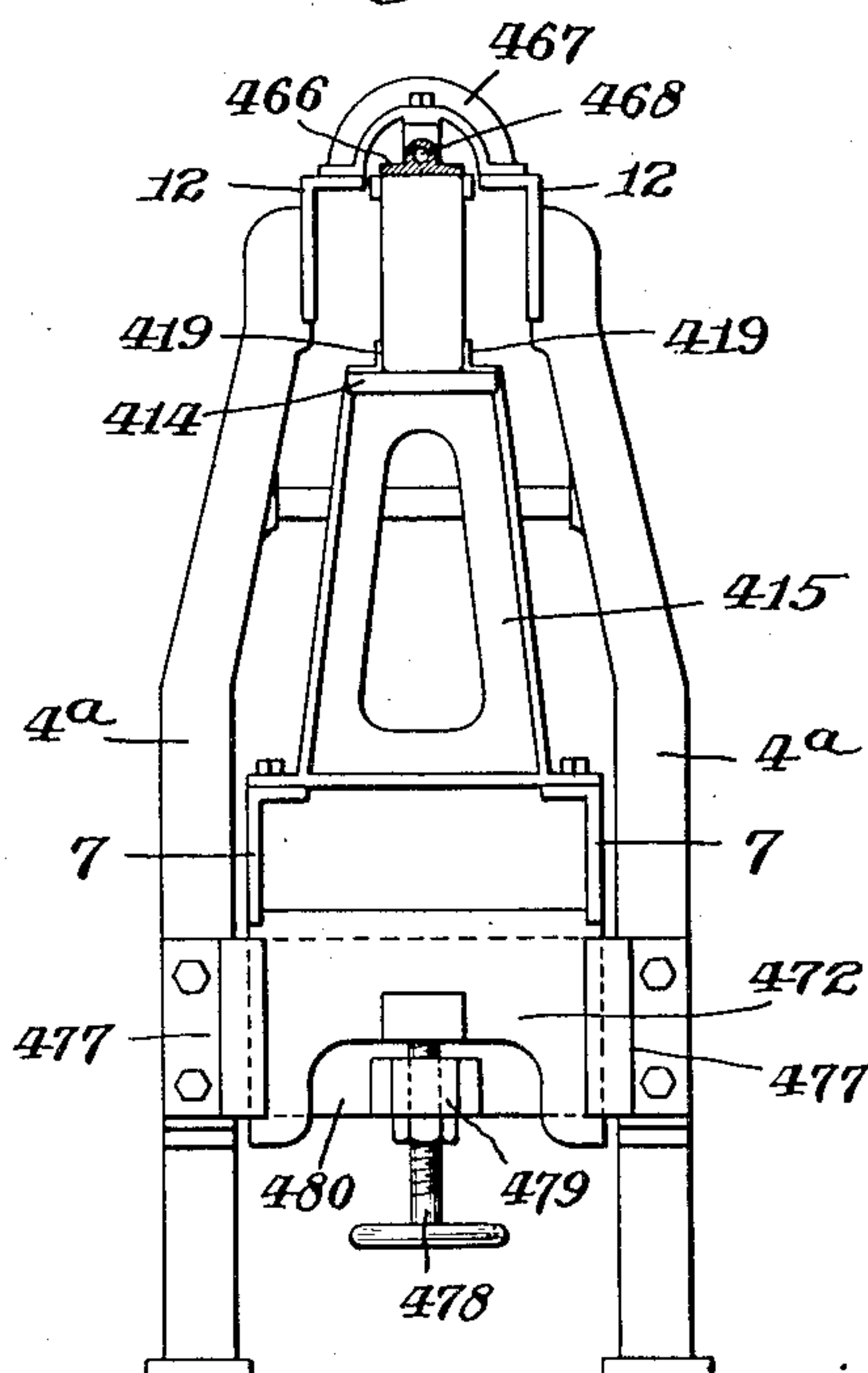
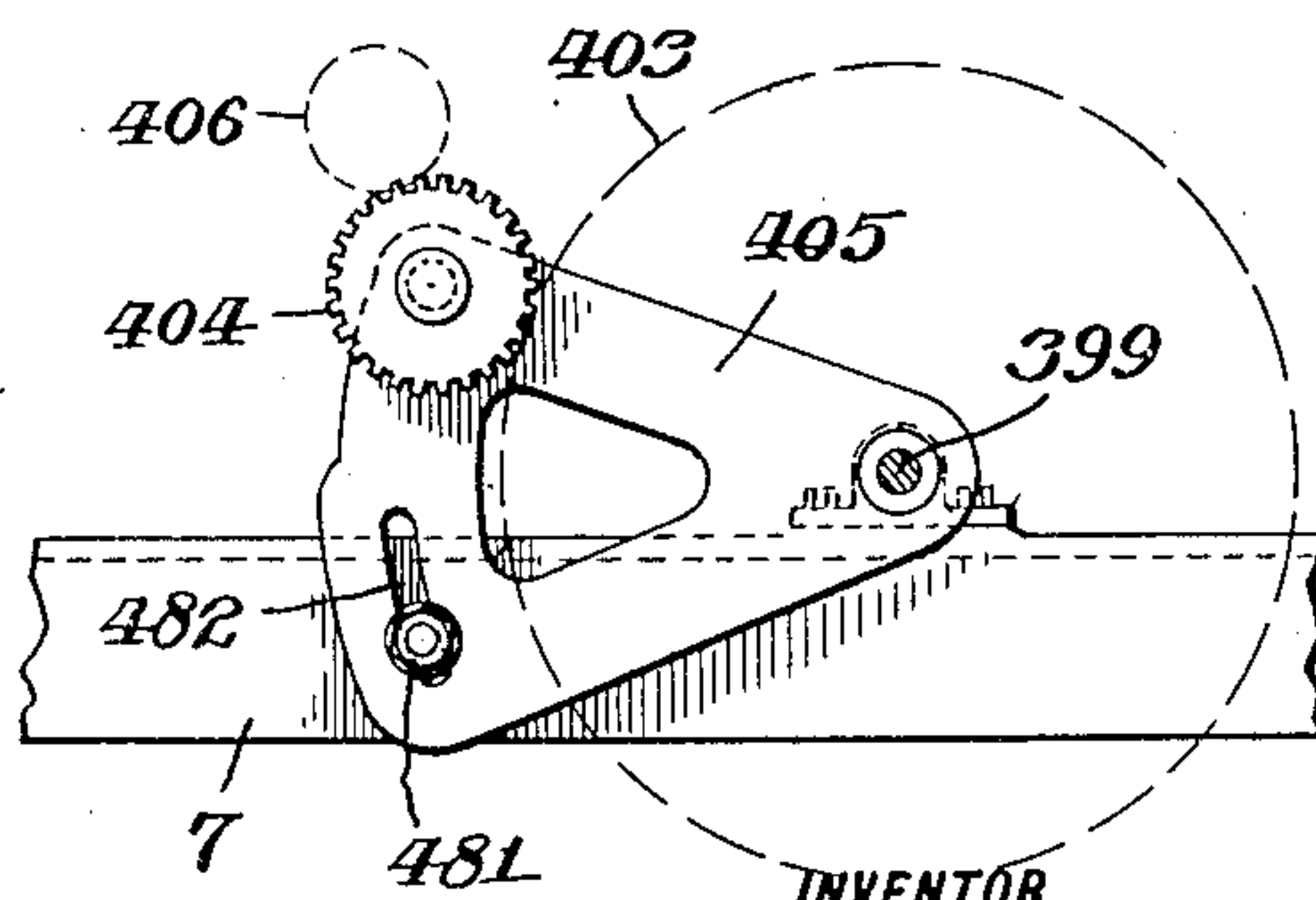


Fig. 50.



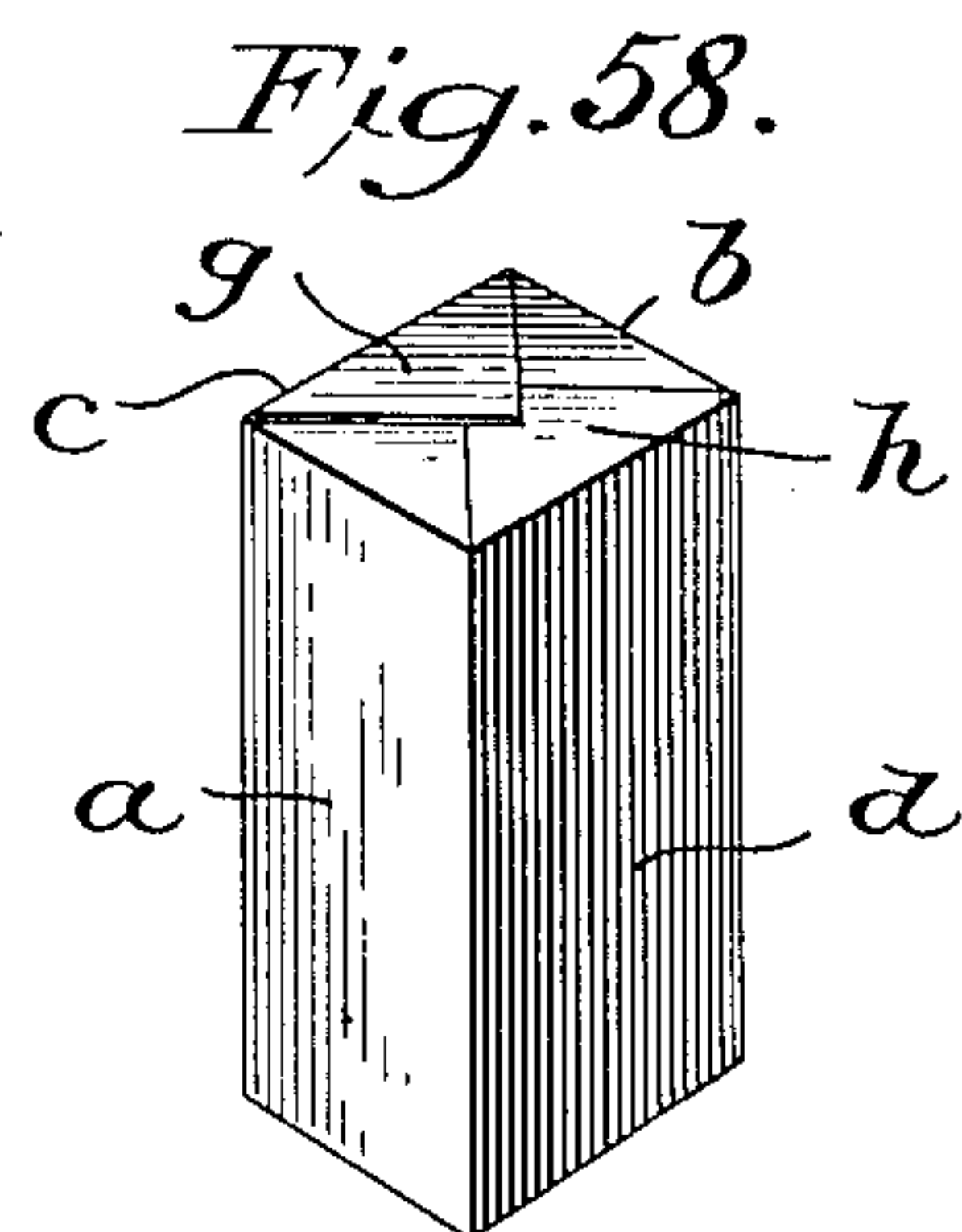
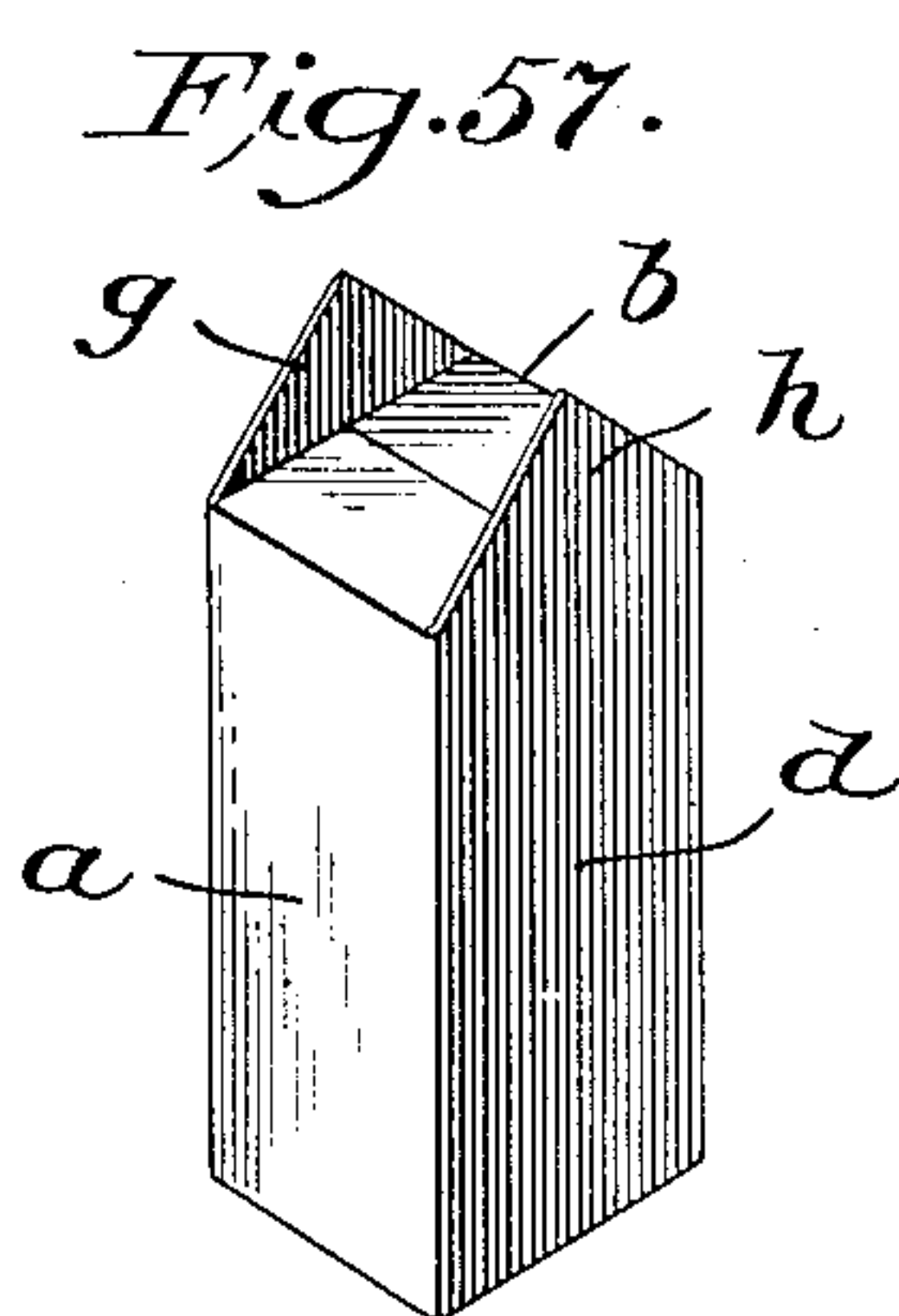
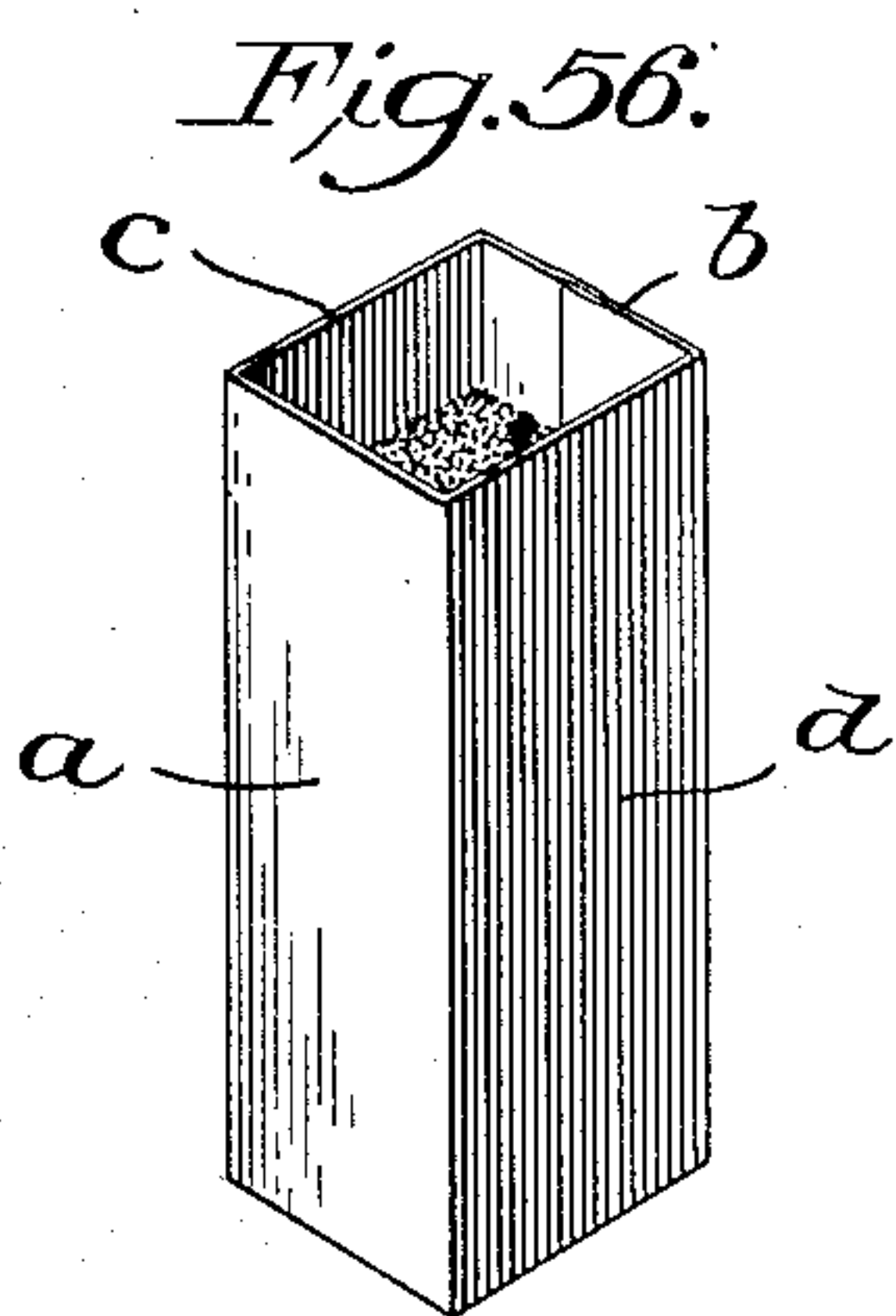
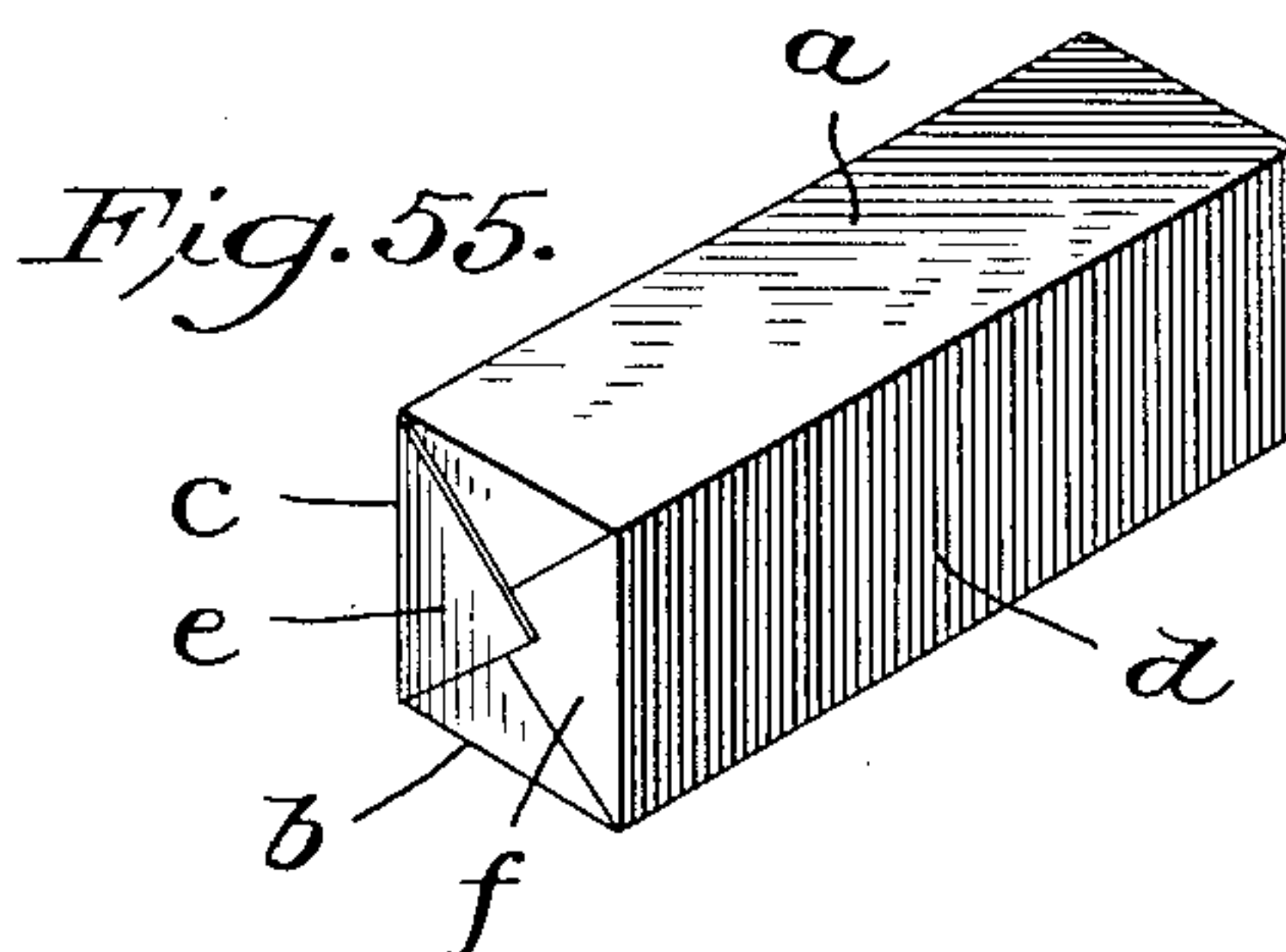
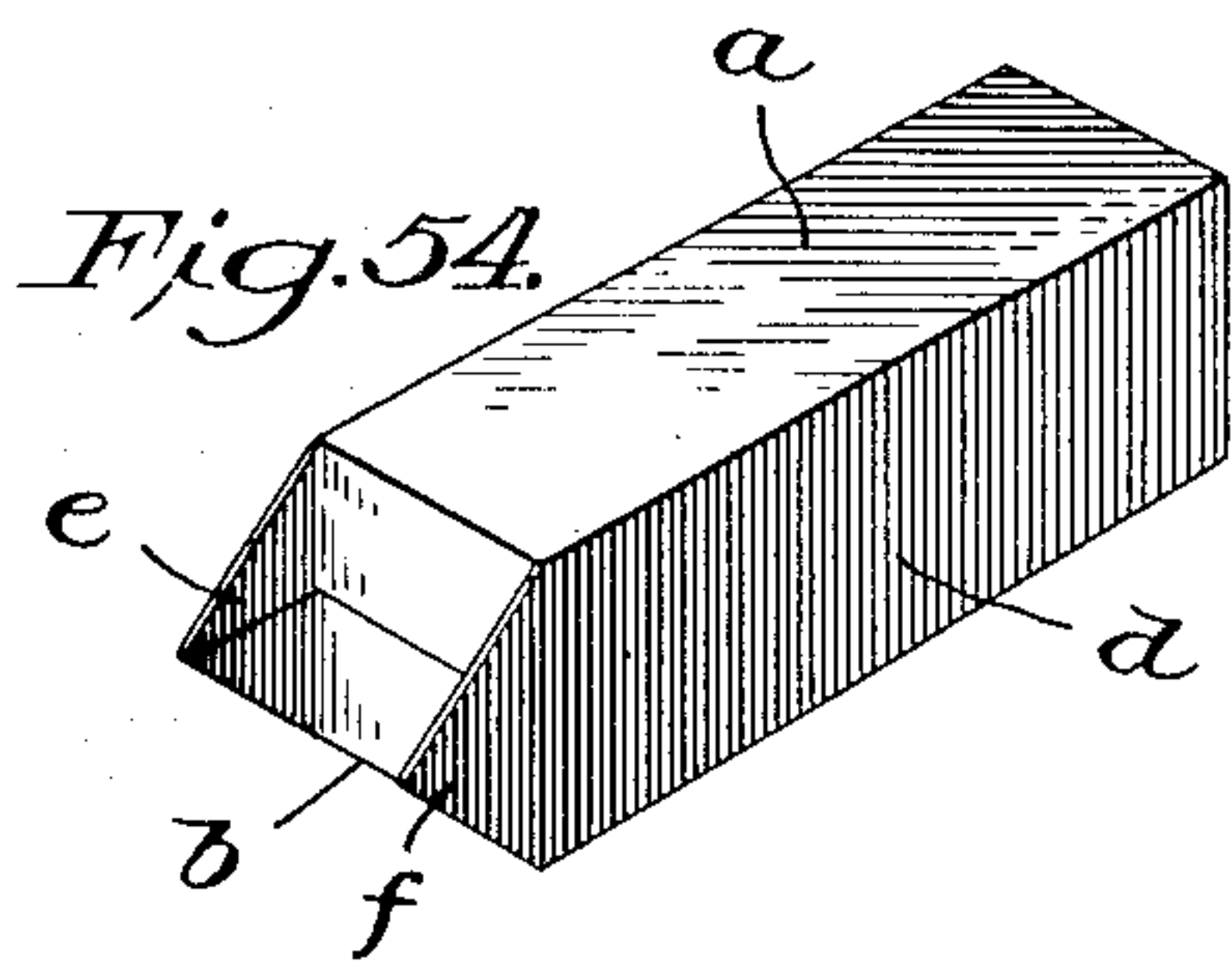
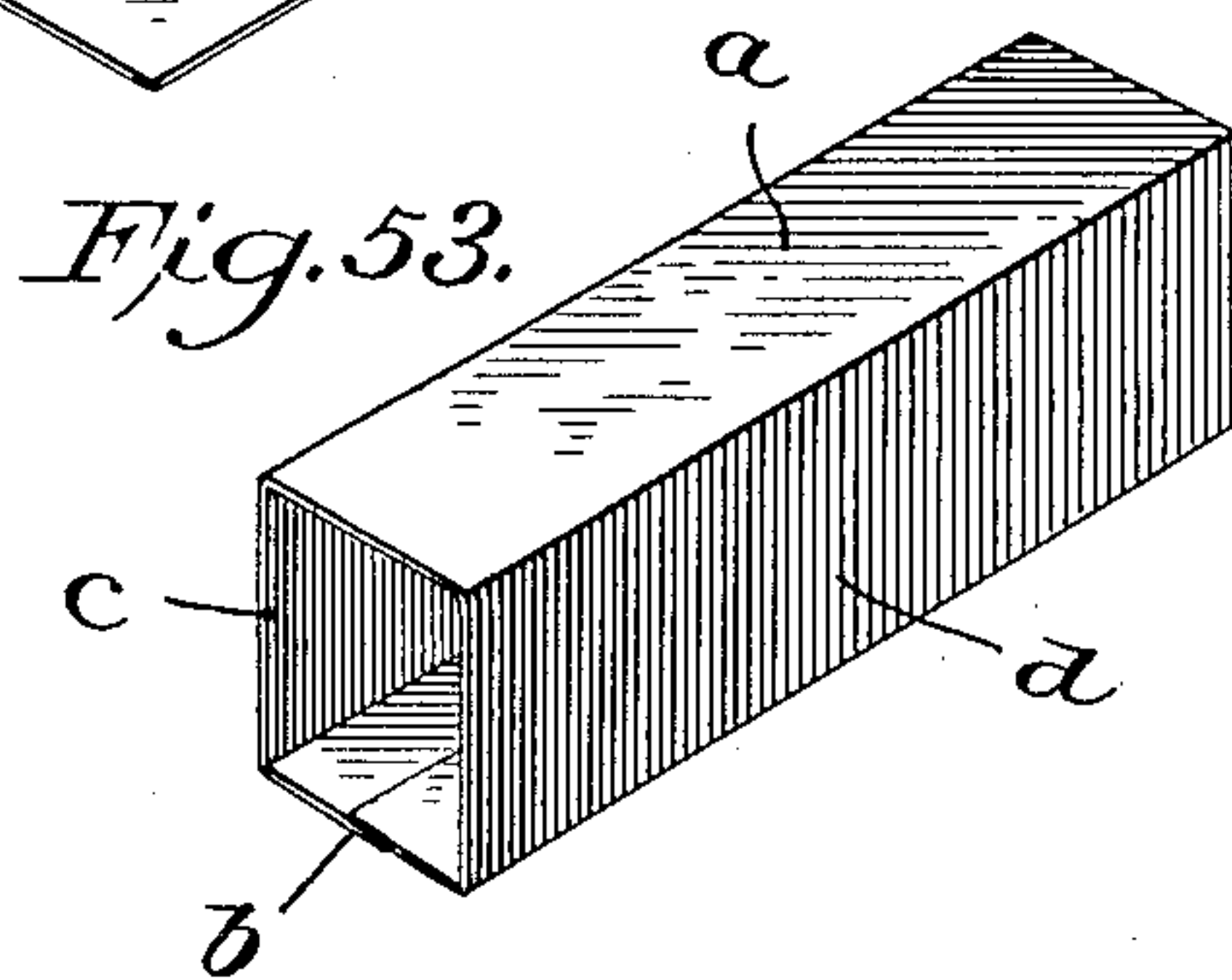
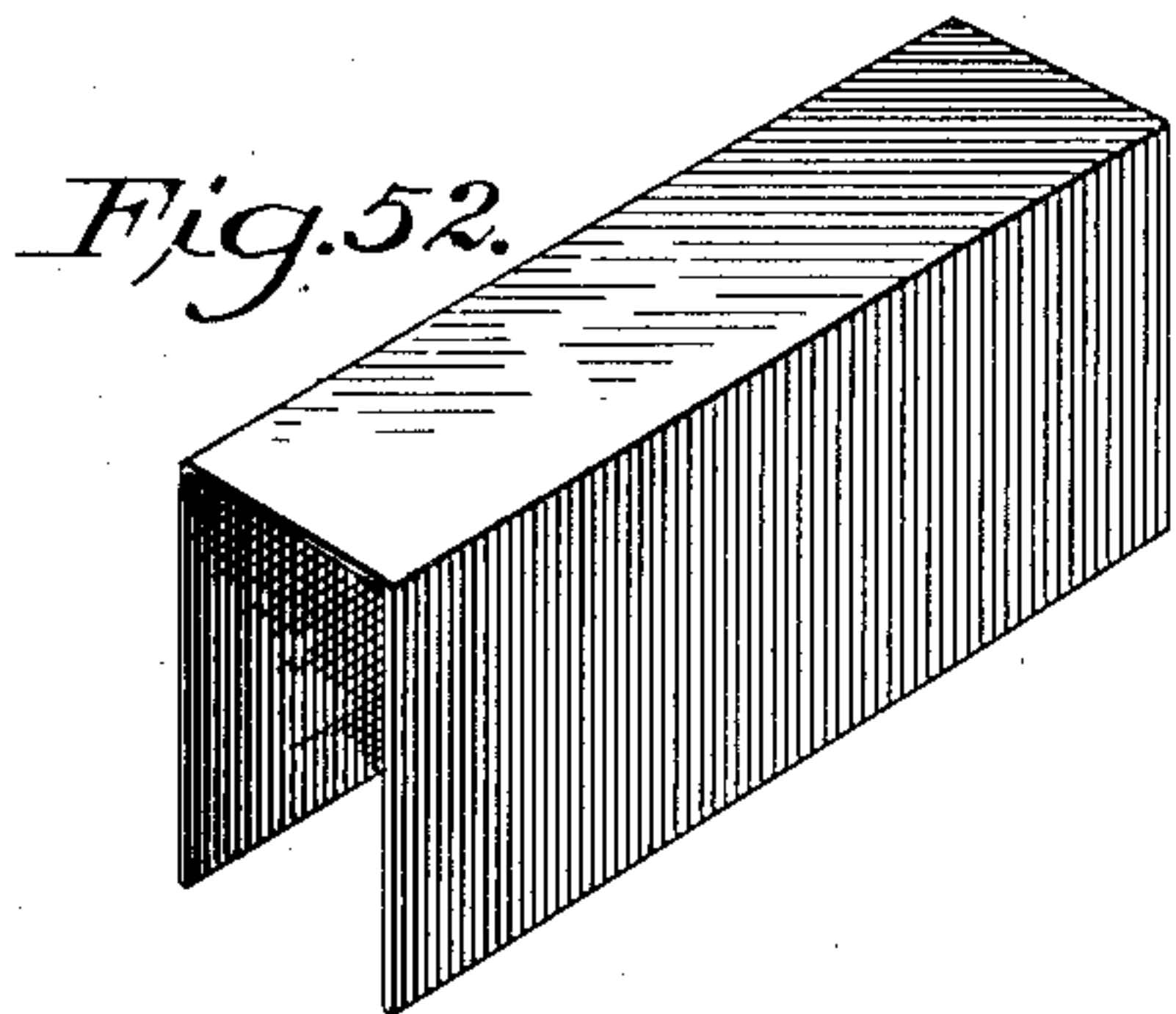
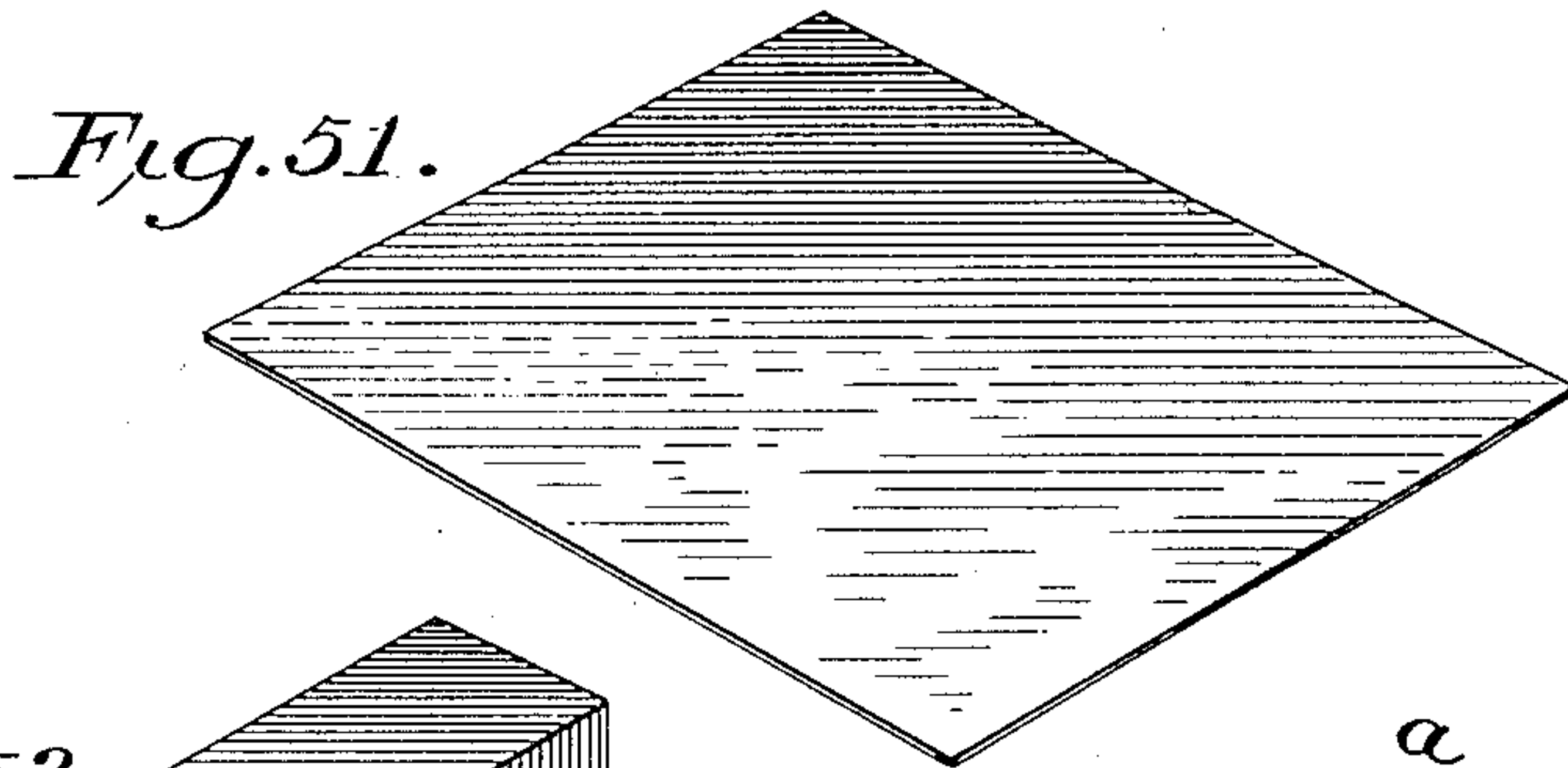
INVENTOR

Edward Stanley

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E. STANLEY.
PACKAGING MACHINE.
APPLICATION FILED JUNE 19, 1903.

30 SHEETS—SHEET 30.



WITNESSES:

Walter C. Pusey
H. J. Amble

INVENTOR

Edward Stanley
A. V. *grouse*
ATTORNEY.

UNITED STATES PATENT OFFICE.

EDWARD STANLEY, OF NORRISTOWN, PENNSYLVANIA.

PACKAGING-MACHINE.

No. 869,664.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed June 19, 1903. Serial No. 162,177.

To all whom it may concern:

Be it known that I, EDWARD STANLEY, a citizen of the United States, residing at Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Packaging-Machines, of which the following is a specification.

This invention relates to packaging machines, its object, as generally stated, being to provide; first, mechanism for cutting blanks from a strip of paper; secondly, mechanism for printing the blanks; thirdly, mechanism for forming the blanks into paper bags; fourthly, mechanism for introducing a predetermined quantity of material to the bags; and, finally, mechanism for closing the open ends of the bags, thereby producing packages.

The invention consists in the novel features of construction, and combinations of parts which will be hereinafter fully described and claimed.

In the drawings—Figure 1 is a side elevation of my improved packaging machine. Fig. 2 is a sectional elevation thereof, showing the two main side frames and certain parts of the mechanism, as seen at right angles to Fig. 1. Fig. 3 is an elevation of one of the side frames, showing a portion of the driving mechanism, as seen from the side of the machine opposite to Fig. 1. Fig. 4 is a plan view of the upper portion of the inclined extension frame, showing the first paste box, the feed rollers, the cutting mechanism, and the carrying belt. Fig. 5 is a longitudinal section thereof, as on the line 8—8 of Fig. 4. Fig. 6 is a transverse section, as on the line 9—9 of Fig. 5, showing the first paste box. Fig. 7 is a transverse section, as on the line 10—10 of Fig. 5, showing a pair of feed rollers. Fig. 8 is a transverse section, as on the line 11—11 of Fig. 5, showing the cutting mechanism. Fig. 9, is an end view of the knife-carrying roller. Fig. 10 is a sectional detail, as on the line 13—13 of Fig. 9. Fig. 11 is a transverse section, partly broken away, as on the line 14—14 of Fig. 5. Fig. 12 is a transverse section, as on the line 15—15 of Fig. 5, showing the carrying belt and a pair of feed rollers. Fig. 13 is an enlarged elevation of a portion of the former-carrying wheel, and adjuncts. Fig. 14 is a vertical section through a portion of the series of formers, the second paste box, the folding mechanism for the bottom of the bag, and adjuncts. Fig. 15 is a plan view of the second paste box, showing a development of the driving mechanism for the paste rollers, and adjuncts. Fig. 16 is a sectional development, as on the line 19—19 of Fig. 14. Fig. 17 is a sectional development, as on the line 20—20 of Fig. 13. Fig. 18 is a transverse section, as on the line 21—21 of Fig. 14, showing one of the supporting bars of the main frame, and a yielding presser roller mounted thereon. Fig. 19 is a sectional detail thereof, as on the line 22—22 of Fig. 18. Fig. 20 is an end view of one of the formers as it is moving up-

wardly with its carrying wheel. Fig. 21 is an elevation of the outer end thereof as seen at right angles to Fig. 20. Fig. 22 is a vertical section through the outer end of one of the formers as on the line 25—25 of Fig. 20. Fig. 23 is an elevation of a portion of the wheel carrying the radially movable friction rollers for removing the paper bag from the formers; and the upper end of the operating bar therefor. Fig. 24 is a sectional detail as on the line 27—27 of Fig. 23. Fig. 25 is a vertical section through one of the formers when it occupies its lowermost position showing its carrying wheel in section, a portion of the bracket for supporting the former-carrying wheel, the upper end of the bar for operating the radially moving friction rollers, and adjuncts. Fig. 26 is a sectional detail of the friction rollers as on the line 29—29 of Fig. 25. Fig. 27 is a similar section, as on the line 30—30 of Fig. 26. Fig. 28 is an elevation of a pair of folder cams and their supports, as seen from the line 31—31 of Fig. 14. Fig. 29 is a sectional detail thereof, as on the line 32—32 of Fig. 16. Fig. 30 is a similar view as on the line 33—33 of Fig. 16. Fig. 31 is a sectional detail, as on the line 34—34 of Fig. 25, showing one of the supporting arms for two of the folder plates, and the steam passage therein. Fig. 32 is an elevation of the measuring and filling mechanism, two of the formers and the supporting wheel for the latter shown in section. Fig. 33 is a vertical section through a portion of the measuring and filling mechanism, slightly enlarged. Fig. 34 is a section through the measuring and filling mechanism as on the line 37—37 of Fig. 32. Fig. 35 is a similar section, as on the line 38—38 of Fig. 32. Fig. 36 is a sectional detail thereof, as on the line 39—39 of Fig. 35. Fig. 37 is a transverse sectional elevation of a portion of the carrier for receiving bags from the formers, showing one of the formers in its lowermost position, the bag just delivered therefrom to the underlying carrier, the friction rollers for removing the bag from the former, the operating bar for the latter, and adjuncts. Fig. 38 is a sectional elevation of the bar for operating the friction rollers, its support and actuating mechanism. Fig. 39 is an elevation of a portion of the receiving end of the carrier for receiving bags from the formers, a part of one of the supporting wheels therefor, and adjuncts. Fig. 40 is an elevation of a portion of the discharge end of the carrier for receiving bags from the formers, the mechanism for closing the open ends of the bags to produce packages, and adjuncts. Fig. 41 is a sectional plan of a portion of the receiving end of the carrier for receiving bags from the formers, and adjuncts, showing the position of a bag upon the carrier immediately following its removal from a former. Fig. 42 is a plan view, partly broken away, of a friction bar, for supporting the bags and packages. Fig. 43 is a plan view of the mechanism for closing the open

ends of the bags to produce packages. Fig. 44 is a horizontal section, as on the line 47—47 of Fig. 45, showing the pasting and pressing rollers, and adjuncts. Fig. 45 is a longitudinal vertical section, as on the line 48—48 of Fig. 43. Fig. 46 is a transverse sectional detail as on the line 49—49 of Fig. 40. Fig. 47 is a sectional detail through the third paste box as on the line 50—50 of Fig. 40. Fig. 48 is a sectional detail of a pair of folder cams, as on the line 51—51 of Fig. 40. Fig. 49 is an elevation of a pair of supporting standards of the main frame, and adjuncts. Fig. 50 is a detail of an adjustable bracket carrying a gear wheel hereinafter referred to. Fig. 51 is a perspective view of one of the blanks of paper before it has been acted upon by the folding mechanism. Figs. 52 to 58, inclusive, are perspective views, showing the successive operations through which a blank passes during the formation of a bag and then a package.

The frame work of the machine, as generally stated, comprises the side frames 1 and 1^a, their tie bars 2, the inclined extension 3, the supporting standards 4 and 4^a, and the horizontal bars 7 and 12.

The main driving shaft 16 extending transversely of the machine is journaled in bearings in the side frames 1, 1^a and is provided with a suitable driving pulley 17.

Journaled in suitable bearings on the standards 4 is a shaft 18 on which is mounted a roll of paper 23 of sufficient width to form the four sides of the bag or package.

The paper passes from the roll 23 over a guide roller 24, along the top of a sectional table 35, over a pasting roller 36 and between feed rollers 40, 41 by means of which it is drawn from the roll 23. The table 35 is supported by brackets 42 and brackets 109, 110 hereinafter referred to on the extension 3.

The lower feed roller 41 is fixed to a shaft 108 which has its bearings in brackets 109, 110 secured to the extension 3. One end of the shaft 108 extends outwardly and is provided with a gear wheel 111 which is driven by an idler 112 on a stud shaft on the bracket 110. The idler 112, in turn, is driven by a gear wheel 113 on transverse shaft 58, hereinafter referred to, and the shaft 58 is provided with a bevel gear wheel 57 which is driven by a similar wheel 59 on the upper end of an inclined shaft 60 mounted in bearings 61 and 62 on the side frame 1, and extension 3, respectively. The lower end of the shaft 60 is provided with a worm wheel 63 which is driven by a worm 64 on a transverse shaft 65 arranged parallel to the main shaft 16. The shaft 65 is journaled in bearings on the side frames 1, 1^a, and is provided with a gear wheel 66 which is driven by a gear wheel 67 on the main shaft 16.

The upper roller 40 may be constructed of any suitable yielding material, such, for example, as rubber, and is mounted on a shaft 114 having its bearings in boxes 115 which are slidingly fitted to extensions 116 on the brackets 109, 110. The roller 40 is pressed toward the roller 41 by screws 117 fitted to top bars 118 of the extensions 116 and bearing upon the plates 119, between which and the boxes 115 are interposed pieces of the material 120. By manipulating the screws 117 the pressure of the roller 40 may be nicely regulated.

The paste roller 36 is arranged in a paste-containing box 121 located at one side of the table 35, and the roller is fixed to a shaft 122 which extends through and is

journaled in the lower portion of said box. The wall of the paste box 121, above the roller 36, is provided with an off-set 123 through which one edge of the strip of paper passes, and the roller 36 projects through an opening in the off-set 123 and slightly above the top line of the table 35 so as to apply a line of paste along the under side of one edge of the onwardly moving strip of paper.

One end of the shaft 122 projects outwardly and is provided with a gear wheel 124 which coacts with a similar wheel 125 on the driven shaft 108, by means of which the paste roller 36 is actuated.

The paper is advanced from the feed rollers 40, 41 to and between a pair of rollers 126 and 127. The upper roller 126 is fixed to a transverse shaft 128, and the lower roller is fixed to the driven shaft 58 hereinbefore referred to, both shafts being journaled in the brackets 109 and 110. The upper roller 126 carries a longitudinally arranged knife 129, by means of which the paper is severed into predetermined lengths, each length constituting a blank of sufficient size to form a paper bag. The knife 129 has a slight radial movement within the roller 126 and is secured at its respective ends to guide frames 130 arranged on the respective ends of said roller. The guide frames are held in place and guided by under-cut plates 131 secured to the ends of the roller 126. The knife 129 is held normally inward by flat springs 132, the free ends of which are fitted to openings in the frames 130. The springs 132 are adapted to work within depressions 133 in the face of the roller 126 and are secured to the latter by screws 134. The frames 130 are provided with rollers 135 which are adapted, during the rotation of the roller 126, to act against fixed cams 136 supported by extensions of the brackets 109 and 110. As the rollers 135 pass the cams 136, the frames 130 are moved against the action of the springs 132 to project the cutting edge of the knife 129 slightly beyond the face of the roller 126; and as the rollers 135 escape the cams 136, the knife is returned to its normal position by the action of the springs 132. The lower roller 127 is provided with a narrow longitudinal opening 137 which is adapted, during the rotation of the rollers 126, 127, to register with the knife 129. When the knife 129 meets the opening 137, the rollers 135 act against the cams 136 and project the cutting edge of the knife 129 into said opening, thereby severing the strip of paper passing between the rollers 126, 127. The shafts 58, 128 are provided with similarly pitched coacting gear wheels 138, 139 and are driven by the bevel gear wheel 57 meshing with the bevel gear wheel 59 on the shaft 60, as previously explained.

In order to insure the straight passage of the paper from the rollers 126, 127 and to prevent the paper from curling upwardly due to its natural tendency from having been wound upon the roll 23, I provide the roller 126 with grooves 140, and the roller 127 with ribs 141 which extend part way around the roller 127 and which are adapted to register with the grooves 140, to the end that as the forward end of the strip of paper leaves the rollers 126, 127, the ribs 141 will press the paper into the grooves 140 and thereby form and maintain stiffening corrugations in the paper until the ribs 141 escape the latter, whereupon the corrugations disappear. The ribs 141 are arranged so as to produce the

corrugations in the forward end of the paper immediately following the severance of each blank from the latter.

Before being acted upon by the knife 129, the forward end of the paper extends to and between a pair of feed rollers 143, 144 mounted on brackets 145, on the extension 3. The lower roller 144 is carried by a shaft 146 which has its bearings in the brackets 145. One end of the shaft 146 is provided with a gear wheel 147 which coacts with an idler 148 which is driven by the gear wheel 138 on the shaft 58. The upper roller 143 may be constructed of any suitable yielding material, and is mounted on a shaft 149 having its bearings in boxes 150, which are slidably fitted to openings 151 in the brackets 145. The roller 143 is pressed toward the roller 144 by screws 152 fitted to top bars 153, of the brackets 145 and bearing upon plates 154, between which and the boxes 150 are interposed pieces of yielding material 155. By manipulating the screws 152, the pressure of the roller 143 may be nicely regulated. The roller 144 is provided with a groove 156 to which is fitted a carrying belt 157 which passes over supporting rollers 158, and around a pulley 159. The rollers 158 and pulley 159 are journaled in a frame 160 which is fitted to an off-set 161 in a transverse frame 162 mounted on the extension 3, the frame 160 being held in place by a set screw 163.

Resting upon the belt 157 directly over the rollers 158 and pulley 159 are a series of rollers 164 having their bearings in a frame 165 which is fitted to an off-set 166 in the under side of a bridge 167, the respective ends of which are secured to the top of the frame 162. The frame 165 is held in place by a screw 168.

The surface speed of the roller 144 and belt 157 is greater than that of the feed rollers 40 and 41, and the pressure of the roller 143 is such that the belt 157 and the roller 144 will slip upon the paper until the latter is severed by the knife 129; whereupon the severed length or blank is carried onward by the rollers 143, 144 and belt 157 at a greater rate of speed than the onwardly moving strip of paper. The blank passes between the rollers 164 and the belt 157 and the weight of the said rollers and frame 165 press the blank upon the belt 157 in a manner to insure its passage therewith.

It will be observed that the top of the table 35 and the top of the frame 162 are provided with grooves 169, 170, respectively, directly beneath the travel of the line of paste applied by the roller 36; that the rollers 41 and 144 and belt 157 do not extend to the lateral edges of the paper; and that the roller 127 is provided with a circumferential groove 171 directly beneath the line of paste. This construction insures the passage of the paper to and with the belt 157, without in any way affecting the line of paste applied by the wheel 36.

By the mechanism hereinafter described, each successive blank is formed into a bag, a predetermined quantity of material is introduced to the bag and the open end of the bag is then closed, thereby forming a package.

To produce the bag, the blank passes through the following operations which, as generally stated, consist, first, in folding the bag into channel form, as indicated in Fig. 52, secondly, in folding the sides of the channel to meet each other and pasting the meeting edges together, and thereby forming a rectangular tube, having

the sides *a*, *b*, *c* and *d*, as indicated in Fig. 53, thirdly, in folding the sides *a* and *b* to meet each other at one end of the tube and thereby forming the outwardly projecting flaps *e* and *f*, as indicated in Fig. 54, fourthly, in applying paste to the inner faces of the flaps *e* and *f*, and, finally, in folding the latter toward each other and upon the folded ends of the sides *a* and *b*, thereby producing a bag, as indicated in Fig. 55. A predetermined quantity of material is then introduced to the bag, as indicated in Fig. 56, and the open end of the latter is closed in the following manner: The upper ends of the sides *a* and *b* are folded to meet each other and down upon the top of the material contained in the bag, thereby forming the upwardly projecting flaps *g* and *h*, as indicated in Fig. 57; paste is applied to the inner faces of the flaps *g* and *h*; the latter are then folded toward each other and down upon the folded ends of the sides *a* and *b*, thereby producing a package as indicated in Fig. 58.

I shall now proceed to describe the mechanism for producing the paper bags which, in its preferred embodiment, is of the following construction:

As the blanks are severed from the strip of paper by the knife 129, they are successively advanced and fed horizontally by the belt 157 to a moving series of formers 172 which, in the present instance, are mounted on a vertically arranged wheel 173 so as to project radially from the outer edge thereof, as shown.

The wheel 173 is fixed to a shaft 174 which extends into and is secured to a hub 175, (see Fig. 25) which is rotatably mounted on a bracket 176 projecting from the side frame 1^a. The hub 175 supports the wheel 173 and is provided with a bevel gear wheel 177 which coacts with a similar wheel 178 on the upper end of an inclined shaft 179 journaled in bearings on the side frame 1^a. The lower end of the shaft 179 is provided with a worm wheel 180 which is driven by a worm 181 on the main shaft 16, whereby the wheel 173 is slowly rotated.

The formers 172 are rectangular in cross section and each former is provided with an inner flaring end 182 and a pair of doors 183, 184 pivoted to its outer end. The doors 183, 184 are provided with ears 185, 186, respectively, (see Fig. 21) by means of which they are pivoted to the sides of the former, the ears being arranged within off-sets in the sides of the former so as to lie flush with the outer surface of the latter. The doors are arranged to cover each about one half of the outer end of the former and they are pivoted to the latter at their forward corners, as shown, to the end that, as the formers move upwardly the doors will close against their outer ends, and when the outer ends of the formers are projected downwardly the doors will open outwardly by gravity for a purpose hereinafter described.

The feeding of the paper is so timed in respect to the movement of the wheel 173 that, as the upper surface of each successive former 172 is coming into line with the top of the belt 157, the latter delivers a blank between said former and a pair of arms 187, 188 projecting from the bridge 167 toward the center of the wheel 173.

The arms 187, 188 are arranged on the respective sides of the path traversed by the formers 172, and the spaces between the inner faces of the said arms and

the respective sides of the formers are each equal to the thickness of the paper, or substantially so.

Just as the rearward edge of the blank leaves the belt 157, the upper face of the former passes between the lower edges of the arms 187, 188. This operation stops the forward movement of the blank and, during the continued upward movement of the former, folds the sides of the blank down against the respective sides of the former, the end of the blank which is to form the bottom of the bag projecting beyond the outer end of the former.

As the former moves upward between the arms 187, 188 and the extensions 189, 190 thereon, respectively, forming continuations of the inner faces of said arms, the sides of the blank are held against the respective sides of the former by frictional engagement with said arms and extensions, the respective sides of the blank extending below the bottom of the former.

Arranged on the respective sides of each former 172 is a pair of oppositely disposed folder plates 191, 192 which are adapted to move toward and away from each other through a plane which is parallel and adjacent to the rear side of the onwardly moving former. The plates 192 are supported by arms 193 extending laterally and outwardly from the wheel 173, and the plates 191 are supported by arms 194 extending outwardly from a wheel 195 which is secured to the shaft 174 between the wheel 173 and the hub 175. The plates 192 are adapted to slide upon brackets 196 projecting laterally from the arms 193 and are held in place and guided by under-cut guide plates 197 secured to said brackets; and the plates 191 are adapted to slide upon lateral extensions 198 of the arms 194 and are held in place and guided by under-cut guide plates 199 secured to said extensions, similarly to the plates 192.

The plates 191, 192 are provided with rollers 200, 201, which project into spaces 202, 203 between the lateral edges of said plates, respectively. These rollers 200, 201 are adapted to act against fixed cams 204, 205 and 206, 207, respectively, during the rotation of the wheels 173, 195, to move the plates to and from the formers 172 for a purpose hereinafter explained.

The cams 205, 207 are supported by brackets 208, 209 projecting from the side frames 1^a, 1, respectively; and the cams 204, 206 extend some distance around the paths traversed by the rollers 200, 201, and are supported by brackets 210, 211, projecting from the side frames 1^a, 1, respectively.

Arranged at right angles to each of the plates 191 is a folder plate 212 which is adapted to move to and from the adjacent former 172 through a plane which is parallel and adjacent to the outer end of said former. These plates 212 are adapted to slide upon the outer faces of the arms 194 and are held in place and guided by under-cut guide plates 213 secured to the outer faces of said arms.

The plates are provided with rollers 214 which are adapted to act against fixed cams 215, 216 for a purpose hereinafter described. The cam 216 is supported by brackets 217 projecting from the side frame 1^a, and the cam 215 extends some distance around the path traversed by the rollers 214 and is supported by brackets 218 also projecting from the side frame 1^a.

The tops of the extension 189, 190, of the arms 187, 188 are provided with teeth 219, 220, respectively, and

the inner ends of the plates 191, 192 are also provided with teeth 221, 222, respectively, the teeth 221, 222 being adapted to enter the spaces between the teeth 219, 220, respectively, during the rotation of the wheels 195, 173 and the inward movement of the plates 191, 192.

As the bottom of each upwardly moving former is passing the teeth 220 of the extension 190, the roller 201 engages the cam 207 which moves the plate 192 inwardly, the teeth 222 of the plate 192 entering the spaces between the teeth 220 of the extension 190 and thereby folding the lower portion of the adjacent side of the blank against the bottom of the former 172 before the latter escapes the teeth 220. After this side of the blank is folded as just described, its edge extends beyond the center of the former 172, and the inner edge of the plate 192 is projected only a slight distance beyond the side of the former thereby leaving the edge of the blank exposed.

During the foregoing operation, the plate 191 is being moved inwardly by its roller 200 engaging the cam 205, and, immediately following the folding up of the lower portion of one side of the blank by the action of the plate 192, the teeth 221 of the plate 191 enter the spaces between the teeth 219 of the extension 189 and thereby fold the lower portion of the other side of the blank up against the former 172 and the exposed portion of the opposite edge of the blank, the paste previously applied to one edge of the blank by the roller 36 coming into contact with the opposite edge of the blank and thereby uniting the respective edges.

It will be observed that the inner edge of the plate 191 is projected beyond the center of the former 172 by the cam 205 thereby firmly holding the edges of the blank together and against the said former. The plates 191, 192 remain in engagement with the blank until the paste has dried sufficiently to hold the paper together; whereupon they are withdrawn as will hereinafter appear. By holding the sides of the blank against the respective sides of the former 172 by the teeth 219, 220 until the teeth 221, 222 have folded the depending sides of the blank up against the bottom of the former, I am enabled to fold the blank tightly around the former. At this stage of the operation, the blank is formed into a rectangular tube having the four sides *a*, *b*, *c* and *d* as indicated in Fig. 53, the tube being around one of the formers 172 with that portion of the tube which is to be folded into the bottom of the bag projecting beyond the outer end of the former. The blank is next acted upon by the outer curved end of a rotating folder arm 223 which is arranged adjacent to the path traversed by the outer ends of the formers 172 and which projects from a collar 224 secured to a shaft 225. This shaft 225 is fitted to bearings 226 on a frame 227 extending between the side frames 1 and 1^a, the ends of the frame 227 being secured to the said side frames. The shaft 225 is provided with a bevel gear wheel 228 which coacts with a similar wheel 229 on one end of a shaft 230 which is fitted to bearings on the side frame 1^a. The other end of the shaft 230 is provided with a bevel gear wheel 231 which is driven by a similar wheel 232 secured to the hub 175 of the rotating wheel 173.

The folder arm 223 moves in the direction indicated by the arrow in Fig. 17, and it moves at a greater rate of speed than the outer end of the former 172, to the end that, as the former passes the folder arm 223, the outer

curved end of said arm will act upon the outwardly projecting portion of the paper tube or blank in a manner to fold the outer end of the side *b* of the tube up against the outer end of the former and under the outwardly turned lower end of a fixed folder plate 233 which extends upwardly along the path traversed by the outer end of the former. During this operation the outwardly turned end of the folder plate 233 acts upon the outwardly projecting end of the side *a* of the tube and folds the latter down upon the outer end of the former 172.

When the outer end of the tube or blank is being folded, as above described, the corner folds thereof are reversed and brought down to meet the lateral edges of the outer end of the former, thereby making oblique folds in the sides *c* and *d* and forming the flaps *e* and *f* as shown in Fig. 54. The sides *a*, *b* of the blank just folded are held against the outer end of the former during the onward movement of the latter, by the folder plate 233, the space between the outer end of the former and the folder plate being of substantially the same thickness as the paper.

It will be observed on reference to Fig. 15 that the lower end of the folder plate 233 is reduced in width and that the outer end of the folder arm 223 is bifurcated to clear the reduced end of the plate. The folder plate 233 is secured near its lower end to a bracket 234 projecting from a bar 235 which is secured at its respective ends to the side frames 1 and 1^a. During the onward movement of the wheel 173, and while the blank is passing the folder plate 233, the outwardly projecting flaps *e* and *f* pass between fixed plates 236, 237 and driven rollers 238, 239 arranged adjacent to said plates, respectively. This operation creases the oblique folds in the flaps *e* and *f*. The plates 236, 237 are mounted on brackets 240, 241 secured to the bar 235 and are provided with flaring ends to insure the passage therebetween of the flaps *e*, *f*; and the rollers 238, 239 are secured to the lower ends of shafts 242, 243, respectively, which are journaled in bearings on a plate 244 which is secured to the bar 235.

The upper ends of the shafts 242, 243 are provided with coacting gear wheels 245, 246, respectively, and the shaft 243 is provided with a bevel gear wheel 247 which meshes with a similar wheel 248 on one end of a short shaft 249 mounted in a bearing on the bar 235. The other end of the shaft 249 is provided with a bevel gear wheel 250 which is driven by a similar wheel 251 on the upper end of a vertical shaft 252 journaled in bearings 253, 254 on the frame 227 and bar 235, respectively. The lower end of the shaft 252 is provided with a bevel gear wheel 255 which meshes with a similar wheel 256 on the driven shaft 225 which carries the folder arm 223.

Mounted on the bar 235 and a bar 257 extending between the side frames 1 and 1^a, is a paste-containing box 258 in which are arranged paste-applying rollers 259, 260 which project through openings in the respective sides of the box. These rollers 259, 260 are fixed to the lower ends of shafts 261, 262, respectively, which are mounted in bearings in the wall of the box. The upper ends of these shafts are provided with coacting gear wheels 263, 264, and the gear wheel 264 is driven by a gear wheel 265 on the shaft 242 of the roller 238.

The paste box 258 is slightly narrower than the form-

ers 172 and it is arranged between the fixed plates 236, 237 which extend adjacent and parallel to the sides of the box.

Upon leaving the rollers 238, 239 the flaps *e* and *f* pass between the plates 236, 237 and the paste-applying rollers 259, 260, respectively, thereby receiving paste on their opposing inner faces from the rollers 259, 260 which project slightly beyond the outside line of the box 258, the plates 236, 237 insuring the contact of the paper or flaps with the rollers. Just as the outer end of the former is escaping the end of the folder plate 233, the outwardly projecting flaps *e*, *f*, are acted upon by two folder cams 266, 267, respectively, which are supported by brackets 268 projecting from the under side of the bar 257. These cams 266, 267 comprise straight portions 269, 270 and curved portions 271, 272, respectively. The straight portions are arranged in line with the outer ends of the formers and between which the outer ends of the sides of the formers are adapted to pass; and the forward ends 273, 274 of the curved portions 271, 272 diverge outwardly from the path traversed by the outer ends of the formers, and gradually converge from their diverging ends 273, 274 to straight portions 275, 276, respectively, which are arranged adjacent to the path traversed by the outer ends of the formers and are on a plane at right angles to the straight portions 269, 270, as shown in Figs. 14, 16, 28, 29 and 30. The forward end 274 of the cam 267 extends to a point in advance of the forward end 273 of the cam 266, to the end that, as the former passes the cams 267, 266, the cam 267 will fold the outwardly projecting flap *f* down upon the previously folded ends of the sides *a*, *b*, and the cam 266 will fold the outwardly projecting flap *e* down upon the previously folded ends of the sides *a*, *b* and upon the flap *f* just folded, the paste previously applied to the flaps *e*, *f* pasting the latter together and to the previously folded ends of the sides *a* and *b*. Upon leaving the cams 266, 267 the outer end of the former passes a yielding roller 277 which presses the folds in the end of the tube firmly together. This roller is journaled in the lower ends of a pair of arms 278 depending from a plate 279 which is slidingly fitted to the bar 257.

The plate 279 is held in place and guided by suitable under-cut guide plates 280 secured to the bar 257, and the plate is pressed downwardly by the action of a spring 281, the ends of which bear upon pins 282 projecting from the plate 279. The spring 281 is mounted on a pin 283 which projects from the bar 257 and through a slot 284 in the plate 279, the end of the slot limiting the downward movement of the plate 279 and perforce the roller 277.

As the former 172 is passing the cams 266, 267 and roller 277 the plate 212 is being moved toward the former by the action of the roller 214 engaging the cam 216, and just as the former is leaving the roller 277, the plate 212 passes over the folded flap *e* and is projected, during the onward movement of the wheel 173, so as to entirely cover said flap.

In order to hold the point of the flap *e* in engagement with the underlying folds until the plate 212 nears the said point, I provide a centrally arranged spring finger 285 which is secured at one end to the plate 279. The other end of this finger extends through a groove 286 in the roller 277 and projects a slight distance beyond the

roller, whereby, as the former moves forward, the projecting end of the finger 285 will hold the last fold *e* in engagement with the preceding folds until the plate 212 nears the center line of the former, whereupon the said finger escapes the paper and the plate 212 continues its movement over the end of the former in a manner to hold the folds at the end of the blank firmly together and against the outer end of the former. The blank is now formed into a paper bag as indicated in Fig. 55, around the former 172; and the plates 191, 192 and 212 remain in engagement with the folds until the rollers 200, 201 and 214 meet the lower inclined ends 287, 288 and 289 of the cams 204, 206 and 215, respectively, or until the paste has dried sufficiently to hold the folds together, whereupon the rollers 200, 201 and 214 engage the inclined ends 287, 288 and 289 of the cams 204, 206 and 215, respectively, and the plates 191, 192 and 212 are thereby withdrawn from the former for a succeeding operation.

I preferably heat the ends of the plates 191 and 212 which hold the folds of the paper together in order to assist in drying the paste; and, for this purpose, I provide steam passages 290 which extend through the arms 194 and their extensions 198 adjacent to the ends of the plates 191 and 212, as shown in Figs. 17 and 31. Each of these passages is connected by a pipe 291 to a passage 292 extending through the hub 175 and opening into a space 293 between the end of the hub and a head 294 screwed onto the latter. The head 294 is provided with a stuffing box 295 through which a steam pipe 296 extends. The steam is introduced to the space 293 through the pipe 296 and is distributed from the space 293 through the passages 292 and pipes 291 to the passages 290 in the arms 194.

Immediately following the withdrawal of the plates 191, 192 and 212 from the former 172, the upper flaring end of the latter passes under the discharge end 297 of a measuring and filling mechanism which measures a predetermined quantity of the material employed in filling the packages from a suitable source of supply, and, during the passage of the upper end of each former 172 beneath the discharge end 297, the measured quantity of material is discharged into said former. This measuring and filling mechanism, in its preferred form is of the following construction:

Mounted on the side frame 1 is an inclined frame 298 from which project brackets 299, 300 and 301. The brackets 299 and 300 are fixed to the frame 298, and the bracket 301 is slidably fitted to the frame so as to be vertically adjustable thereon; that is to say, the flat end 302 of the bracket 301 takes against one side of the web 303 of the frame 298 between the flanges 304 and is provided with screws 305 which pass through a slot 306 in said web and carry a plate 307 which takes against the opposite side of the web 303 and thereby guides and supports the bracket in its positions of adjustment. Secured to the bracket 301 is an upwardly projecting bracket 308 which is provided with an internally-threaded boss 309 to which is fitted the lower end of an adjusting screw 310 which carries the bracket 301. This screw is provided with a head 311 which rests upon a bracket 312 which is secured to the frame 298 and through which the upper end of the screw 310 extends. The screw is also provided with a collar 313 which takes against the under side of the bracket 312.

Thus it will be seen that, by manipulating the screw 310, the bracket 301 may be adjusted up or down, as occasion may require, the flat end 302 of the bracket and the plate 307 sliding upon the web 303.

Supported by the brackets 299, 300 and 301 is a sectional tube 314 which is arranged on an incline, as shown, so that its lower end will be directed toward the upper flaring end of the lower formers, and so that its upper portion will clear the upper formers. This tube 314 is divided into three sections 315, 316 and 317 which are arranged a slight distance apart; each section 315, 316 being made in two parts 318, 319 and 320, 321, respectively. The section 317 extends upwardly from the bracket 299 and is supported by the latter and a bracket 322 on the side frame 1; the lower part 320 of the section 316 extends upwardly from the bracket 301, and the upper part 321 of the section 316 extends downwardly from the bracket 299 and into the upper end of its lower part 320; and the lower part 318 of the section 315 extends upwardly from the bracket 300, and the upper part 319 of the section 315 extends downwardly from the bracket 301 and into the upper end of its lower part 318. Thus it will be seen that the sections 315, 316, and 317 constitute in effect the continuous tube 314 which gradually increases in diameter from top to bottom, the lower end of the section 315 being arranged directly above the discharge end 297 which projects from the bracket 300.

Arranged directly beneath the sections 315, 316 and 317 and slidably fitted to the brackets 300, 301 and 299 are reciprocative plates 323, 324 and 325, respectively, which are held in place and guided by suitable under-cut plates 326 secured to the brackets 300, 301 and 299. These plates 323, 324 and 325, when they occupy the position shown, cover the ends of the sections 315 and 316, and thereby provide measuring chambers 327 and 328 hereinafter referred to, the chamber 328 being slightly larger than the chamber 327.

The brackets 301 and 299 are provided with suitable stuffing boxes 329 through which the plates 324 and 325 extend; and the bracket 300 is provided with spring plates 330, 331 which bear against the plate 323. This construction prevents any liability of any of the material in the tube 314 being withdrawn by the plates 323, 324 and 325. The outer ends of the plates 323, 324 and 325 are provided with studs to which are fitted antifriction rollers 332, 333 and 334 which are adapted to bear against cams 335, 336 and 337, respectively, which are secured to an inclined shaft 338, suitable springs 339 being provided, which tend to withdraw the plates from the tube 314, and maintain the rollers in engagement with the cams.

The shaft 338 is mounted in bearings 340 and 341 on the side frame 1 and the inclined frame 298, respectively, and it is provided on its lower end with a bevel gear wheel 342 which coacts with a similar wheel 343 on a horizontal shaft 344 which is mounted in bearings 345 on the side frame 1. The shaft 344 is provided with a worm wheel 346 which is driven by a worm 347 on one end of the aforementioned transverse shaft 65.

The cams 335, 336 and 337 each comprise the concentric portions 348, 349, and the inclined portion 350 and the outwardly curved portion 351 connecting the respective ends of the concentric portions. The inclined portions 350 permit the springs 339 to withdraw

the plates 323, 324 and 325 from the sections of the tube 314, the outwardly curved portions 351 project the plates across the ends of the sections of the tube 314, and the concentric portions 348, 349 maintain the plates 5 in their retracted or projected positions, respectively, during the rotation of the shaft 338.

The cams 335, 336 and 337 are so arranged on the shaft 338 that the inclined portions 350 and curved portions 351 of the cams 335 and 337 move plates 323 and 325 10 from the tube 314 and back again, while the concentric portion 348 of the cam 346 maintains the plate 324 between the chambers 327 and 328, and the plate 324 is moved from between the said chambers and back again by the inclined portion 350 and curved portion 351 of 15 the cam 336, while the concentric portions 346 of the cams 335 and 337 maintain the plates 323 and 325 across the ends of the sections 315 and 316 of the tube 314.

Assuming that the sections 315 and 317 of the tube 314 are filled with the material which is to fill the packages, that the section 316 or chamber 328 is empty, and that the upper section 317 is connected to a suitable source of supply, the operation of the measuring and filling mechanism is as follows: As the central portion of the upper flaring end of each former 172 is nearing 20 the center of the discharge end 297, the inclines 350 of the cams 335, 337 pass the rollers 332, 334 and permit the springs 339 to withdraw the plates 323, 325, respectively, from the tube 314; and while the concentric portions 349 of the cams 335, 337 are passing the rollers 25 332, 334, respectively, the contents of the chamber 327 is being discharged into the former 172 and the material in the section 317 feeds down and fills the chamber 328. This being done and before the edge of the discharge end 297 reaches the flaring edge of the former 30 172, the curved portions 351 of the cams 335, 337 pass the rollers 332, 334, and project the plates 323, 325 across the lower ends of the sections 315 and 317, respectively, of the tube 314. During the foregoing operation the concentric portion 348 of the cam 336 is 40 passing the roller 333 and the plate 324 remains projected and thereby separates the chamber 327 from the chamber 328. The rollers 332, 334 now act against the concentric portions 348 of the cams 335, 337 and maintain the plates 323, 325, respectively, projected, and 45 while these concentric portions 348 are in engagement with the rollers 332, 334, the inclined portion 350, the concentric portion 349 and the curved portion 351 of the cam 336 are passing the roller 333 of the plate 324, the inclined portion 350 permitting the spring 339 to 50 withdraw the plate, the concentric portion 349 maintaining the plate withdrawn until the material in chamber 328 feeds down and fills the chamber 327, and the curved portion 351 projecting the plate 324 to separate the chamber 327 from the chamber 328. As the plate 55 324 is being projected its sharp forward end cuts through the material extending between the sections 315, 316 and separates from the chamber 327 so much of the material contained in both chambers as is in excess of the amount required to fill chamber 327. Immediately fol- 60 lowing the projection of the plate 324, the central portion of the upper flaring end of the next succeeding former nears the center of the discharge end 297 and the foregoing operation is repeated.

By the employment of the intermediate chamber 328 65 instead of connecting the source of supply direct to the

chamber 327, I am enabled to measure very accurately the amount of material introduced to each former, irrespective of the pressure in the source of supply, for the reason that while the chamber 327 is being filled, the bulk of the material in the main source of supply is 70 supported by the plate 325, and that the amount of material contained in chamber 328 in excess of the amount required to fill chamber 327 is practically the same during each filling operation and exerts little or no pressure on the contents of the latter chamber. 75

It will be observed that when the bracket 301 is being adjusted on the frame 298, the respective parts of the sections 315 and 316 of the tube 314 will slide upon each other and that by adjusting the bracket 301 up or 80 down the size of the chamber 327 may be increased or decreased and the quantity of material introduced to each former nicely regulated. It will also be observed that the sections of the tube 314 gradually increase in diameter toward the bottom thereby insuring the downward passage of the material for filling the packages. 85

Immediately following the passage of the material from the chamber 327 to the former 172, the paper bag is moved radially from the former, and, as the bag is moving from the former, the doors 183 and 184 in the outer end of the latter open by gravity and permit the con- 90 tents of the former to pass by gravity into the bag.

The preferred means for moving the bags from the formers 172 is as follows: Projecting radially from the wheel 173 adjacent to each former 172 is a flat arm 352 provided with projections 353 which are secured to the 95 wheel 173, as shown, so as to support the arm a slight distance from the face of the wheel. Each arm is provided with a radially reciprocative slide 354 comprising a pair of plates 355 which are fitted to guide ways 356 in the respective faces of the arm, and which are connect- 100 ed together by a block 357 extending through an elongated slot 358 in the arm. The slide is drawn normally inward by the action of a suitable spring 359, the inner end of the slot 358 limiting the inward movement of the slide 354. 105

Secured to the slide 354 is one end of a spring arm 360, the free end of which extends toward the former 172 and is provided with a block 361 which carries a shaft 362, the respective ends of which project outwardly from the block. Rotatably mounted on the ends of this shaft 362 110 are sleeves 364 carrying rollers 365, preferably of rubber, which are adapted to bear against the former 172. The sleeves 364 are provided with ratchet wheels 366 which are engaged by pawls 367 pivoted to cars 368 projecting from a plate 369 on the block 361, a suitable flat spring 115 370 being employed to press the pawls into engagement with the ratchet wheels. The teeth of the ratchet wheels 366 are so arranged that, as the slide 354 is moving inward, the rollers 365 will be permitted to roll upon the former 172, but when the slide is moving outward, 120 the pawls 367 will engage the ratchet wheels 366 and prevent the rotation of the rollers 365. The inner corner of the block 361 is beveled as at 371 to the end that as the slide 354 is moving inward the beveled portion will act against the outer end of a plate 372, and, just before the slide 354 reaches the limit of its inward move- 125 ment, move the rollers 365 from engagement with the former 172. The plate 372 is arranged between the former 172 and the wheel 173, and it is secured to the latter by means of a screw 374 which passes through a 130

slot 375 in the plate. The outer end of the plate 372 extends to the inner end of the paper blank or bag. The slide 354 remains in its innermost position while the bag is being made around the former, and, while the former is passing the discharge end of the measuring and filling mechanism, a roller 376 projecting from the slide 354 is passing through a channel block 377 which is secured to the upper end of a vertically reciprocative bar 378. This bar 378 is fitted to a guideway in a bracket 379, and is held in place by plates 380 secured to the bracket and projecting over the edges of the bar 378, the bracket 379 being mounted on one of the horizontal bars 12 of the main frame.

The bar 378 is provided with a roller 381 which, when the bar is reciprocated, is adapted to pass between the plates 380, and the roller 381 is engaged by the forked end of an arm 382, the other end of which is pivoted to a bracket 383 on the main frame. The arm 382 is provided with a roller 384 which bears upon a cam 385 mounted on a shaft 386 which is journaled in bearings 387 on the main frame, whereby, as the shaft 386 is rotated, the cam 385 will raise and lower the arm 382 and perforce the bar 378 and block 377. A suitable spring 387^a is provided to maintain the roller 384 in engagement with the cam 385.

The shaft 386 is provided with a gear wheel 388 which coacts with a gear wheel 389 on a shaft 390 journaled in bearings on the side frames 1 and 1^a. The shaft 390 is provided with a bevel gear wheel 391 which is driven by a similar wheel 392 on one end of the aforementioned driven shaft 344.

The reciprocations of the bar 378 are so timed in respect to the movement of the wheel 173 and the operation of the measuring and filling mechanism that, while the contents of the chamber 327 are being discharged into one of the formers 172, the roller 376 of the adjacent slide 354 is entering the channel block 377, and during the passage of the roller 376 through the channel block 377, the bar 378 is lowered and raised, thereby moving the slide 354 to the outer end of the arm 352 and back again. During this operation, the block 361 of the spring arm 360 escapes the plate 372, and the rollers 365 are firmly pressed against the upper end of the paper bag, and during the descent of the slide 354 the rollers 365, being held against rotation by the pawls 367, exert a binding action upon the paper and move the bag downwardly from the former, the weight of the material passing from the former into the bag assisting in the operation. This being done the block 377 returns the slide 354 to its normal position for a succeeding operation. Should the weight of the material filling the bag cause the latter to move from the former 172 faster than the movement of the slide 354, then the rollers 365 will rotate and permit the paper to pass freely between the side of the former and the rollers.

I provide a guard plate 393 mounted on one of the horizontal bars 12 of the main frame and arranged on one side of the path through which the bag moves when leaving the former. This plate prevents any liability of the bottom of the bag tilting toward that side, due to the action of the rollers 365 retarding that side of the bag, when the latter is moving faster than the rollers.

Upon leaving the former 172 the bag is received upon a carrier, which, in the present instance, is an endless

chain 394 comprising the equidistant links 395 and the intermediate links 396. This chain or carrier passes around supporting wheels 397, 398 mounted on shafts 399, 400 which are journaled in bearings 401, 402, respectively, on the parallel horizontal bars 7 of the main frame, between which the wheels 397, 398 are arranged.

One end of the shaft 399 extends outwardly and is provided with a gear wheel 403 which coacts with an idler 404 mounted on a bracket 405 on one of the bars 7. The idler 404 meshes with and is driven by a gear wheel 406 on the aforementioned driven shaft 386 whereby the chain or carrier 394 is moved in the direction indicated by the arrows.

The links 396 of the chain 394 are provided with longitudinal ribs 407 and transverse ribs 408 intersecting the longitudinal ribs, the longitudinal ribs being adapted to register with the peripheral grooves 409 in the wheels 397, 398 and thereby prevent lateral displacement of the chain, and the transverse ribs 408 being adapted to register with the transverse grooves 410 in the peripheries of the wheels 397, 398 and thereby insure the positive movement of the chain.

The links 395 are provided with ears 411 carrying rollers 412 which are adapted to register with sockets 413 in the peripheries of the wheels 397, 398.

The movement of the chain 394 is so timed in respect to the movement of the wheels 195, 173 that the links 395 of the chain meet the formers 172, successively, to receive the paper bags and contents as they are discharged from the said formers.

When the bag has been received upon the chain or carrier 394 the central portion of its bottom rests upon a stationary friction bar 414, the outer end of which is supported by a bracket 415 mounted on the bars 7. The inner end of the bar extends to and along the top of the chain 394 and through longitudinal grooves 416 in the tops of the links 395 to a point slightly beyond the point of introduction of the bag to the chain, and the top of the bar 414 projects slightly above the tops of the links 395, to the end that, as the bags are being carried onwardly by the links 395, the bar 414 will produce friction upon the bottom of the bags. The bar 414 is gradually expanded outwardly from the point where it leaves the chain 394 to a straight portion 417 which is slightly wider than the bag. The straight portion is provided with laterally-disposed upwardly-projecting plates 418, between which the finished packages are adapted to pass. The plates 418 are provided with flanges 419 which are secured to the bar 414, and the forward ends of the plates 418 are curved outwardly to receive the sides of the package.

Each link 395 of the chain 394 extends laterally and has secured thereto the flanges 420 of outwardly projecting parallel plates 421, between which the bags are received upon the link; and the rear ends of the plates 421 are provided with oppositely disposed hinged doors 422 which are adapted to swing toward each other to a position at right angles to the plates 421 and thereby afford a backing for the bag when it has been received upon the link 395. These doors 422 are also adapted to swing open or away from each other to permit the passage therebetween of the bag, as will hereinafter appear.

The doors 422 are provided with outwardly projecting arms 423 which carry rollers 424, and which are

connected to suitable springs 425 which tend to hold the doors 422 normally outward or in the open position.

Just as each link 395 passes over the top of wheel 397, and before the bag is introduced to the link, the rollers 424 pass between the beveled ends 426 of a pair of elongated parallel plates 427 which are mounted on the inner faces of the horizontal bars 12 of the main frame. The rollers 424, being forced toward each other by the beveled ends 426, close the doors 422 against the ends of the plates 421; and the inner faces of the plates 427, against which the rollers 424 bear, maintain the doors 422 in the closed position during the onward movement of the chain or carrier 394.

After the bag has been deposited upon the link 395 the forward movement of the bag is retarded by the stationary friction bar 414 until the doors 422 take against the bag, whereupon the latter is carried forward upon the link 395.

The rollers 412 of the links 395, as they are passing from the wheel 397 to the wheel 398, pass over and bear upon a supporting bar 428 which is mounted on suitable standards 429 rising from the horizontal bars 7. The end of the bar 428 adjacent to the wheel 397 is provided on its upper surface with transverse teeth 430, to the end that as the rollers 412 pass over the teeth the links 395 will be agitated in a manner to settle or pack the material contained in the superposed bags.

After the material in the bag has been settled as above described, so much of the bag as is to be folded into one end of the package projects above the top of the material, and as the chain or carrier 394 carries the bag onward, the top portion of the bag is folded down upon the top of the material by a suitable folding mechanism, which, in its preferred form, is of the following construction: Journaled in bearings 431 on the tops of the horizontal bars 12 is a shaft 432 under which the bags are successively carried by the chain 394. One end of the shaft 432 is provided with a bevel gear wheel 433 which coacts with a similar wheel 434 on the lower end of the short inclined shaft 435 which is journaled in a bracket 436 projecting upwardly from one of the horizontal bars 12. The other end of the shaft 435 is provided with a worm wheel 437 which is driven by a worm 438 on the aforementioned shaft 65. The shaft 432 carries a rotating folder arm 439 arranged to move through the path traversed by the upper end of the bags, and the arm 439 moves at a greater rate of speed than that of the bag, to the end that, as the latter passes under the shaft 432, the outer curved end of the folder arm will act upon the upper end of the side *b* of the bag in a manner to fold the same down upon the top of the material contained in the bag and under the upwardly turned end of a fixed folder plate 440 which extends along and parallel to the path traversed by the bag. During this operation the upwardly-turned end of the folder plate 440 acts upon the upper end of the side *a* of the bag and folds the latter down upon the material contained in the bag.

When the open end of the bag is being folded, as above described, the corner folds thereof are reversed and brought down to meet the top of the material within the bag, thereby producing oblique folds in the sides *c*, *d* and forming the flaps *g* and *h*, as indicated in Fig.

57. The sides *a*, *b* of the bag just folded are held against the top of the material within the bag during the onward movement of the latter by the folder plate 440.

It will be observed on reference to Fig. 43 that the forward upturned end of the folder plate 440 is reduced in width, and that the outer end of the folder arm 439 is bifurcated to clear the reduced end of the plate. The folder plate 440 is secured near its upturned end to a bracket 441^a extending between the horizontal bars 12. During the onward movement of the chain or carrier 394, the upwardly projecting flaps *g* and *h* of the bag pass between fixed plates 441 and a pair of rollers 442 arranged between the plates 441 and rotatably mounted on studs 443 projecting upwardly from the folder plate 440, thereby creasing the oblique folds in the flaps *g* and *h*. The plates 441 are mounted on brackets 443 secured to the bars 12 and the ends of the plates are flared outwardly to receive the flaps *g* and *h*.

Mounted on suitable brackets 444 on the tops of the horizontal bars 12 is a paste-containing box 445 in which are arranged paste-applying rollers 446, 447 which project through openings in the respective sides of the box. These rollers 446, 447 are fixed to the lower ends of the shafts 448, 449, respectively, which are mounted in bearings in the top of the box. The upper ends of these shafts are provided with coacting gear wheels 450, 451, and the gear wheel 450 is driven by a gear wheel 452 on the upper end of a short shaft 453 which is journaled in a bracket 454 extending between the horizontal bars 12. The lower end of the shaft 453 is provided with a worm wheel 455 which is driven by a worm 456 on the aforementioned driven shaft 65.

The paste box 445 is slightly narrower than the space between the sides *c*, *d* of the bag, and it is arranged between the fixed plates 441, which are arranged parallel to the sides of the box and adjacent to the rollers 446, 447.

Upon leaving the rollers 442, the flaps *g* and *h* pass between the plates 441 and the paste-applying rollers 446, 447, thereby receiving paste upon their opposing inner faces from the rollers 446, 447 which project slightly beyond the outside line of the box, the plates 441, insuring the contact of the paper with the rollers.

Supported by brackets 457 on the bars 12 are a pair of parallel bars 458 between which the bags and the tops of the packages are adapted to pass during and after the closing of the open ends of the bags, the top of the bars 458 being arranged on a line with the top of the material in the bags, or substantially so.

The folder plate 440 extends slightly beyond the paste box 445, and just as the bag is escaping the end of said plate, the upwardly-projecting flaps *g* and *h* are acted upon by two folder cams 459, 460, respectively, which are supported by brackets 461, projecting from the horizontal bars 12. These cams 459 and 460 diverge outwardly at their forward ends 462, 463, from the tops of the inner faces of the bars 458, and gradually converge inwardly from their diverging ends to straight horizontal portions 464, 465 arranged adjacent to the path traversed by the top of the material contained in the bags and at right angles to the bars 458, as shown in Figs. 43, 45 and 48.

The forward end 463 of the cam 460, extends to a point in advance of the forward end 462, of the cam

459, to the end that, as each bag passes the cams 459, 460, the cam 460, will fold the outwardly projecting flap *h* down upon the previously folded ends of the sides *a* and *b*; and the cam 459 will fold the outwardly projecting flap *g*, down upon the previously folded ends of the sides *a* and *b*, and upon the flap *h* just folded; the paste previously applied to the flaps *g* and *h* pasting the latter together and to the folded ends of the sides *a* and *b*. This being done the package is complete, and, as the chain 394 moves onward, the top of the package passes under the beveled end of a longitudinal plate 466 which is arranged parallel to the friction bar 414 and in line with the straight horizontal portions 464, 465 of the folder cams 459, 460. This plate 466 is supported by brackets 467 extending between the horizontal bar 12. As the package is moved along beneath the plate 466 the latter holds the top folds together and against the top of the material in the package until the paste has dried.

In order to assist the paste in drying as the package passes along the plate 466 I provide the latter, through its length with a steam passage 468, to which steam is introduced through a pipe 469.

Immediately following the passage of the bag beneath the end of the plate 466, the rollers 424 of the doors 422 pass and escape the outwardly beveled ends 470 of the plates 427 and thereby permit the springs 425 to open said doors. At this point the link 395, which has been carrying the bag, has reached the wheel 398 and begins to move downwardly and away from the bottom of the package leaving said package resting upon the friction bar 414; the doors 422, in their open position, clearing the sides of the package. As the next succeeding package is passed under the forward end of the plate 466, the preceding packages are moved onwardly thereby, and so on each succeeding package moves the preceding package onward between the friction bar 414 and the plate 466. As the packages reach the outer end of the friction bar 414, they may be removed from the latter by the hand of an attendant or discharged into a suitable receptacle below.

The bars 7 which support the wheels 397 and 398 on which the chain or carrier 394 is supported and actuated, are made vertically adjustable toward and from the mechanism for closing the open ends of the bags, to the end that the chain or carrier 394 may be adjusted toward or from the said mechanism to accommodate bags of different lengths. As a convenient means for effecting this adjustment, I mount the respective ends of the bars 7 on plates 471 and 472. The plate 471 is slidably fitted to under-cut plates 473 secured to a bar 474 of the main frame, and it rests upon the upper end of a screw 475 which is fitted to an internally-threaded boss 476 on the bar 474; and the plate 472 is fitted to under-cut brackets 477 mounted on the standards 4^a, and it rests upon the upper end of a screw 478 which is fitted to an internally-threaded boss 479 on a bar 480 extending between the standards 4^a. Thus it will be seen that, by manipulating the screws 475 and 478, the bars 7 and perforce the chain or carrier 394 may be adjusted toward or from the mechanism for closing the open ends of the bags, as occasion may require. When the bars 7 are adjusted, as above described, it is also necessary to adjust the carrier driving

idler 404, in order to maintain the latter's engagement with the gear wheels 403 and 406. I, therefore, pivot the idler carrying bracket 405 to the shaft 399, and secure said bracket to the bar 7 by means of a screw 481 which extends through a slot 482 in the bracket. By loosening the screw 481 the bracket may be raised or lowered and the idler 404 adjusted for the purpose above explained.

While my invention is herein shown and described in a desirable and practicable form, yet I do not limit myself to this particular construction as the same may be greatly modified without departing from the invention.

I claim—

1. In a packaging machine, the combination of a hollow former having a door pivoted thereto and extending over one of its ends, means for supporting and advancing the same, means for folding a sheet of paper around said former to produce a bag, means for introducing a predetermined quantity of material to said former, and means for moving said bag from said former and thereby permitting said door to open by gravity and the material in said former to pass into the bag.

2. In a packaging machine, the combination of a vertically-arranged wheel, means for supporting and rotating the same, a hollow former carried by said wheel, means for folding a sheet of paper around said former to produce a bag, means for introducing a predetermined quantity of material to said former, and means for moving said bag from said former and thereby permitting the material in said former to pass into the bag.

3. In a packaging machine, the combination of a vertically-arranged wheel, means for supporting and rotating the same, a hollow former carried by said wheel, means for folding a sheet of paper around said former to produce a bag, means for introducing a predetermined quantity of material to said former, means for moving said bag from said former and thereby permitting the material in said former to pass into the bag, and means for closing the open end of the bag to produce a package.

4. In a packaging machine, the combination of a vertically-arranged wheel, means for supporting and rotating the same, a hollow former carried by said wheel, means for horizontally introducing a sheet of paper to said former, means for folding said sheet of paper around said former to produce a bag, means for introducing a predetermined quantity of material to said former, and means for moving said bag from said former and thereby permitting the material in said former to pass into the bag.

5. In a packaging machine, the combination of a vertically arranged wheel, means for supporting and rotating the same, a series of hollow formers carried by said wheel, means for supporting and advancing a strip of paper, means for severing bag blanks from said strip, means for horizontally introducing said blanks to said formers, means for folding said blanks around said formers to produce bags, means for introducing a predetermined quantity of material to each of said formers, and means for moving said bags from said formers and thereby permitting the material in said formers to pass into the bags.

6. In a packaging machine, the combination of a vertically-arranged wheel, means for supporting and rotating the same, a series of radially-arranged hollow formers carried by said wheel, means for folding sheets of paper around said formers to produce bags, a measuring and filling mechanism having its discharge end located above the lower portion of the path traversed by the inner ends of said formers, means for operating said mechanism to introduce a predetermined quantity of material to each of said formers, and means for moving said bags from said formers and thereby permitting the material in said formers to pass into the bags.

7. In a packaging machine, the combination of a vertically-arranged wheel, means for supporting and rotating the same, a series of radially-arranged hollow formers carried by said wheel, means for folding sheets of paper around said formers to produce bags, a measuring and fill-

ing mechanism having its discharge end located above the lower portion of the path traversed by the inner ends of said formers, means for operating said mechanism to introduce a predetermined quantity of material to each of said formers, means for moving said bags from said formers and thereby permitting the material in said formers to pass into the bags, and means for closing the open ends of the bags to produce packages.

8. In a packaging machine, the combination of a vertically arranged wheel, means for supporting and rotating the same, radially-arranged hollow formers carried by said wheel, means for folding sheets of paper around said formers to produce bags, means for introducing a predetermined quantity of material to each of said formers, a friction device arranged adjacent to each of said formers, and means for operating said devices to remove the bags from said formers and thereby permit the material in said formers to pass into the bags.

9. In a packaging machine, the combination of a vertically arranged wheel, means for supporting and rotating the same, radially-arranged hollow formers carried by said wheel, means for folding sheets of paper around said formers to produce bags, means for introducing a predetermined quantity of material to each of said formers, a reciprocative slide arranged adjacent to each of said formers, a friction device carried by each of said slides, means for engaging said devices with the bags, a reciprocative bar arranged adjacent to the path traversed by said slides, means for reciprocating said bar, and means for successively engaging said slides with said bar, whereby as each of said slides is engaged with the bar the friction device carried thereby is moved to discharge its bag from its former and thereby permit the material in said former to pass into said bag.

10. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, means arranged in the path traversed by the open end of the bag for closing said open end, and means for bodily adjusting said carrier toward or from the last named means.

11. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, means arranged in the path traversed by the open end of the bag for folding said open end to close the bag and produce a package, means for applying paste to one or more of the folds previous to folding, a bar for supporting the packages as they are delivered from the carrier, and a plate extending parallel to said bar and adjacent the path traversed by the end of the bag, whereby the closed folds of said closed end are pressed together while the paste is drying.

12. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, means arranged in the path traversed by the open end of the bag for folding said open end to close the bag and produce a package, means for applying paste to one or more of the folds previous to folding, a bar for supporting the packages as they are delivered from the carrier, a plate extending parallel to said bar and adjacent the path traversed by the closed end of the bag whereby the folds of said closed end are pressed together while the paste is drying, and means for heating said plate.

13. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, means arranged in the path traversed by the open end of the bag for folding said open end to close the bag and produce a package, means for applying paste to one or more of the folds previous to folding, a bar for supporting the packages as they are delivered from the carrier, a plate extending parallel to said bar and adjacent the path traversed by the closed end of the bag whereby the folds of said closed end are pressed together while the paste is drying, and a steam passage extending along said plate.

14. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, a fixed bar, and means coacting with the bar for agitating the carrier to settle the material in

the bag, and means arranged in the path traversed by the open end of the bag for closing the same.

15. In a packaging machine, the combination of a carrier to receive a partially filled bag, means for advancing the carrier, a support to receive the bag from the carrier, means arranged in the path traversed by the open end of the bag to close said open end, and means for adjusting said carrier and said support toward and from the last named means.

16. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, said carrier being provided with a pair of doors adapted to take against the rear side of the bag, means for advancing the carrier, means arranged in the path traversed by the open end of the bag for closing the same to produce a package, means for disengaging the carrier from the package during the onward movement of the carrier, a support for the package when disengaged from the carrier, and means for opening said doors to clear the package while the carrier is being disengaged from the same.

17. In a packaging machine, the combination of a chain provided with a series of links each of which is adapted to receive a partially filled bag, said links being each provided with a pair of doors adapted to take against the rear side of a bag, supporting wheels for the chain, means for actuating one of said wheels to advance the chain, means arranged in the path traversed by the open ends of the bags to close said open ends to produce packages, means for supporting said packages to permit said links to move therefrom in passing around one of said wheels, and means for opening said doors to clear the packages while said links are moving from the same.

18. In a packaging machine, the combination of a chain provided with a series of links each of which is adapted to receive a partially filled bag, a pair of parallel plates projecting from each of said links to support two sides of a bag, a pair of doors carried by each of said links and adapted to take against the rear side of a bag, supporting wheels for the chain, means for actuating one of said wheels to advance the chain, means arranged in the path traversed by the open ends of the bags to close said open ends to produce packages, means for supporting said packages to permit said links to move therefrom in passing around one of said wheels, and means for opening said doors to clear the packages while said links are moving from the same.

19. In a packaging machine, the combination of a chain provided with a series of links each of which is adapted to receive a partially filled bag, supporting wheels for the chain, means for actuating one of said wheels to advance the chain, a pair of pivoted doors carried by each of said links and adapted when closed to take against the rear side of a bag, springs tending to maintain said doors normally open, means for closing said doors during the onward movement of the chain, means for maintaining said doors temporarily closed, means arranged in the path traversed by the open ends of the bags to close said open ends to produce packages, means for supporting said packages to permit said links to move therefrom in passing around one of said wheels, and means to permit said springs to open said doors to clear the packages while said links are moving from the same.

20. In a packaging machine, the combination of a pair of wheels, a chain extending between said wheels and provided with links each of which is adapted to receive a partially filled bag, means for actuating one of said wheels to advance the chain, a stationary bar extending between said wheels to support the chain, a series of teeth projecting from said bar and adapted to engage and agitate said links to settle the material in the bag, and means arranged in the path traversed by the open ends of the bags for closing the same.

21. In a packaging machine, the combination of a carrier adapted to receive a partially filled rectangular bag, means for advancing the carrier, means for folding two opposite sides of the open end of the bag inwardly and thereby producing oblique folds in the two remaining sides, means for folding the two last named sides of the open end of the bag inwardly, and creasing rollers adapted to

crease the oblique folds before the two last named sides are folded inwardly.

22. In a packaging machine, the combination of a carrier adapted to receive a partially filled rectangular bag, means for advancing the carrier, means for folding two opposite sides of the open end of the bag inwardly and thereby producing oblique folds in the two remaining sides, fixed plates arranged on the respective sides of the path traversed by the open end of the bag, creasing rollers located between said plates and adapted to press the oblique folds against said plates, and means for folding the two last named sides of the open end of the bag inwardly.

23. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, means on said carrier for taking against the rear side of the onwardly moving bag, a stationary friction bar extending along the path traversed by the carrier and partially supporting said bag, and means arranged in the path traversed by the open end of the bag for closing the same.

24. In a packaging machine, the combination of a chain provided with a grooved link adapted to receive a partially filled bag, means for supporting and advancing said chain, means on said link for taking against the rear side of the onwardly moving bag, a stationary friction bar extending through the groove in said link and along the path traversed by said link, said bar being adapted to partially support the bag, and means arranged in the path traversed by the open end of the bag for closing the same.

25. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, means on said carrier for taking against the rear side of the onwardly moving bag, a pair of stationary friction bars arranged on the respective sides of the path traversed by the bag, and means arranged in the path traversed by the open end of the bag for closing the same.

26. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag, means for advancing the carrier, means on said carrier for taking against the rear side of the onwardly moving bag, a pair of stationary friction bars arranged on the respective sides of the path traversed by the bag, a stationary friction bar extending along the path traversed by the carrier and partially supporting said bag, and means arranged in the path traversed by the open end of the bag for closing the same.

27. In a packaging machine, the combination of a carrier adapted to receive a partially filled bag means for advancing the carrier, means on said carrier for taking against the rear side of the onwardly moving bag, a pair of stationary friction bars arranged on the respective sides of the path traversed by the bag, means for folding two opposite sides of the open end of the bag inwardly, and a pair of folder cams arranged in the path traversed by the open end of the bag, said cams gradually converging from points outside of the path traversed by the open end of the bag to a plane at right angles to the inner faces of the friction bars and adjacent to the path traversed by the top of the material in the bag, whereby the remaining sides of the open end of the bag are folded inwardly.

28. In a packaging-machine, the combination with a substantially vertically arranged folding system and a substantially horizontally arranged folding system, of a travelling form coöperating with said systems, and means for delivering material to the form at a point between the systems.

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

EDWARD STANLEY.

Witnesses:

ANDREW V. GROUPE,
RALPH H. GAMBLE.