No. 887,269. PATENTED MAY 12, 1908.

F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 1.

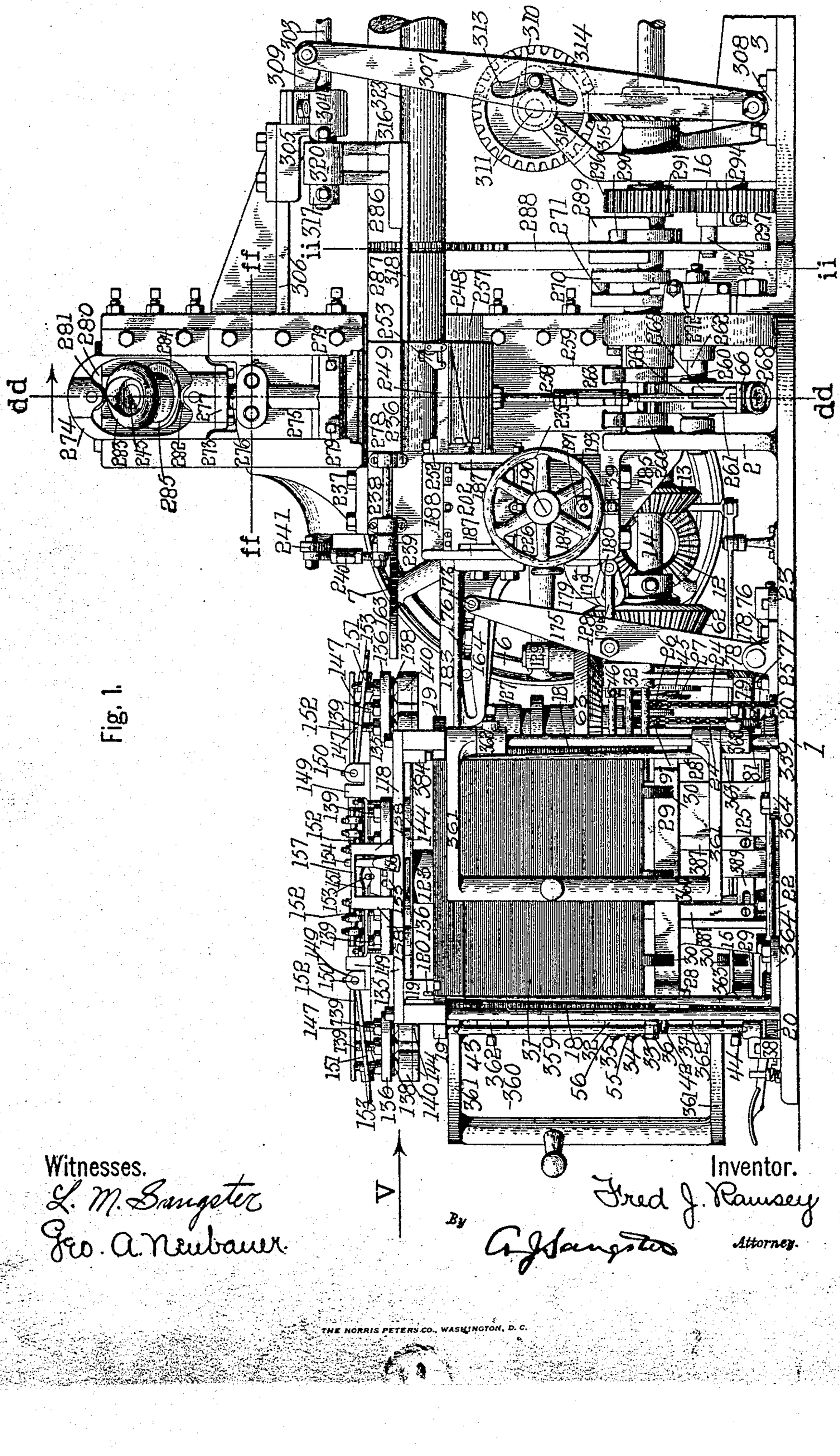

Fig. 1.

Witnesses.
L. M. Sangster
Geo. A. Neubauer.

Inventor.
Fred J. Ramsey
By G. J. Sangster
Attorney.

No. 887,269. PATENTED MAY 12, 1908.

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22 SHEETS—SHEET 2.

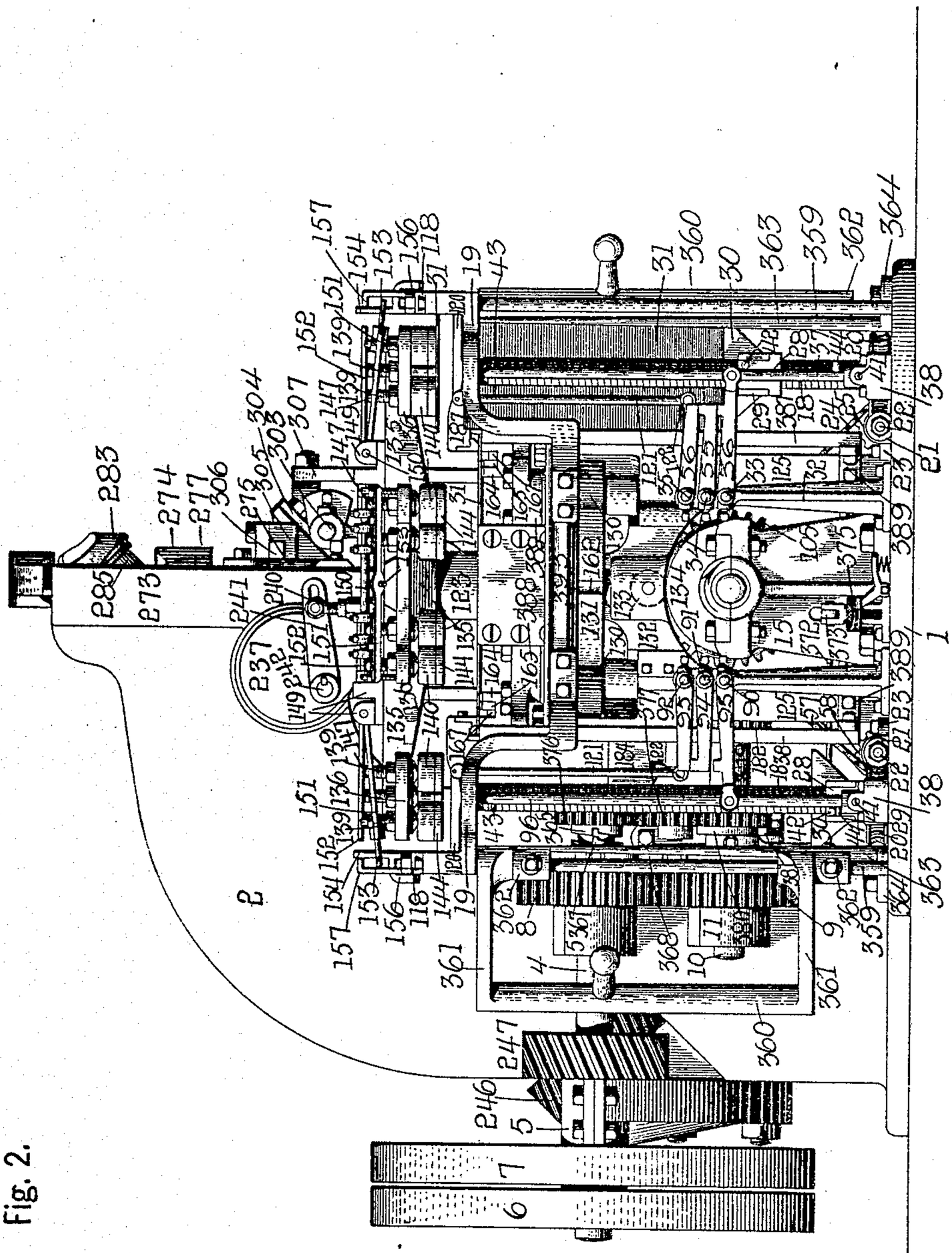

Fig. 2.

Witnesses.
L. M. Langster
Geo. A. Neubauer.

Fred J. Ramsey Inventor.
By Langster Attorney.

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22 SHEETS—SHEET 3.

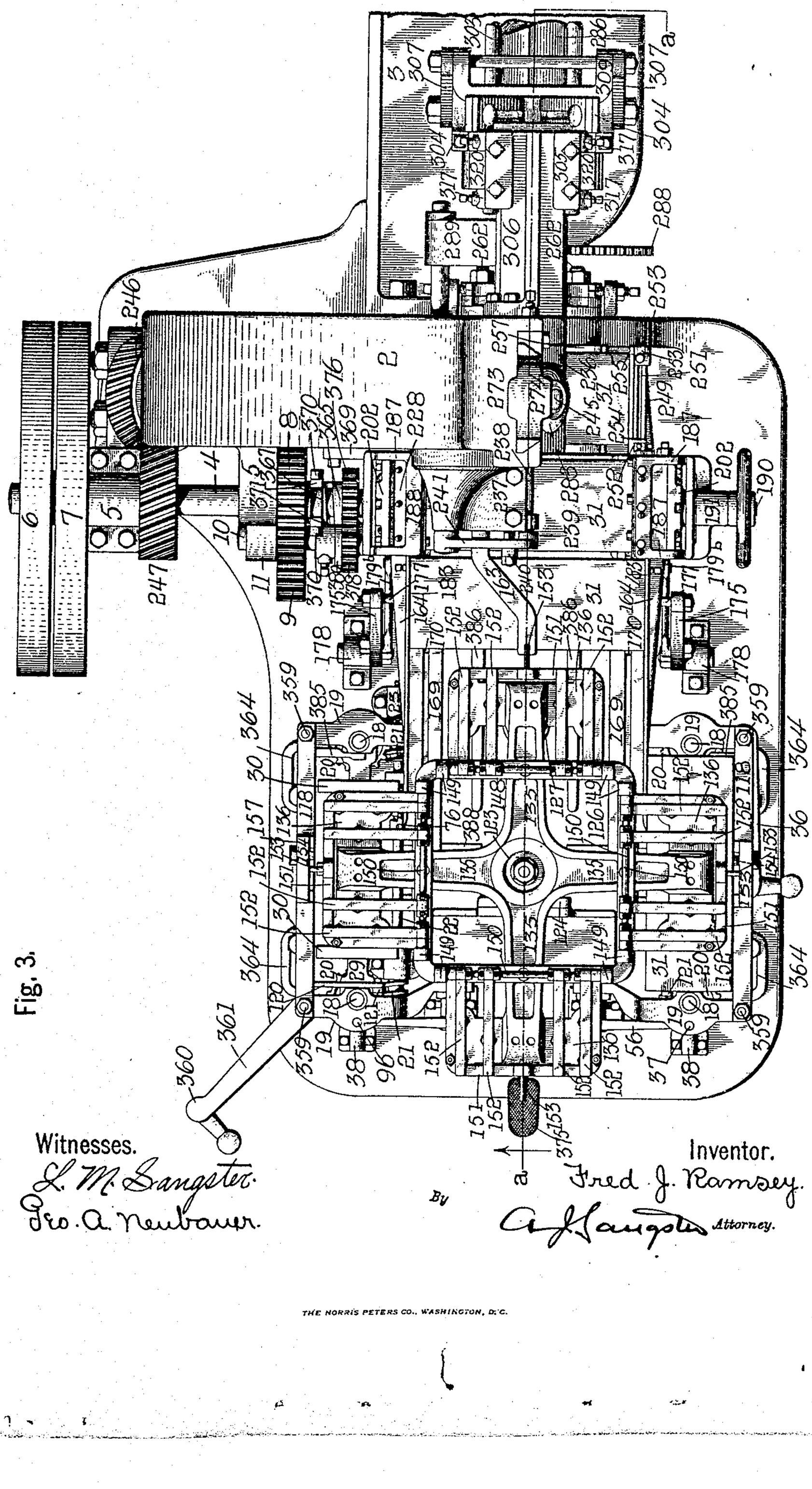

Fig. 3.

Witnesses.

L. M. Sangster.

Geo. A. Neubauer.

Inventor.

Fred J. Ramsey.

By A. J. Sangster Attorney.

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22 SHEETS—SHEET 4.

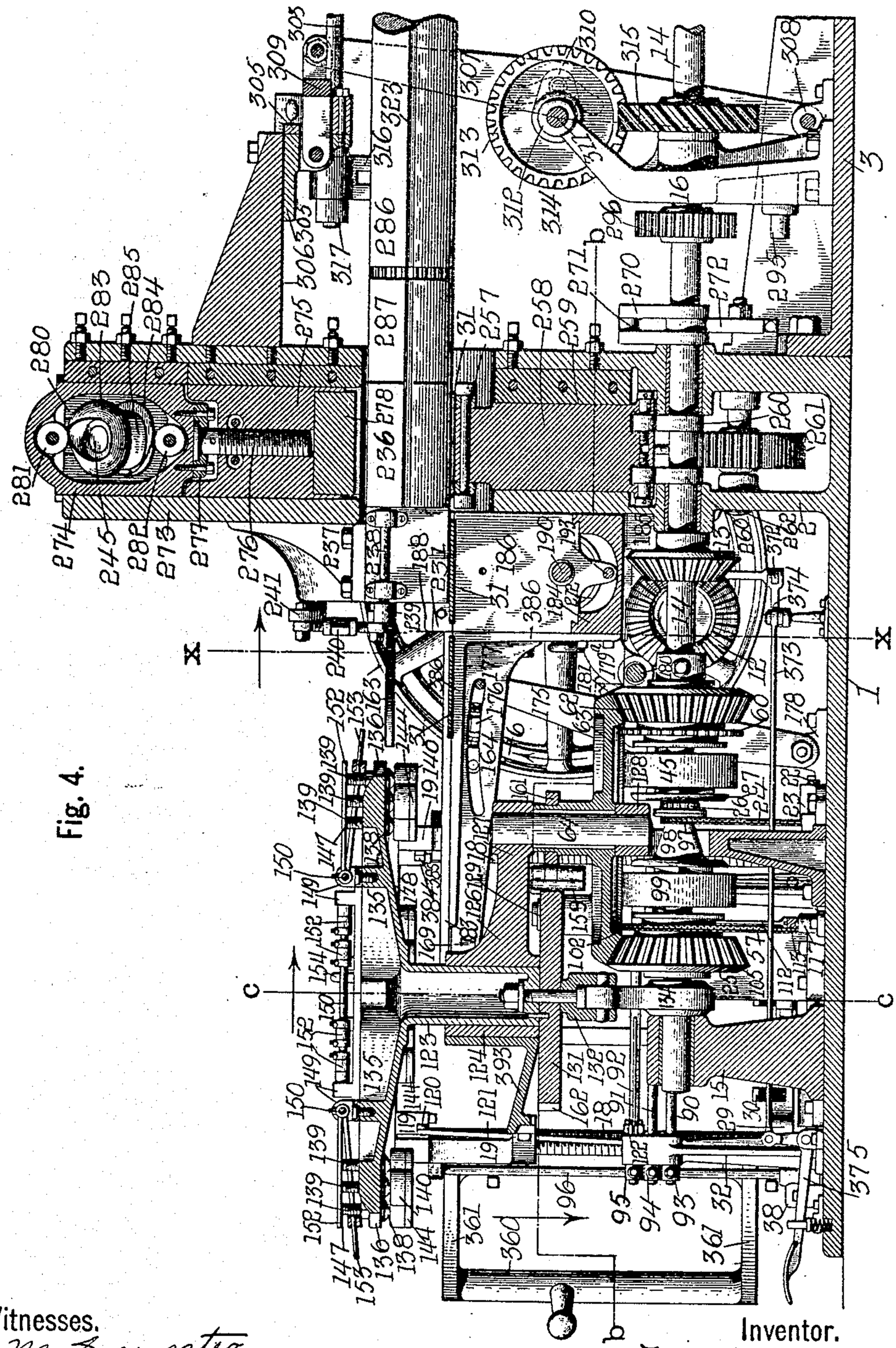

Fig. 4.

Witnesses.
L. M. Langston.
Geo. A. Neubauer

Inventor.
Fred J. Ramsey
By R. J. Langston Attorney.

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22 SHEETS—SHEET 5.

Fig. 6.

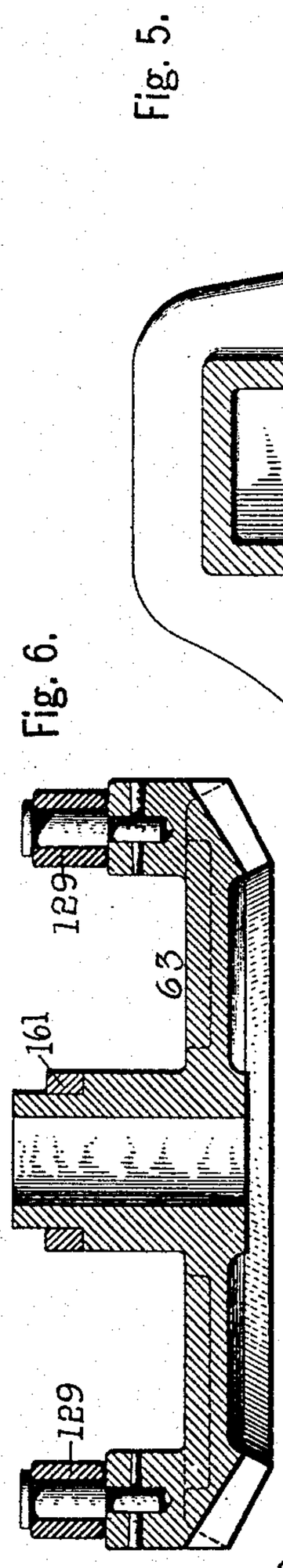

Fig. 5.

Witnesses.

L. M. Sangster

Geo. A. Neubauer.

Inventor.

Fred J. Ramsey.

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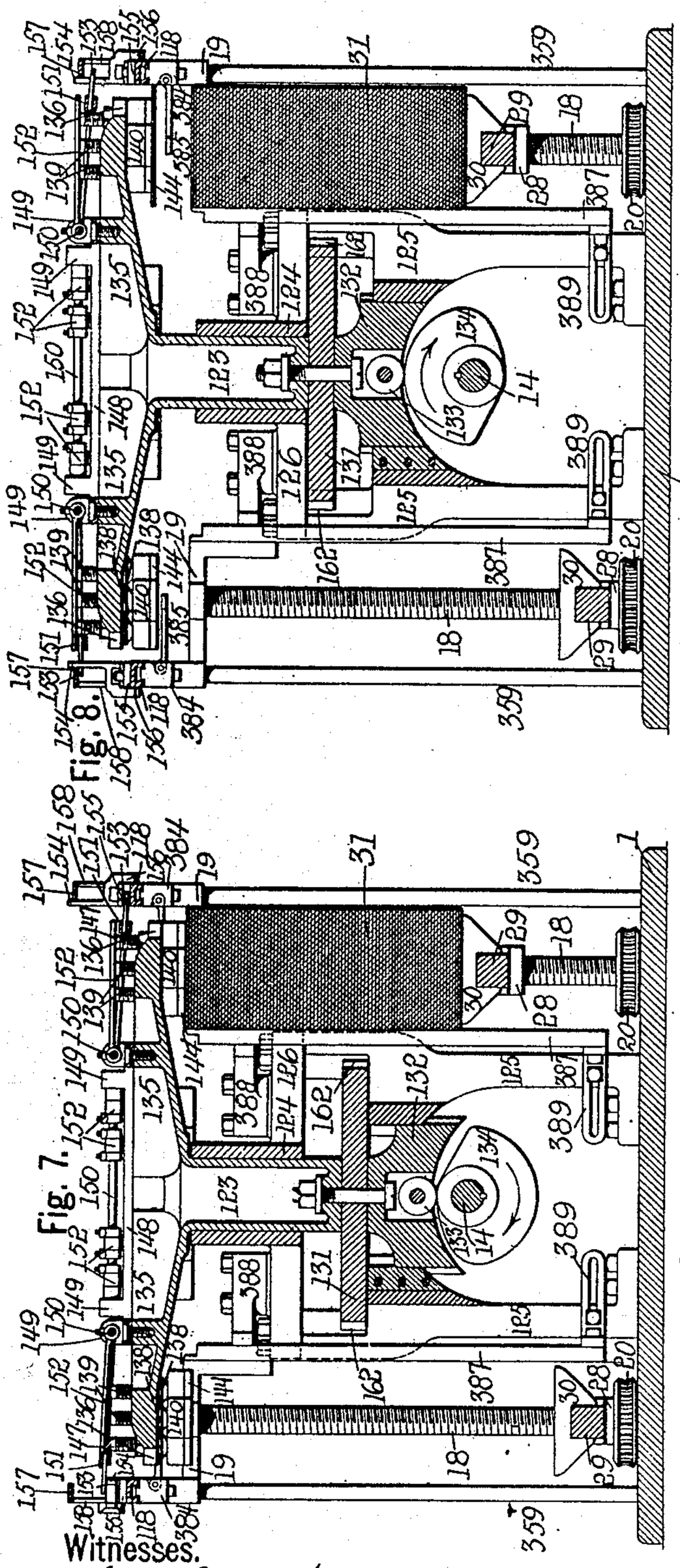
22 SHEETS—SHEET 6.



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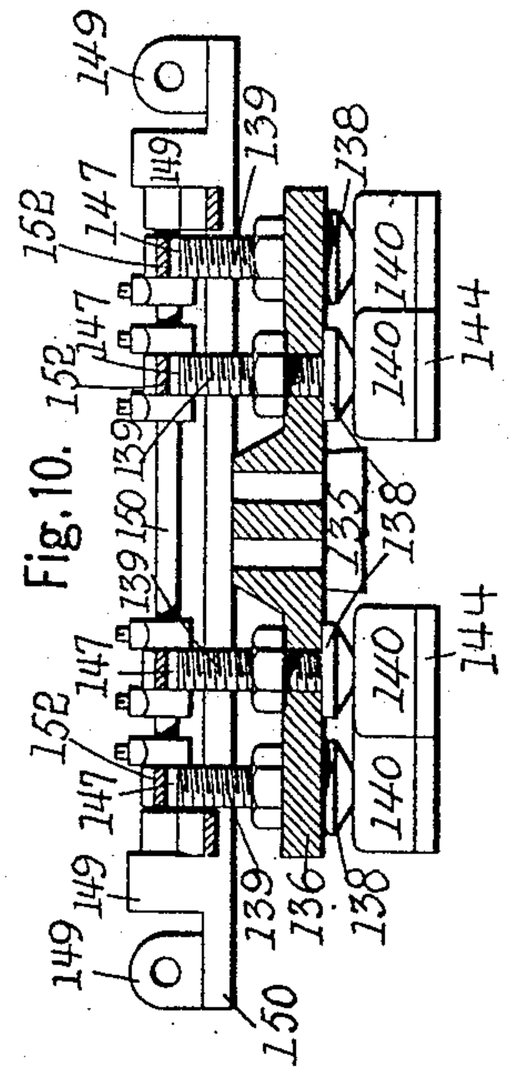

Fig. 10.

Fig. 7.

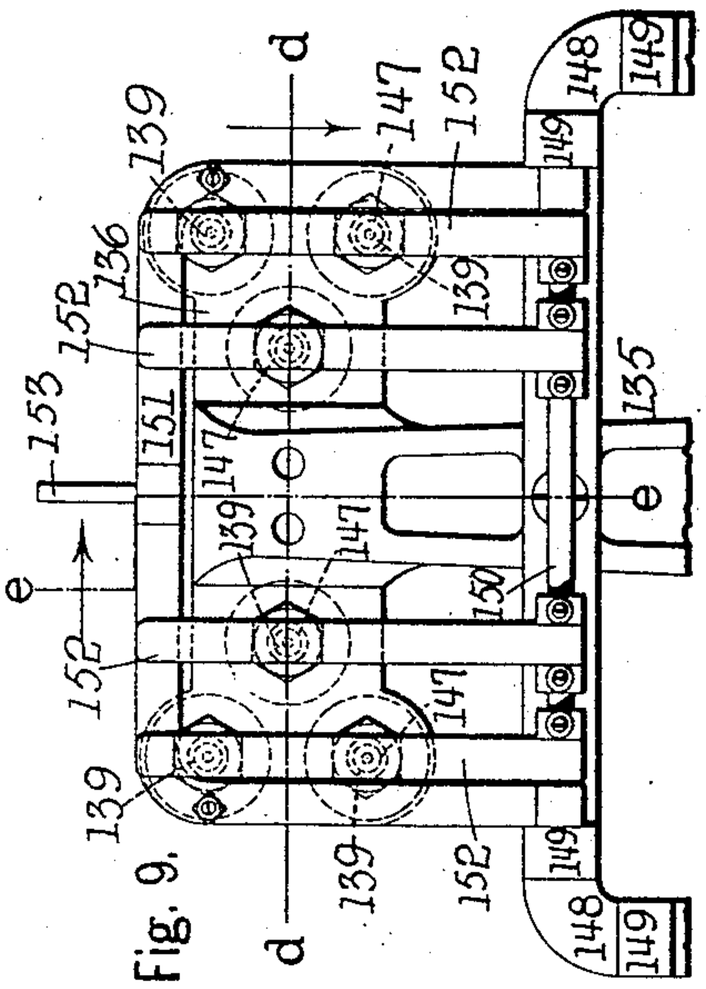

Fig. 9.

Witnesses.

L. M. Sangster.

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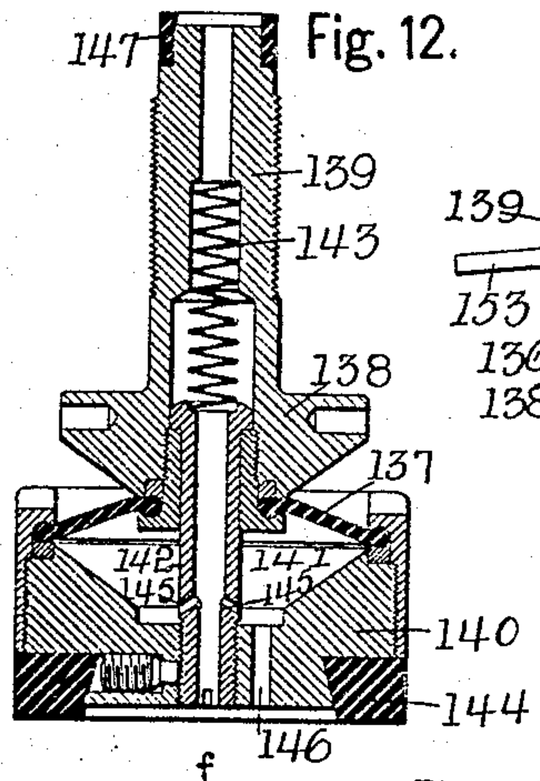
22 SHEETS—SHEET 7.

Fig. 12.



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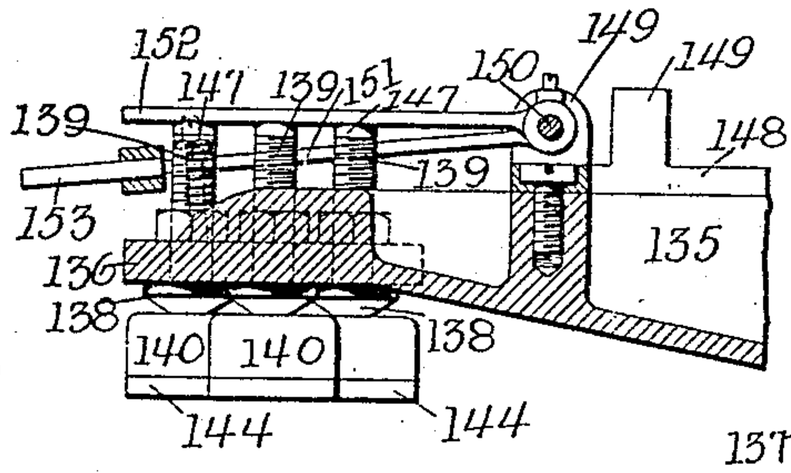
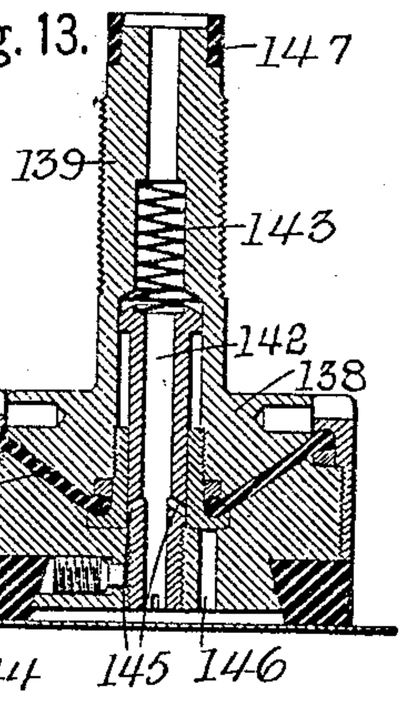


Fig. 13.



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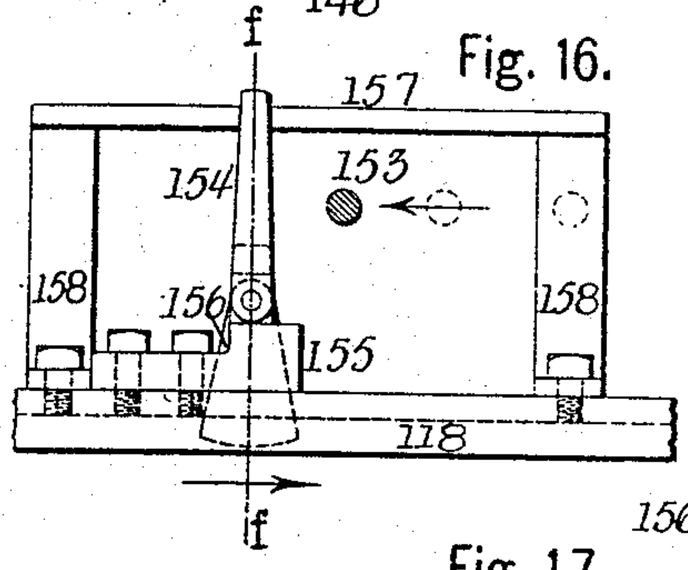

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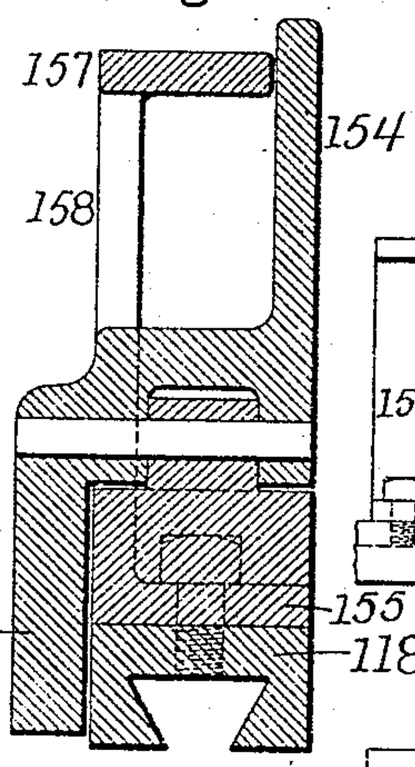

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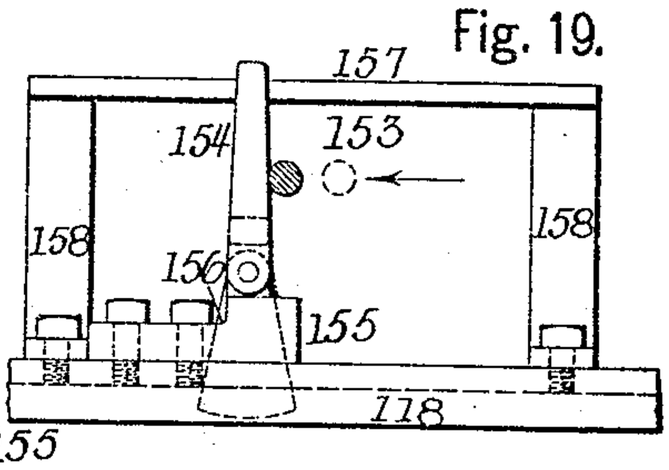

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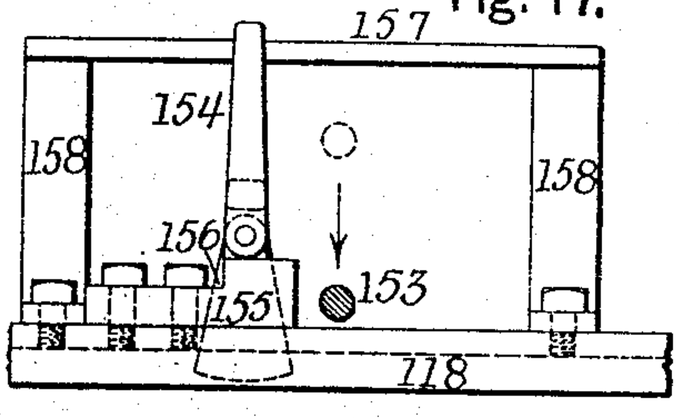

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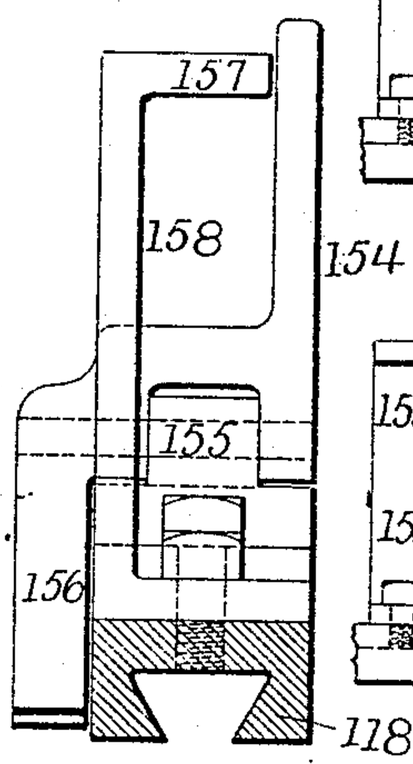

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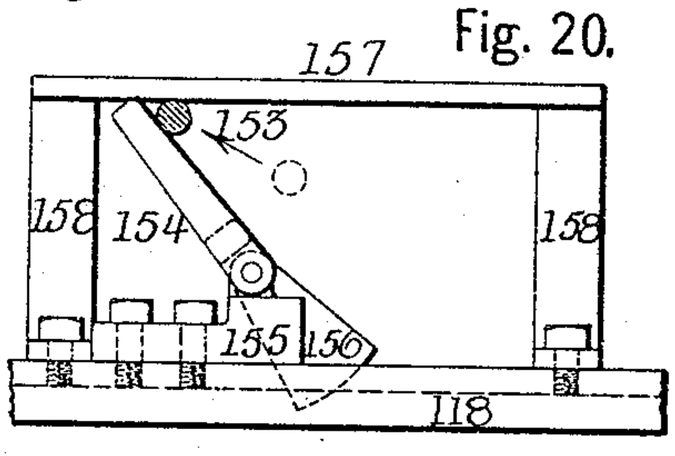

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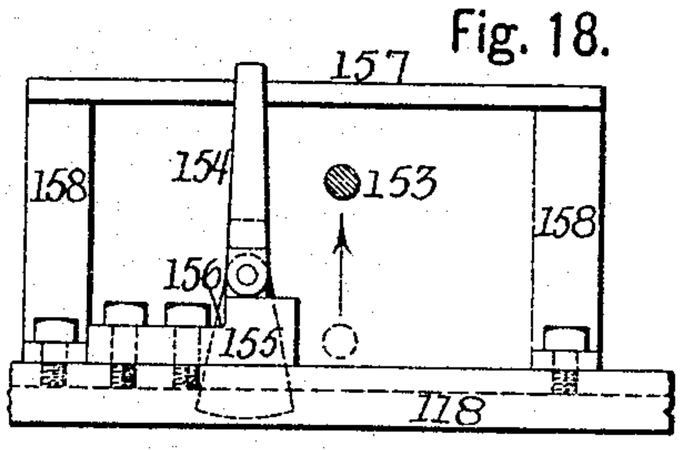

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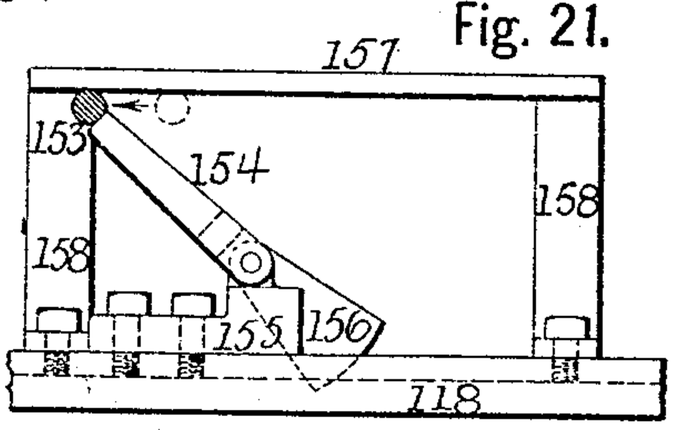

Witnesses.

L. M. Langston.

Geo. A. Neubauer

Inventor.

Fred J. Ramsey

By A. J. Langston Attorney.

No. 887,269. PATENTED MAY 12, 1908.

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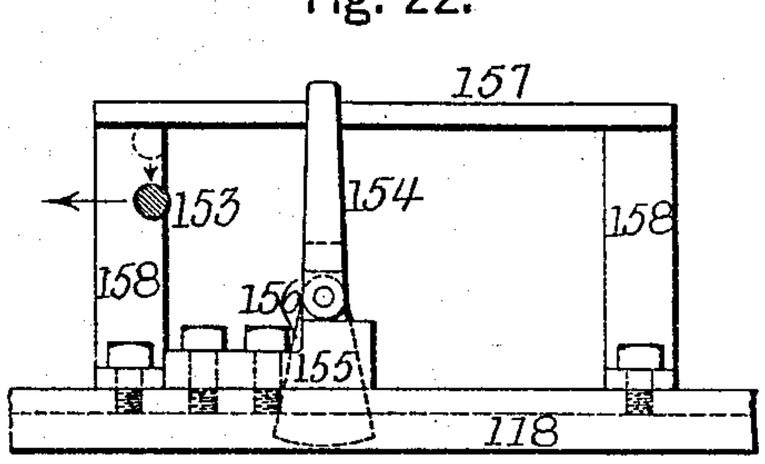
22 SHEETS—SHEET 8.

Fig. 22.



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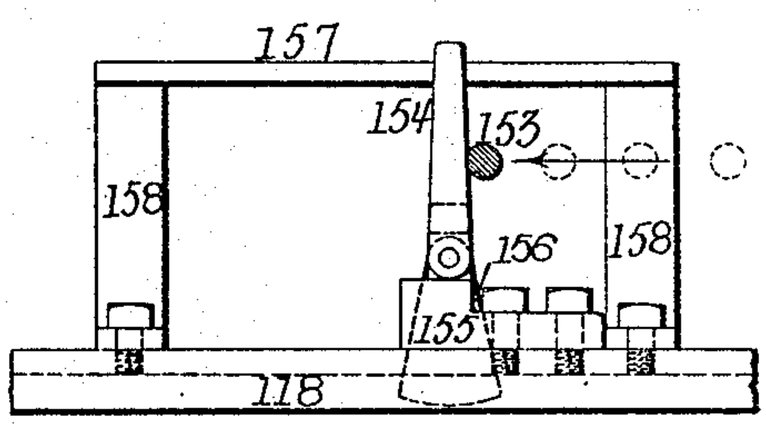

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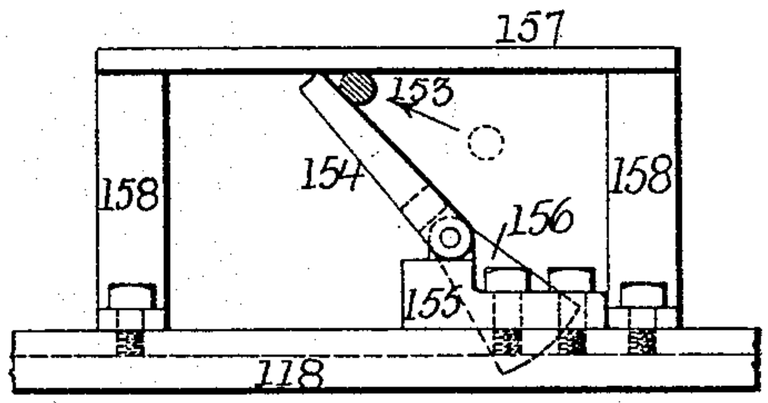

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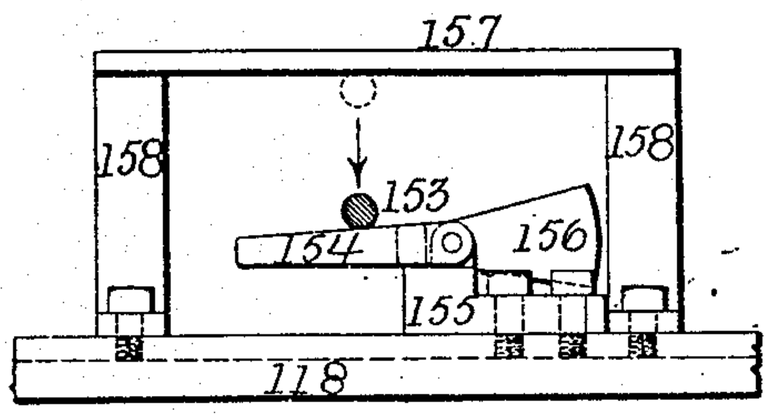

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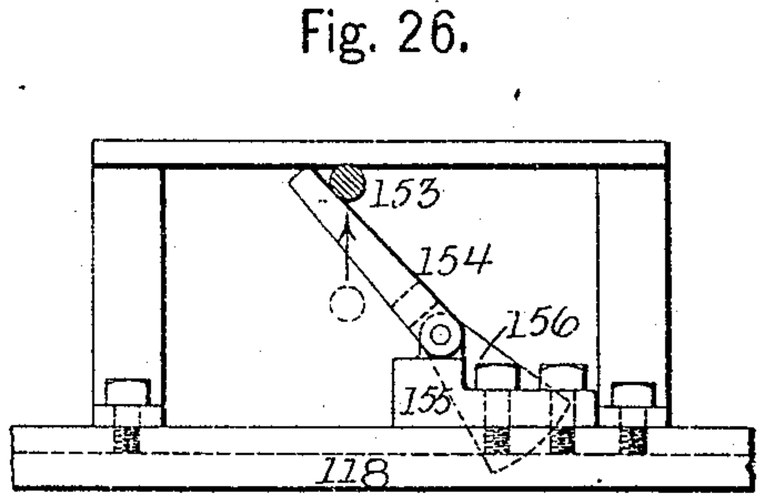

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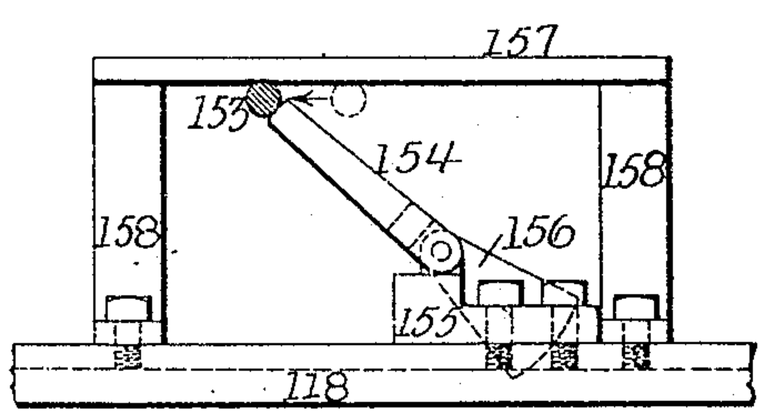

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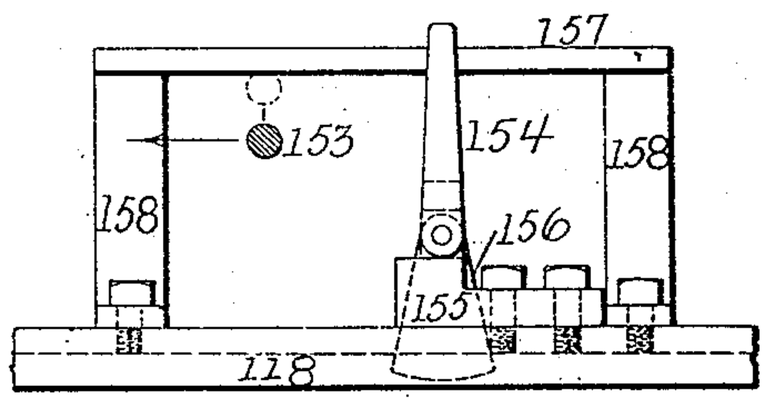

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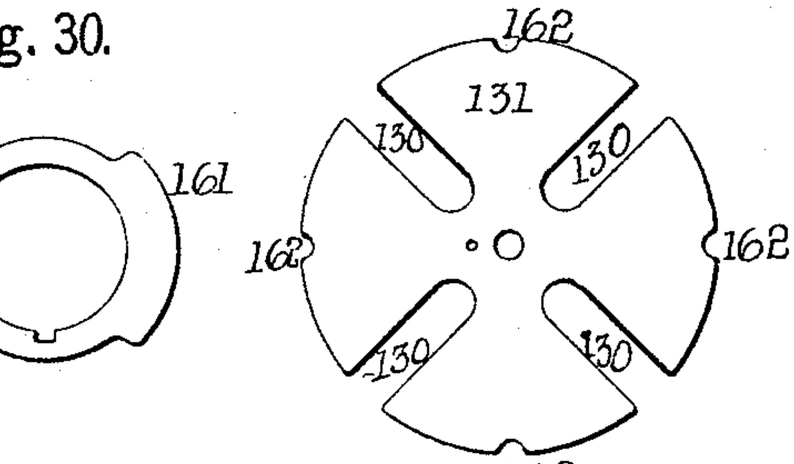


Fig. 30.

Witnesses.

L. M. Langston.

Geo. A. Neubauer.

Fred J. Ramsey Inventor.

By A. J. Langston Attorney.

No. 887,269. PATENTED MAY 12, 1908.

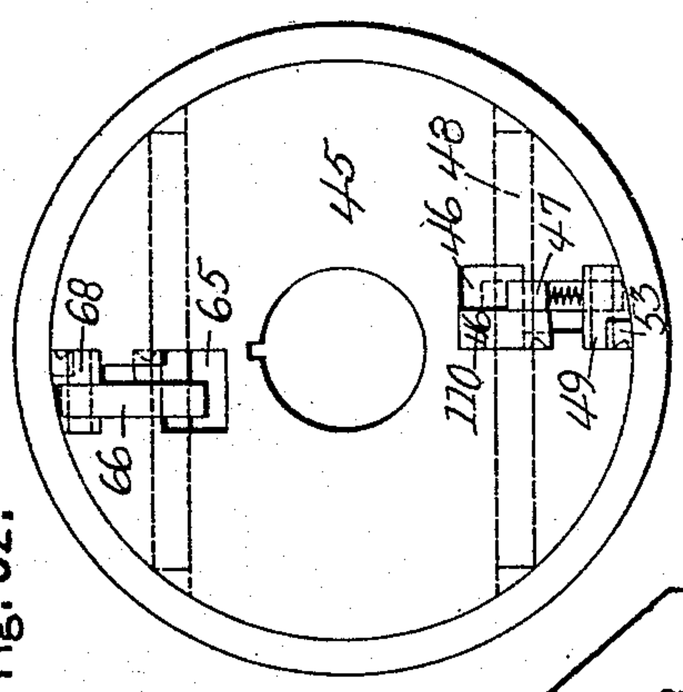
F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 9.

Fig. 32.



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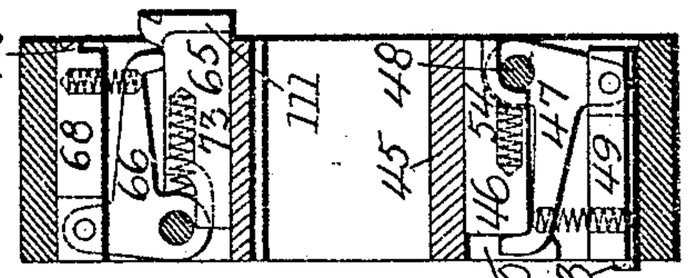
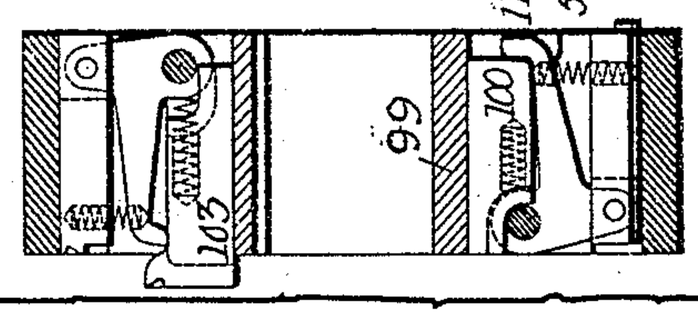


Fig. 33.



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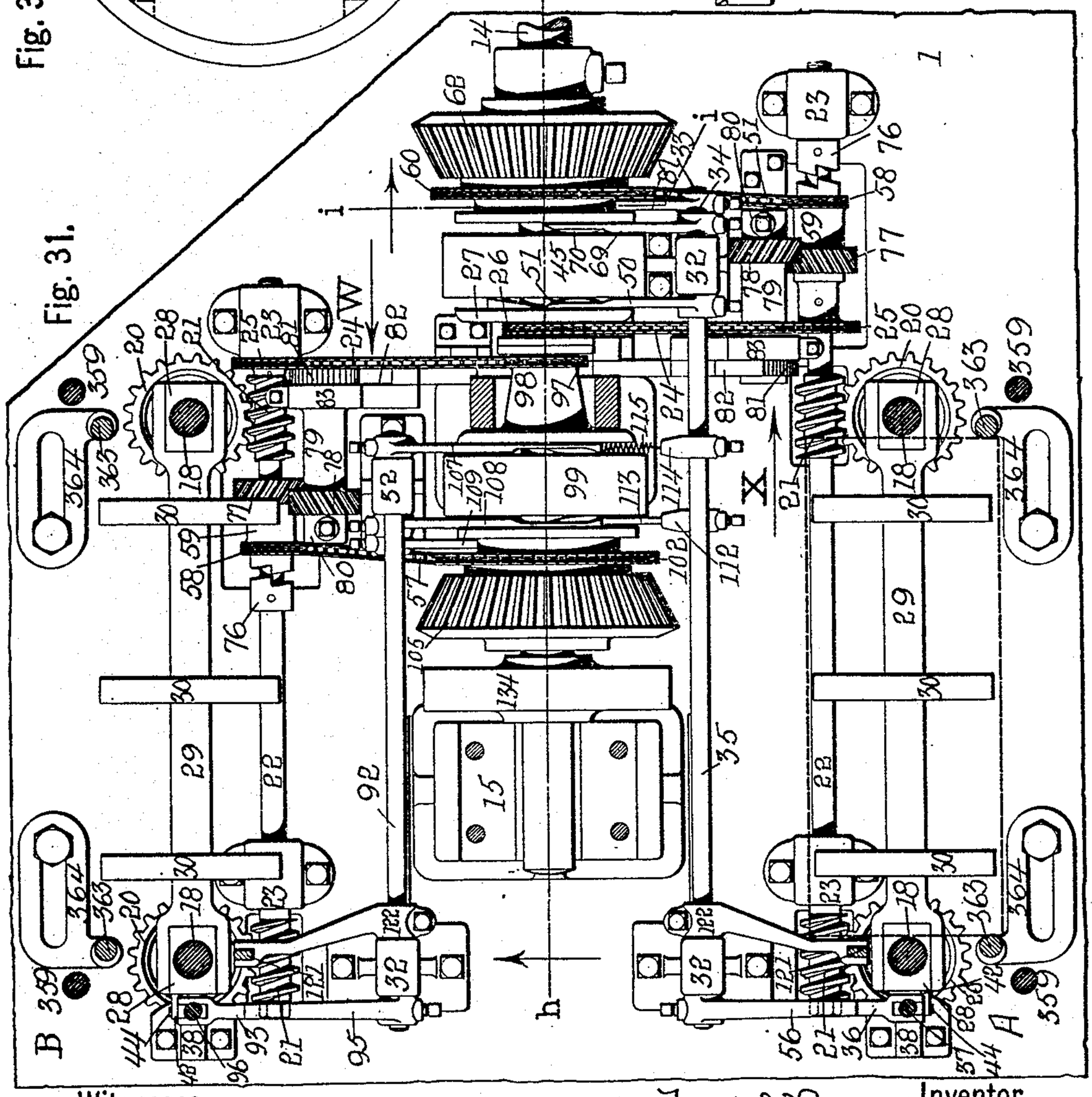


Witnesses.

L. M. Saugster.

Geo. A. Neubauer.

Fred J. Ramsey. Inventor.

By A. J. Langster Attorney.

No. 887,269. PATENTED MAY 12, 1908.

F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 10.

Fig. 35.

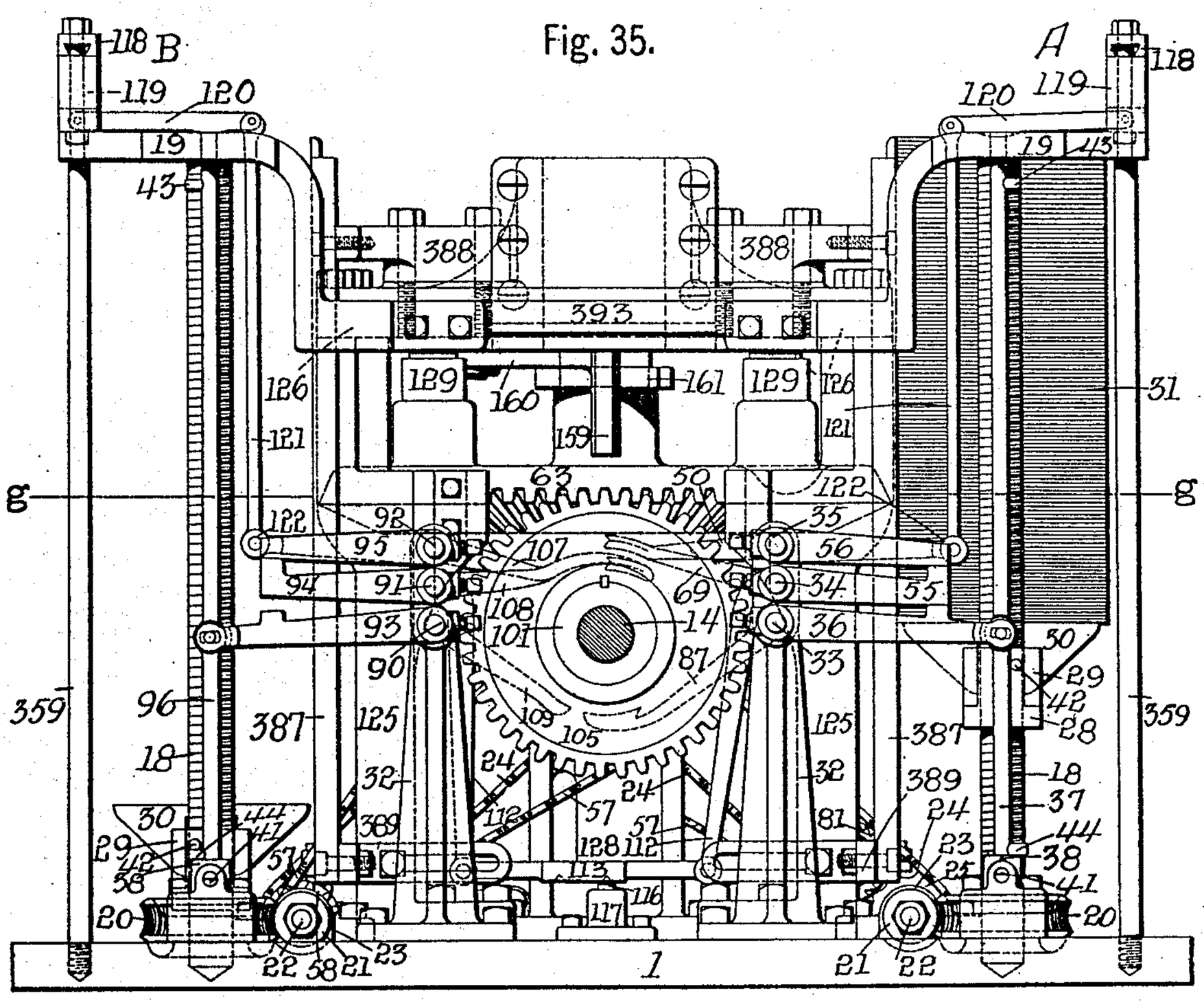
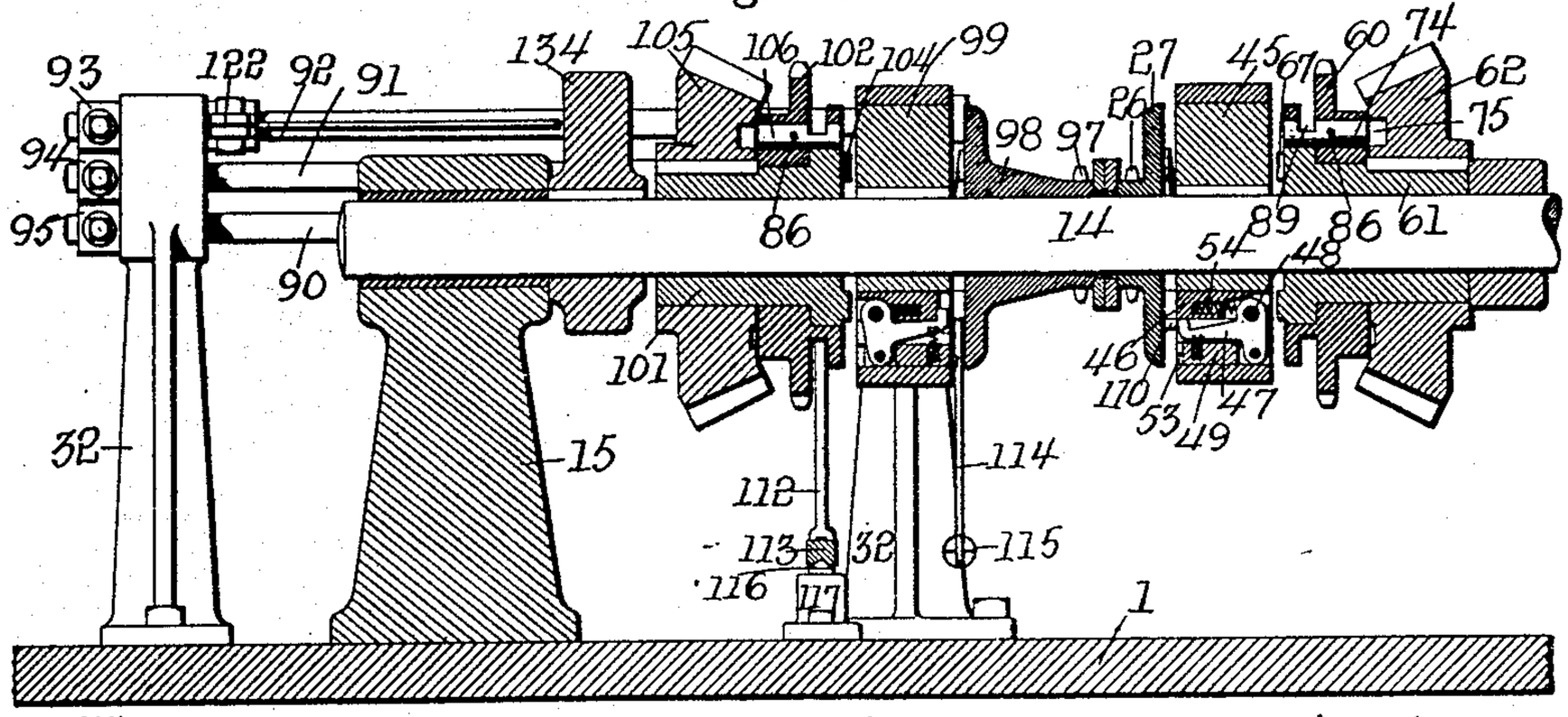


Fig. 36.



Witnesses.
L. M. Langster.
Geo. A. Neubauer.

Fred J. Ramsey. Inventor.
By C. L. Langster Attorney.

No. 887,269. PATENTED MAY 12, 1908.

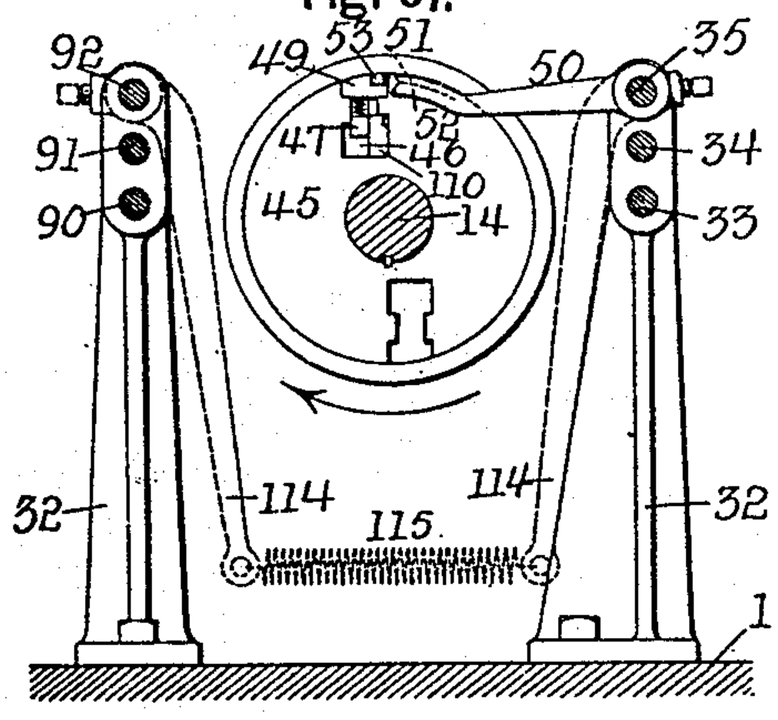
F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 11.

Fig. 37.



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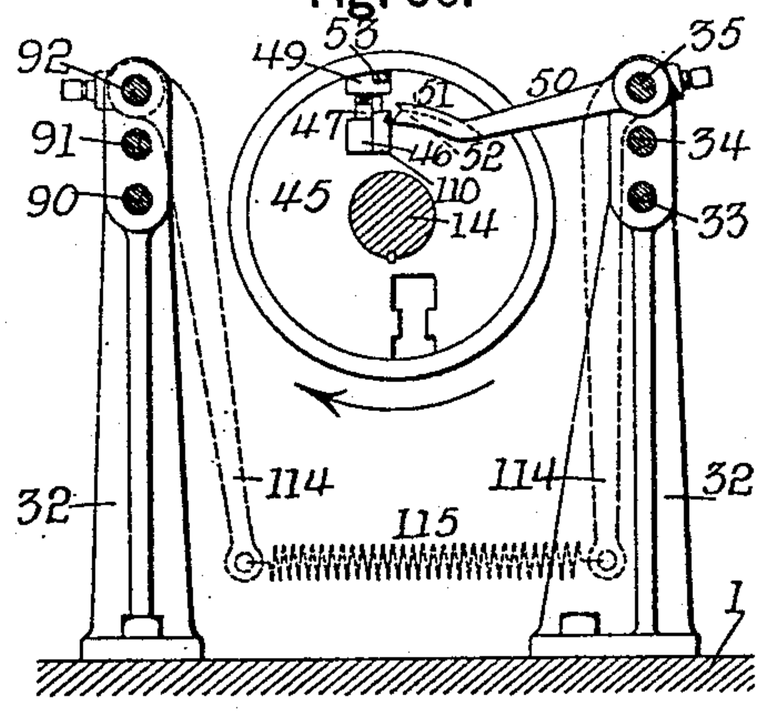

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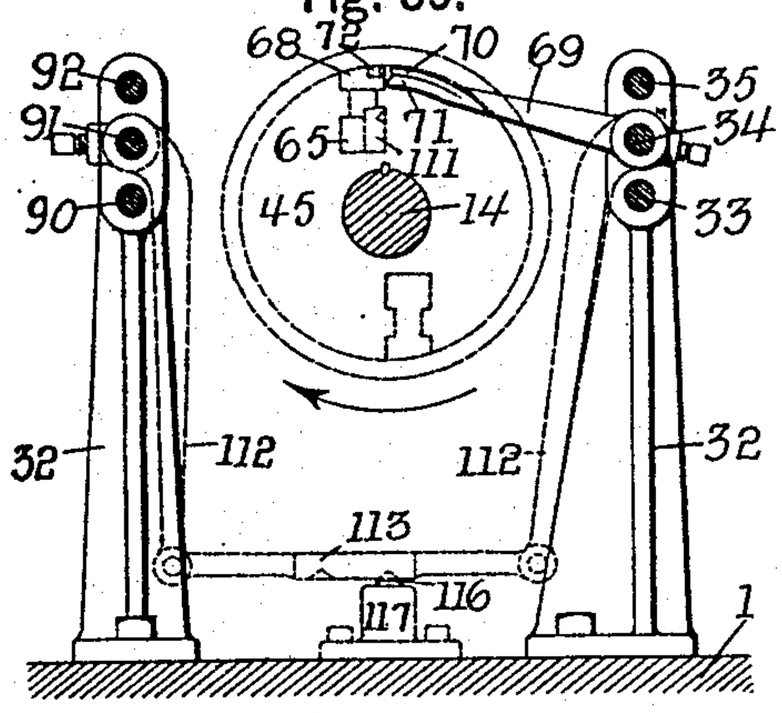

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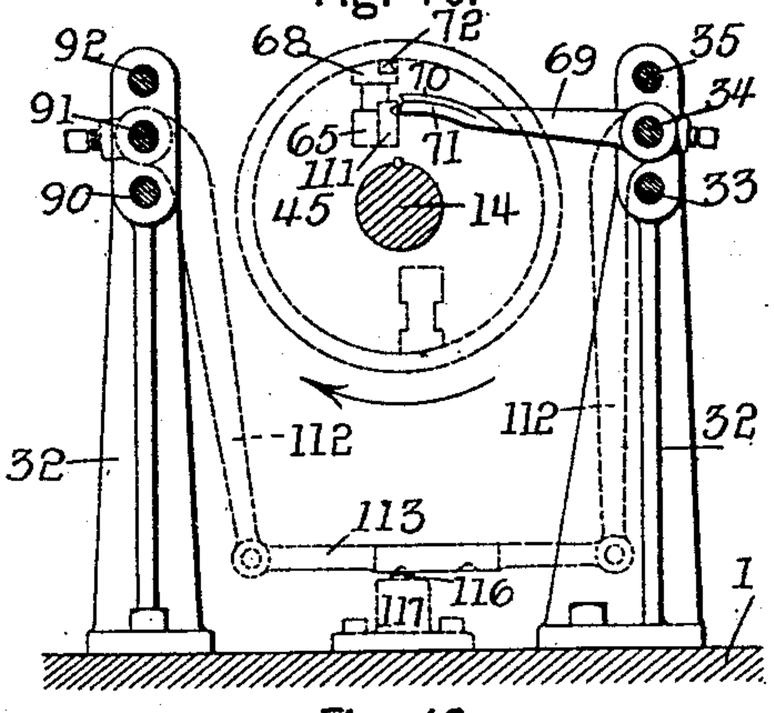

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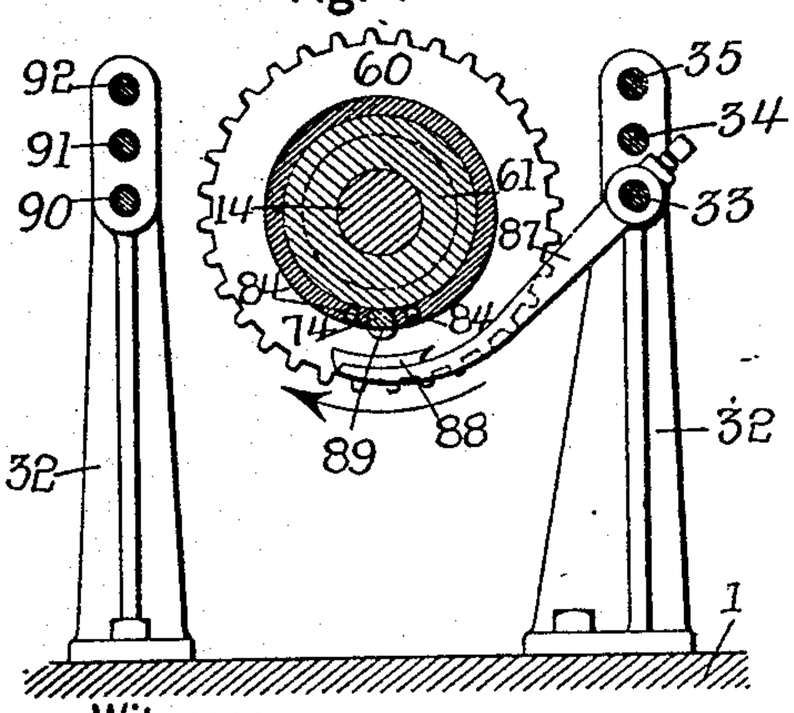

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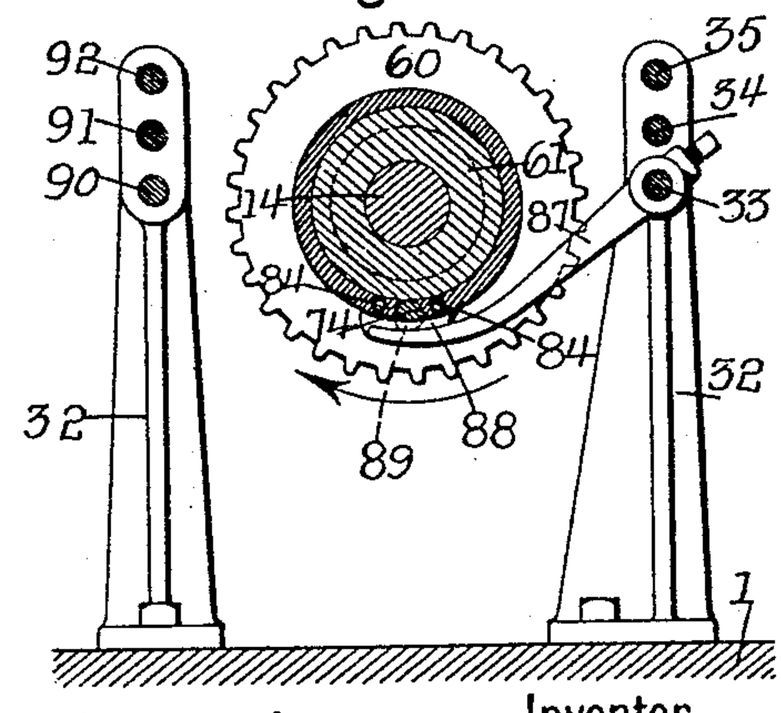

Witnesses.

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Inventor.

Fred J. Ramsey.

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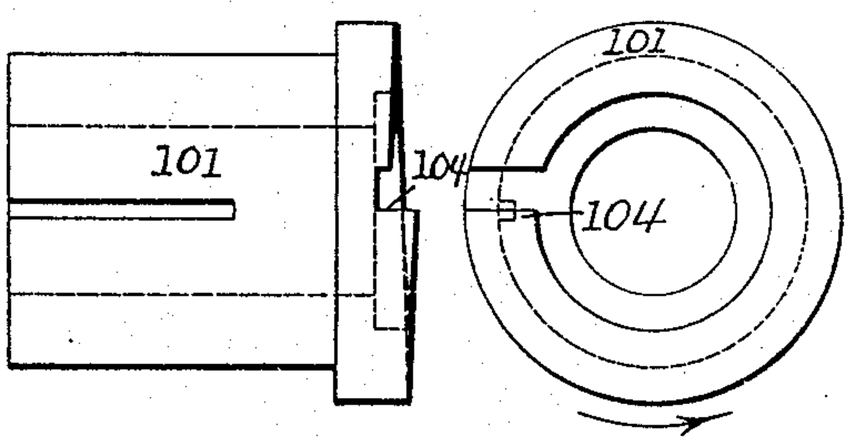
APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 12.

Fig. 43.



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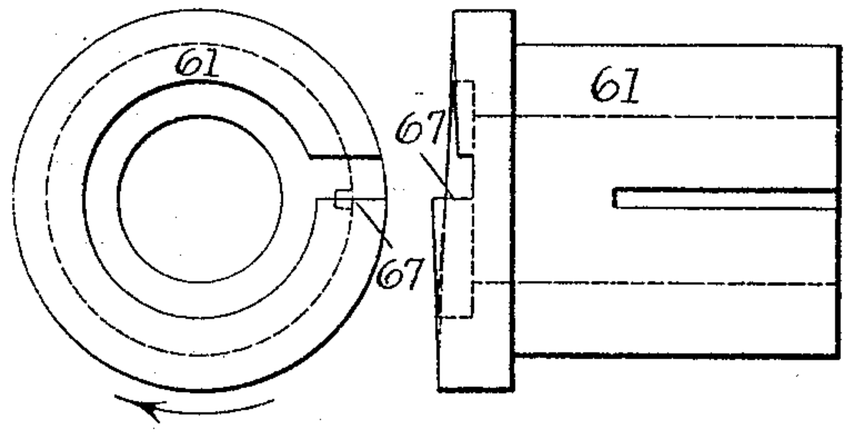
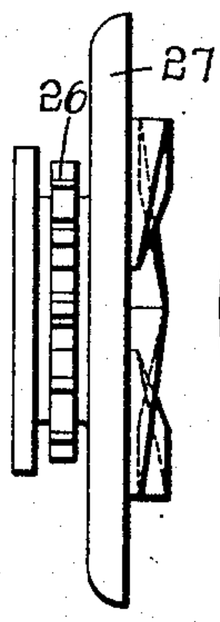


Fig. 45.

Fig. 46.

Fig. 47.



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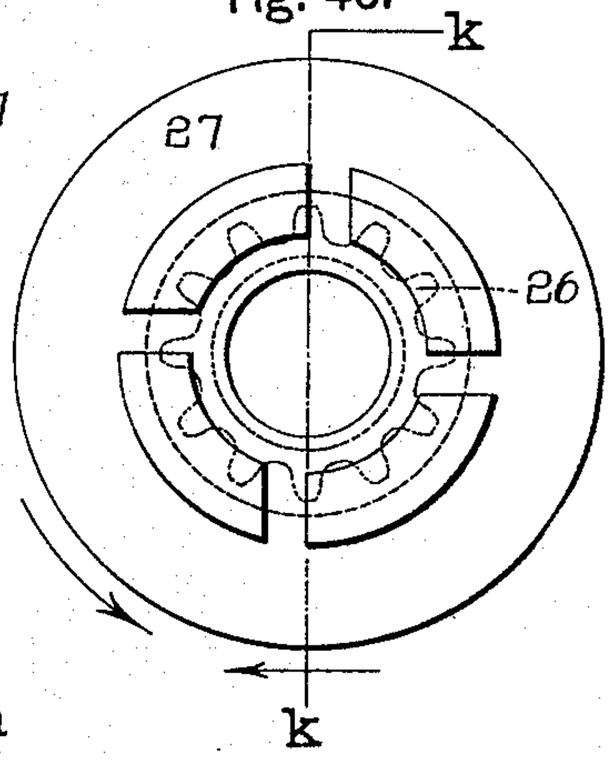

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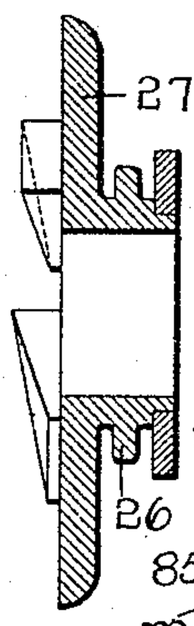

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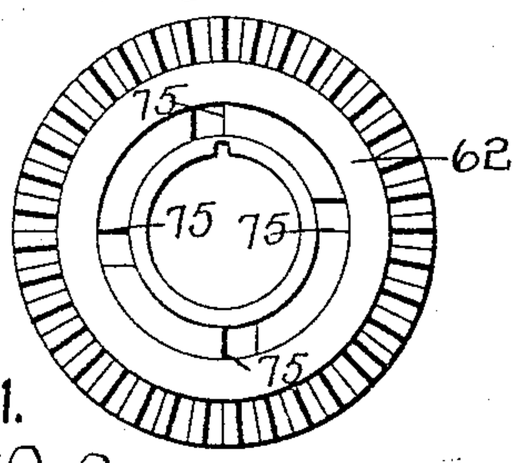

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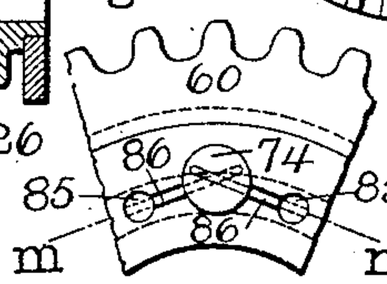

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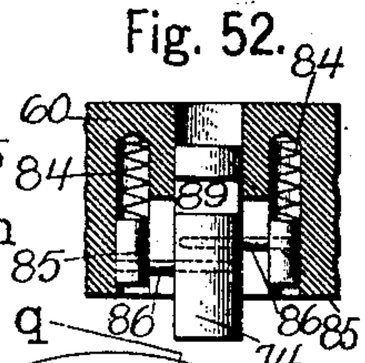

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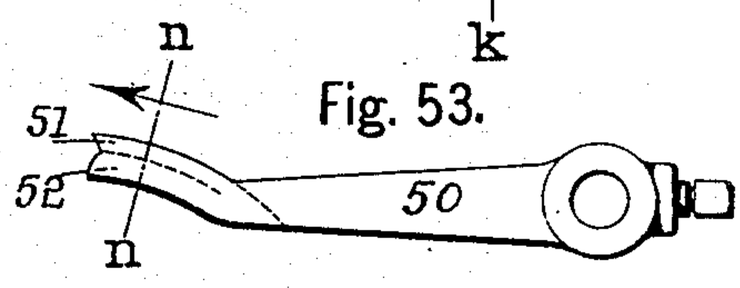

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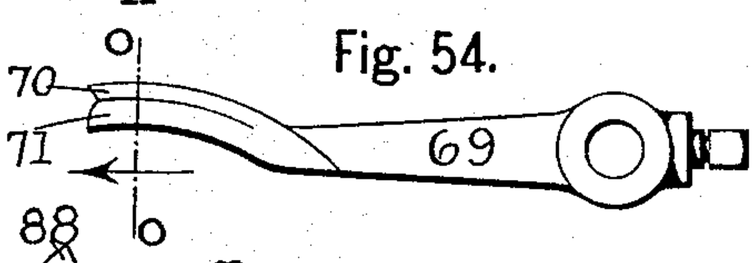

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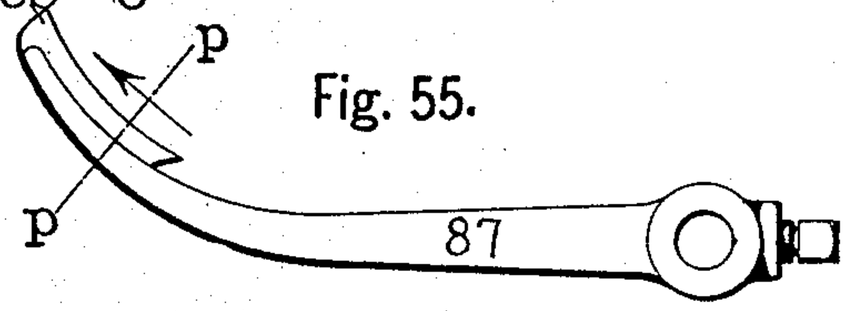

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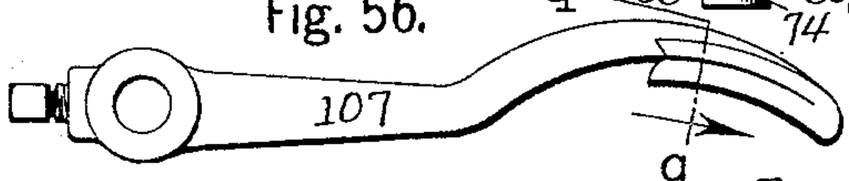
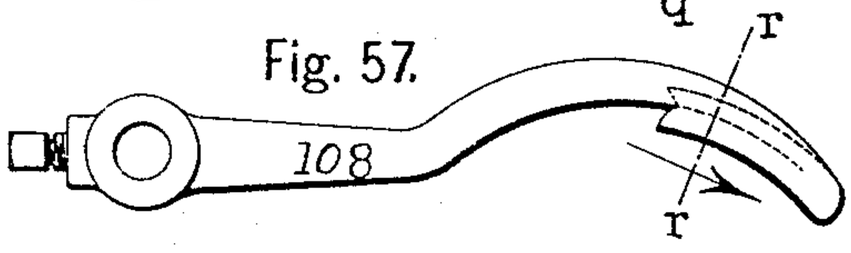


Fig. 57.



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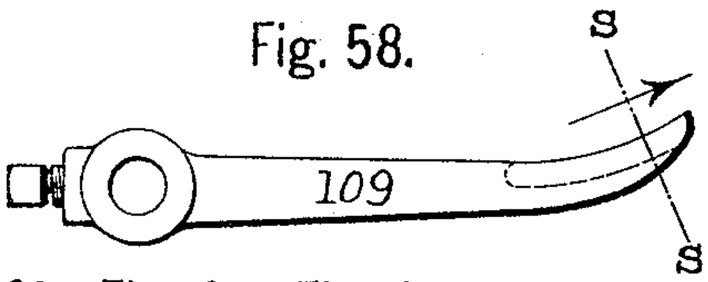
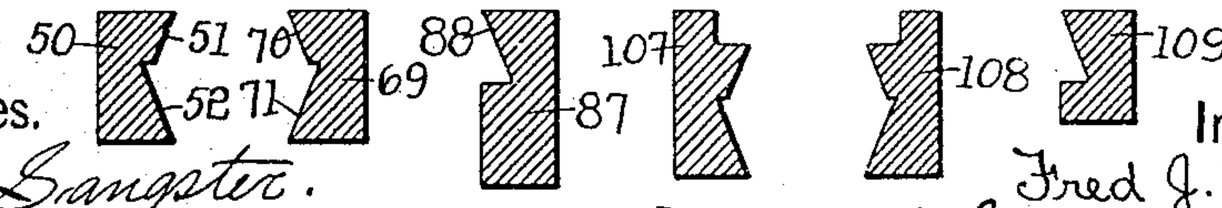


Fig. 59. Fig. 60. Fig. 61. Fig. 62. Fig. 63. Fig. 64.



Witnesses.

L. M. Sangster.

Geo. A. Neubauer.

Inventor.

Fred J. Ramsey.

By A. J. Sangster Attorney.

No. 887,269. PATENTED MAY 12, 1908.

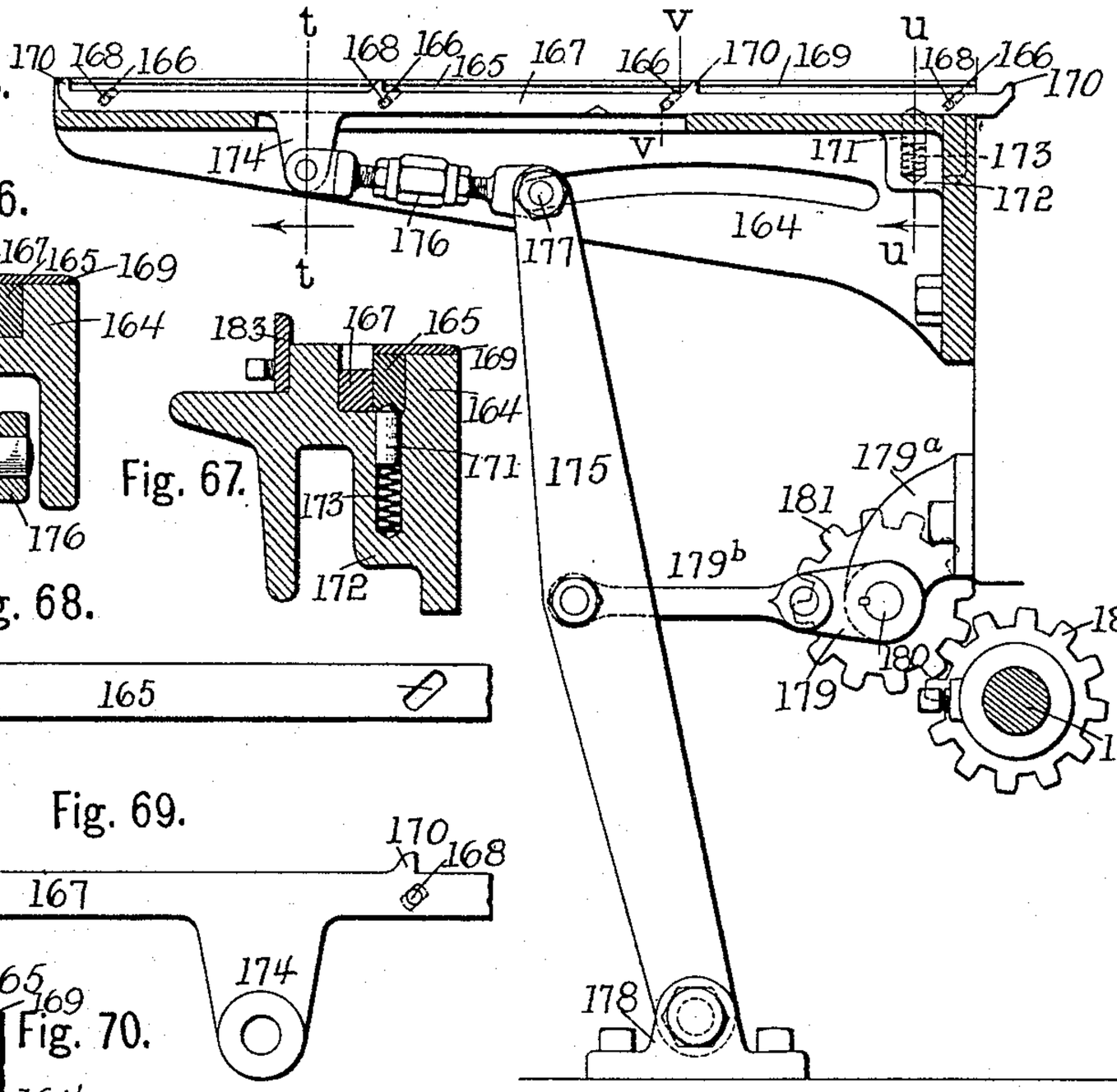
F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 13.

Fig. 65.



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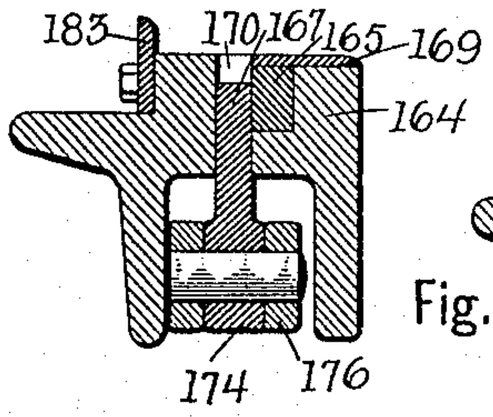


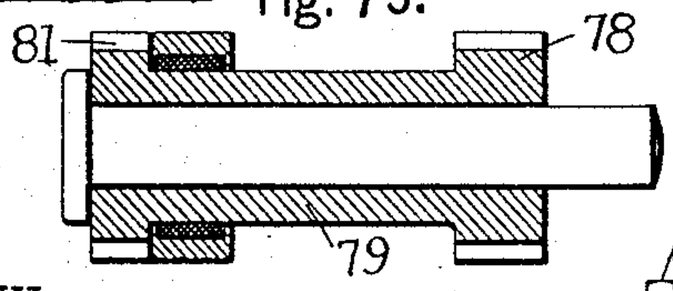
Fig. 67.

Fig. 68.

Fig. 69.

Fig. 70.

Fig. 73.



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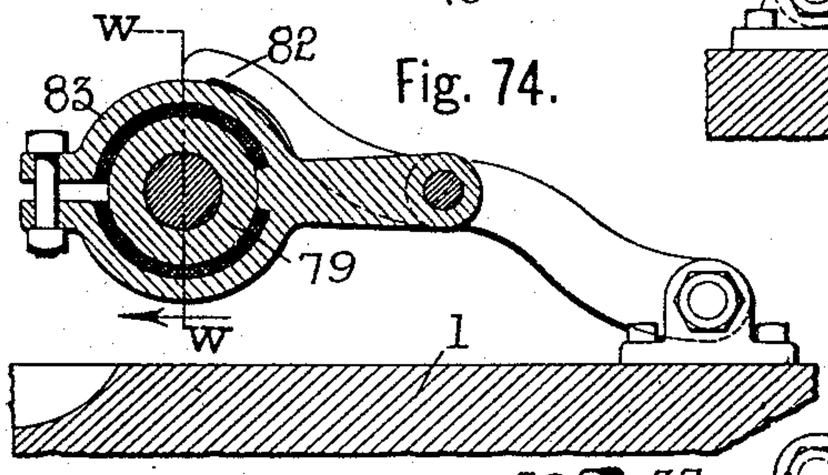

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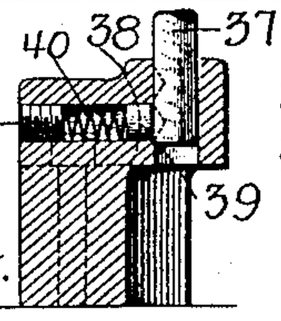

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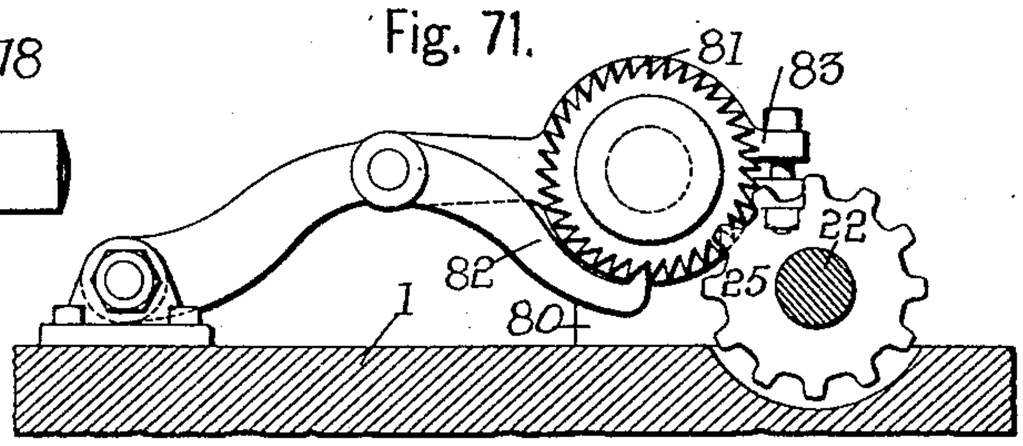
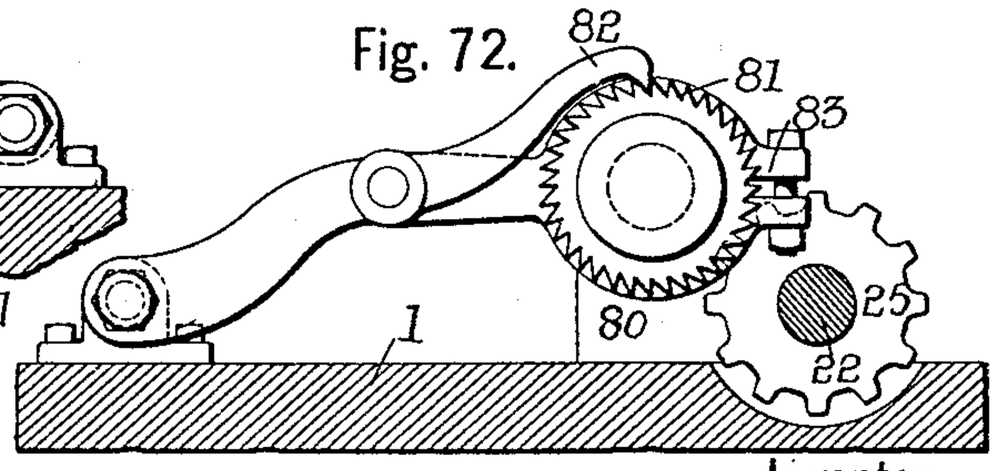


Fig. 72.



Witnesses.

L. M. Sangster.

Geo. A. Neubauer.

Fred J. Ramsey. Inventor.

By A. J. Sangster Attorney.

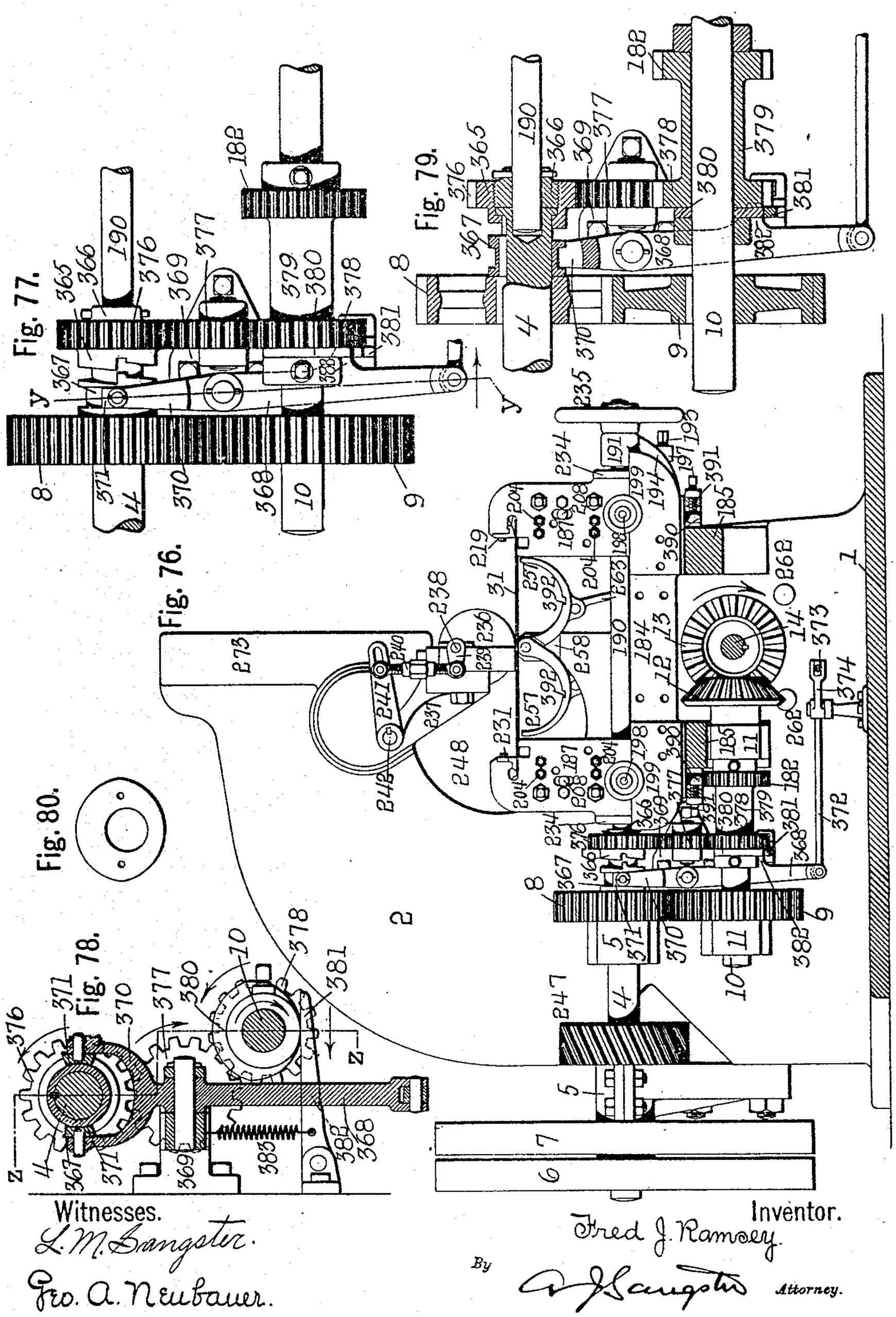
No. 887,269. PATENTED MAY 12, 1908.

F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 14.



Witnesses.
L. M. Sangster.
Geo. A. Neubauer.

Inventor.
Fred J. Ramsey.
By A. J. Sangster Attorney.

No. 887,269. PATENTED MAY 12, 1908.

F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905. 22 SHEETS—SHEET 15.

Fig. 81.

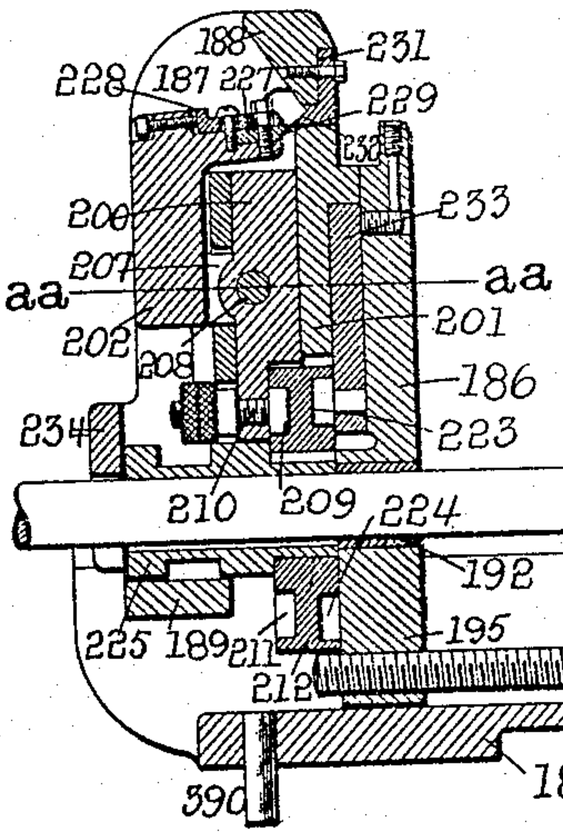
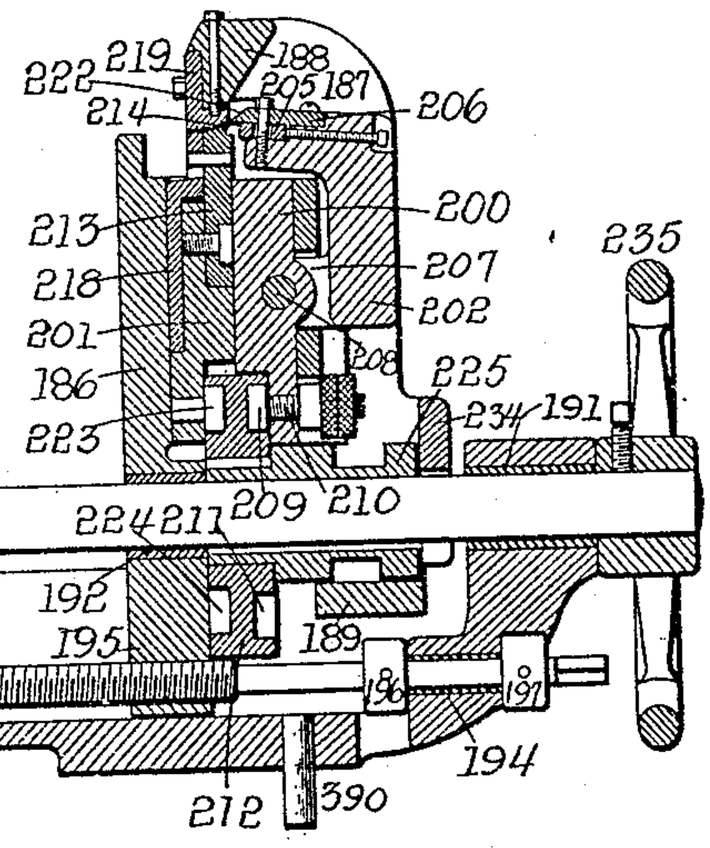


Fig. 82.



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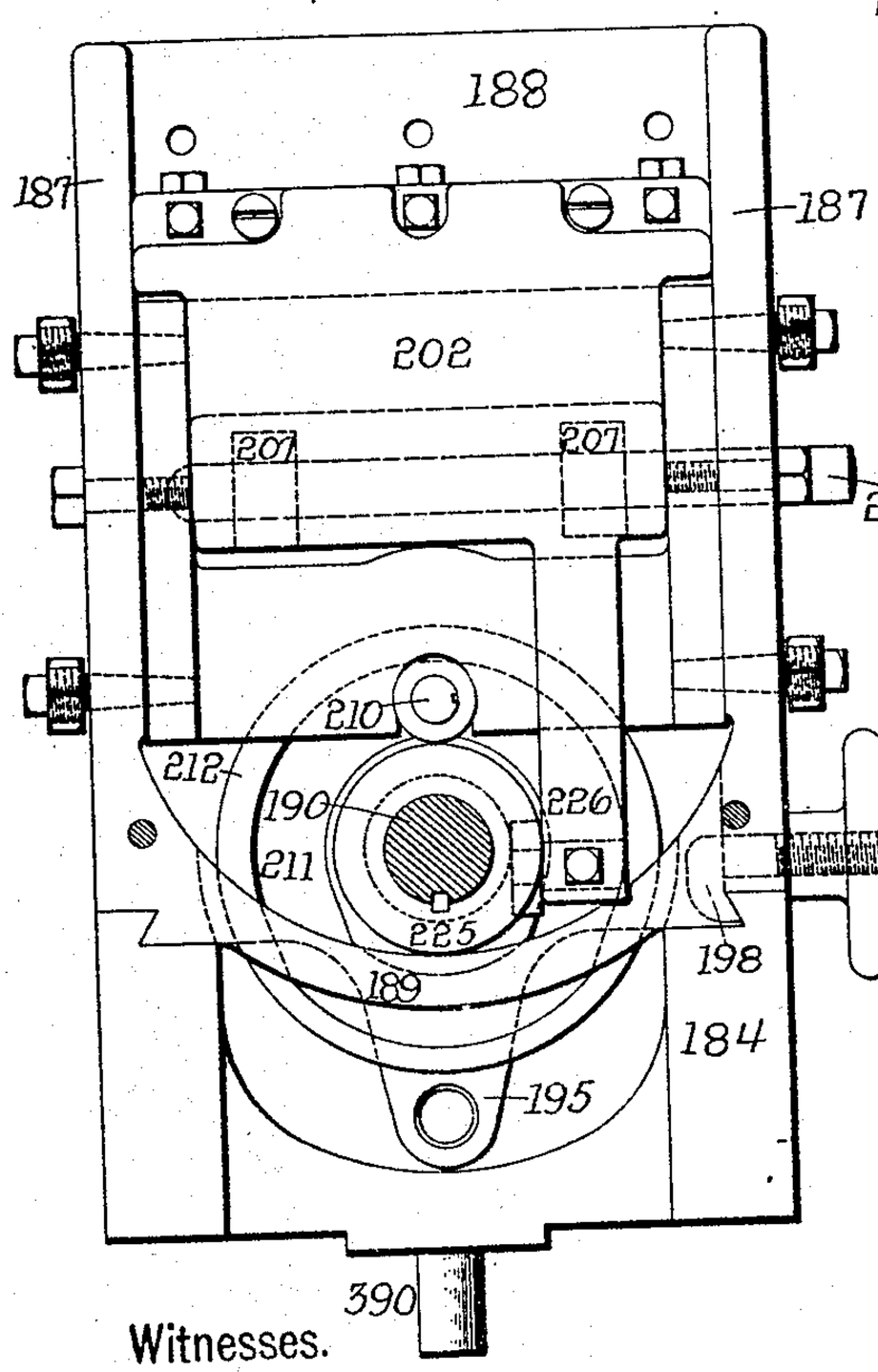

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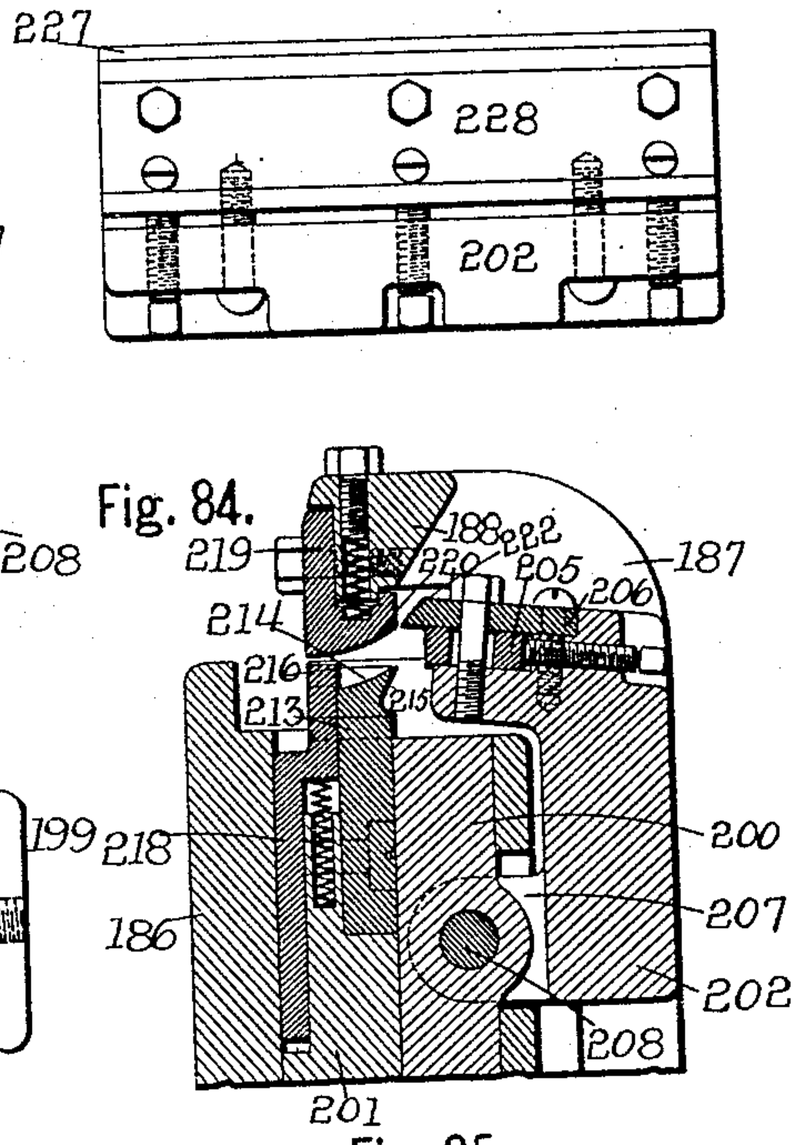

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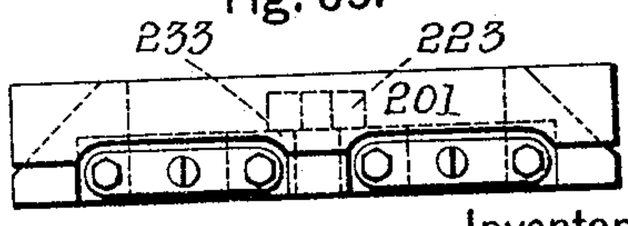

Witnesses.

L. M. Langster.

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22 SHEETS—SHEET 16.

Fig. 86.

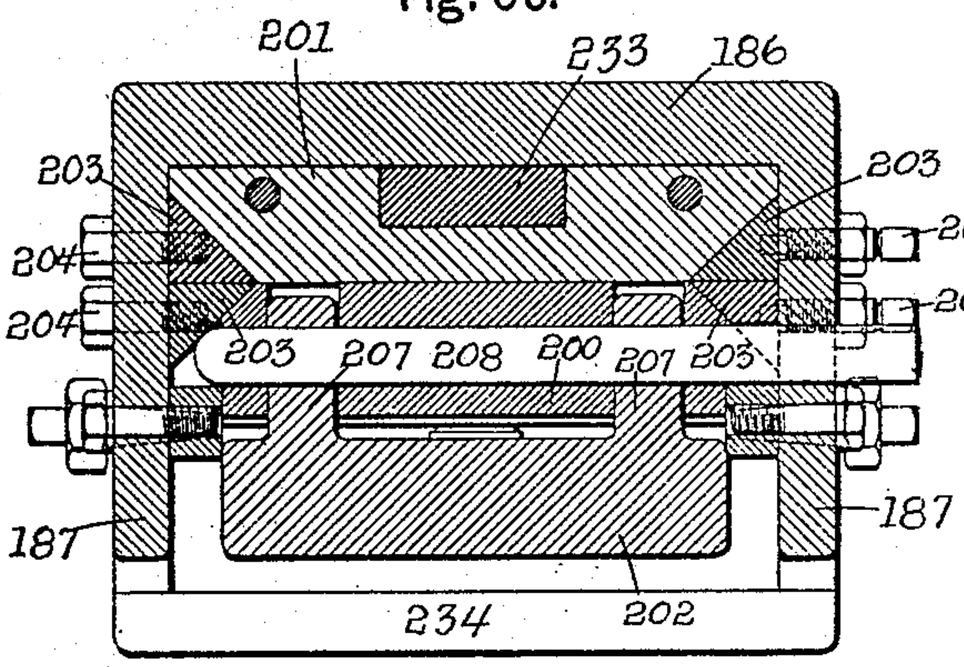
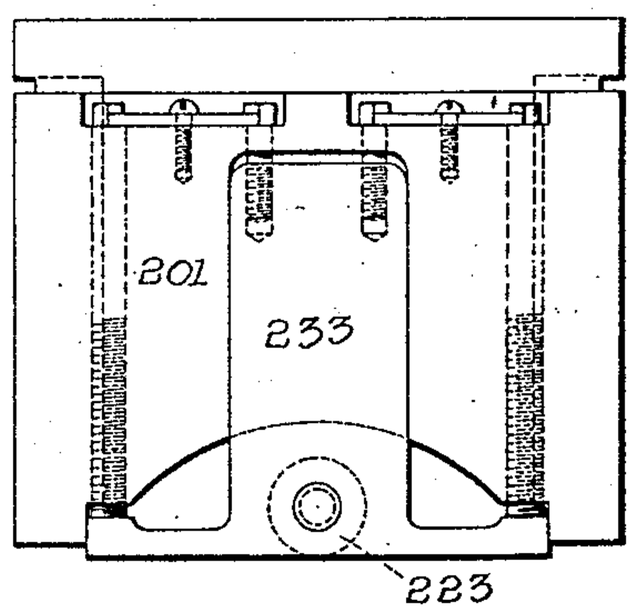


Fig. 87.



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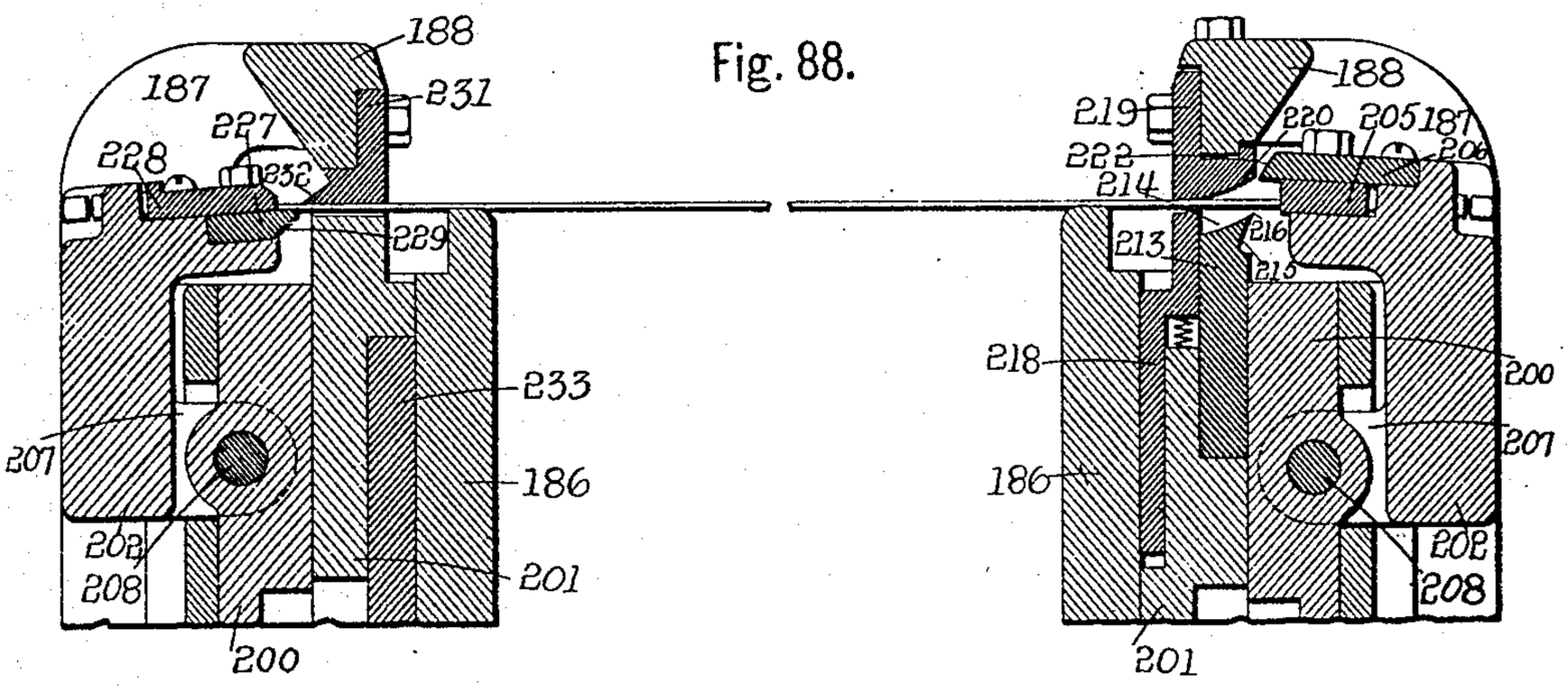

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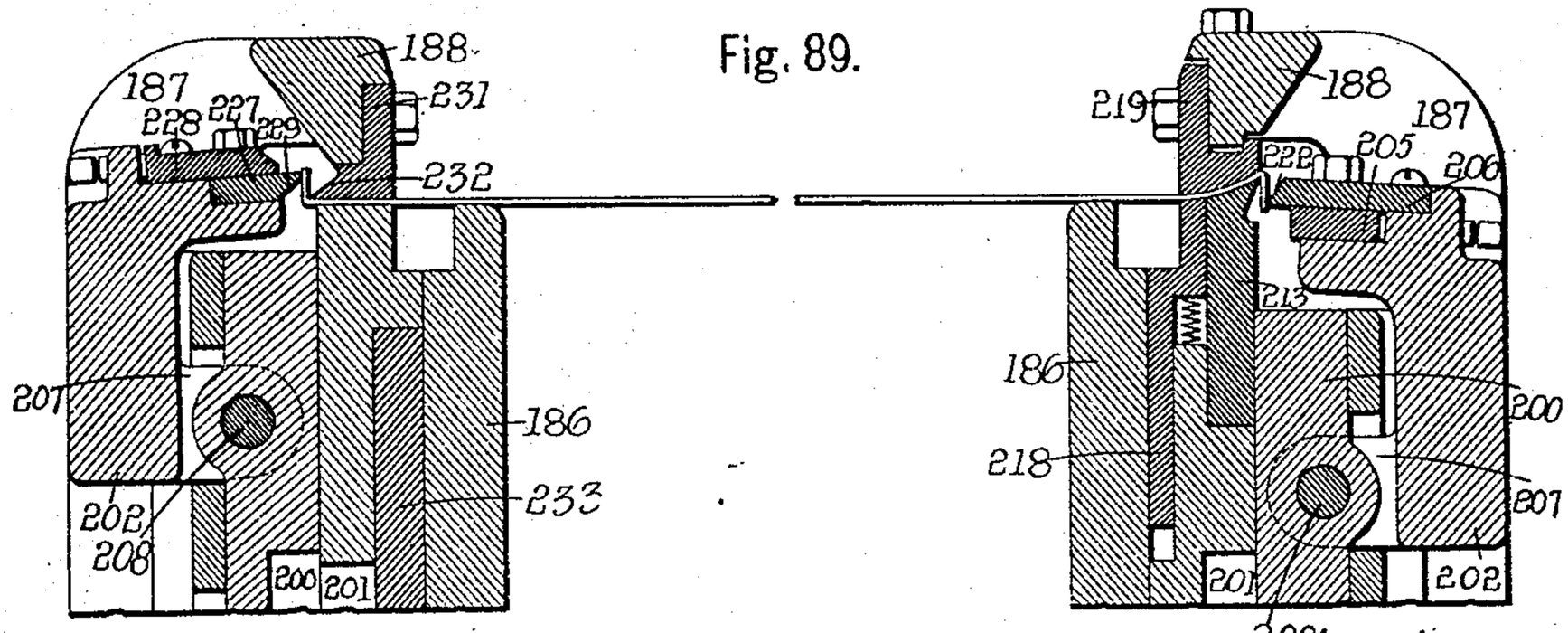

Witnesses.

L. M. Sangster.

Geo. A. Neubauer.

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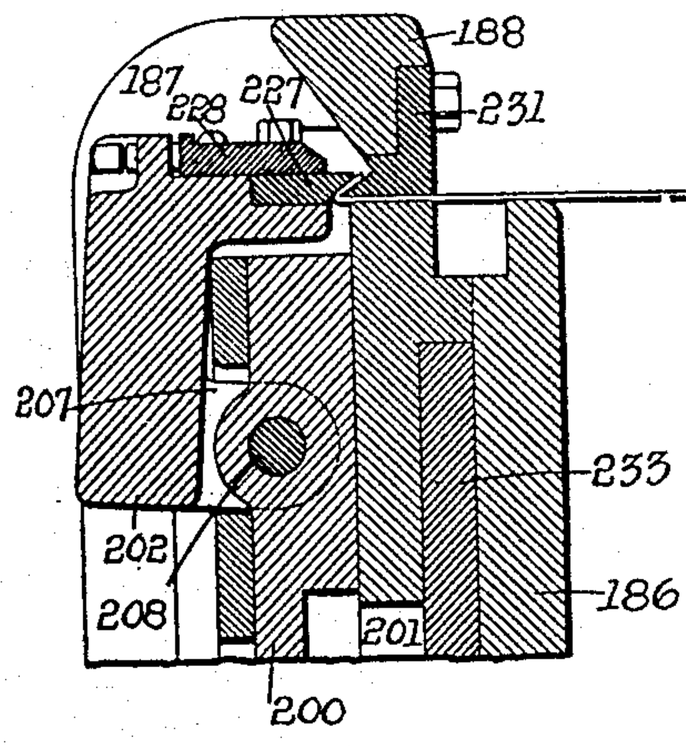
F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 17.

Fig. 90.



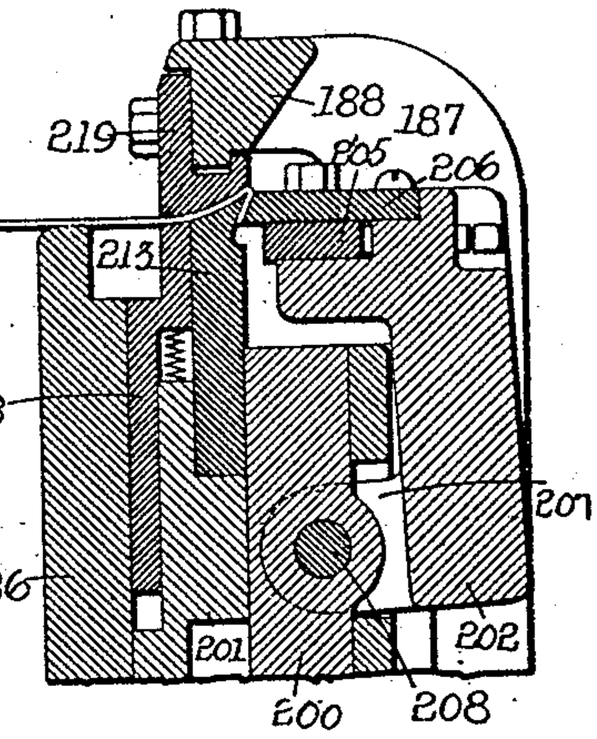


Fig. 91.

Fig. 92.

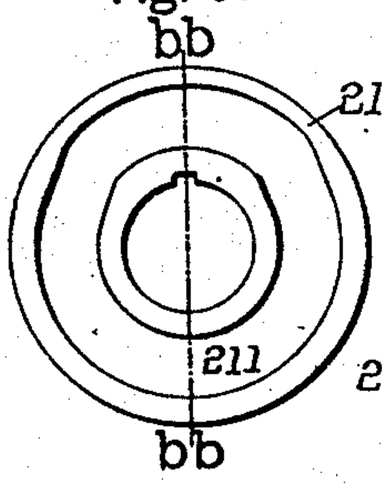


Fig. 95.

Fig. 94.

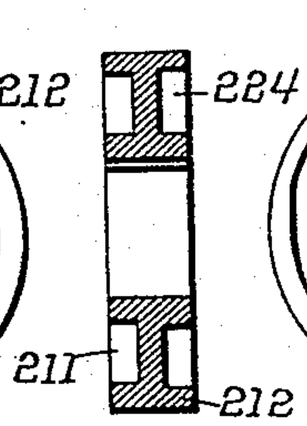


Fig. 97.

Fig. 93.

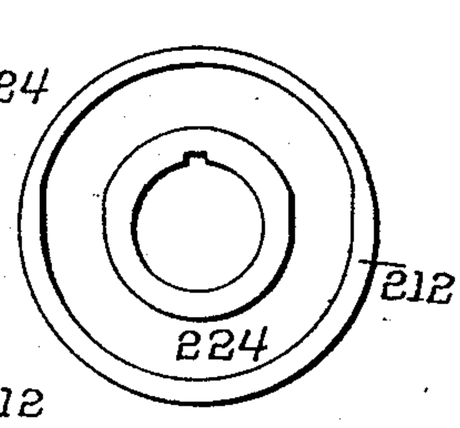
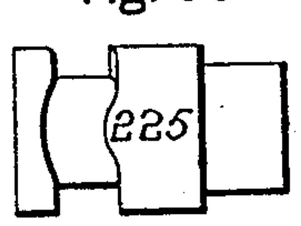


Fig. 96.

Fig. 98.



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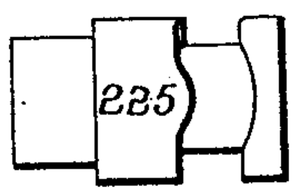

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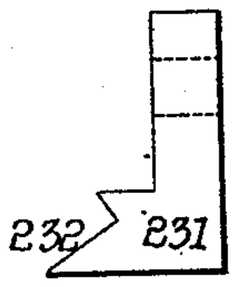

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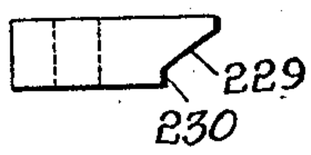

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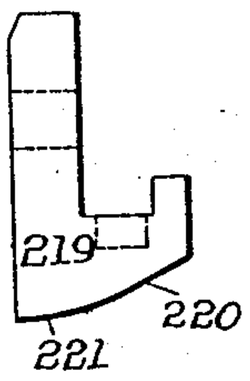

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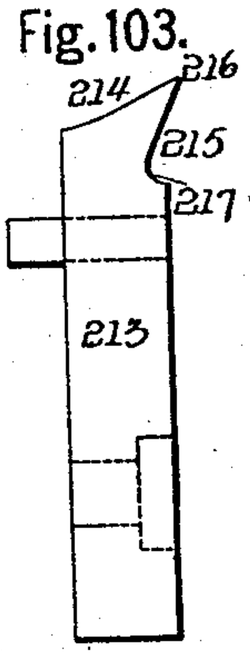


Fig. 105.

Fig. 104.

Witnesses.

L. M. Langston.

Geo. A. Neubauer

Fred J. Ramsey. Inventor.

By A. J. Langston Attorney.

No. 887,269. PATENTED MAY 12, 1908.

F. J. RAMSEY.

CAN FORMING MACHINE.

APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 18.

Fig. 106.

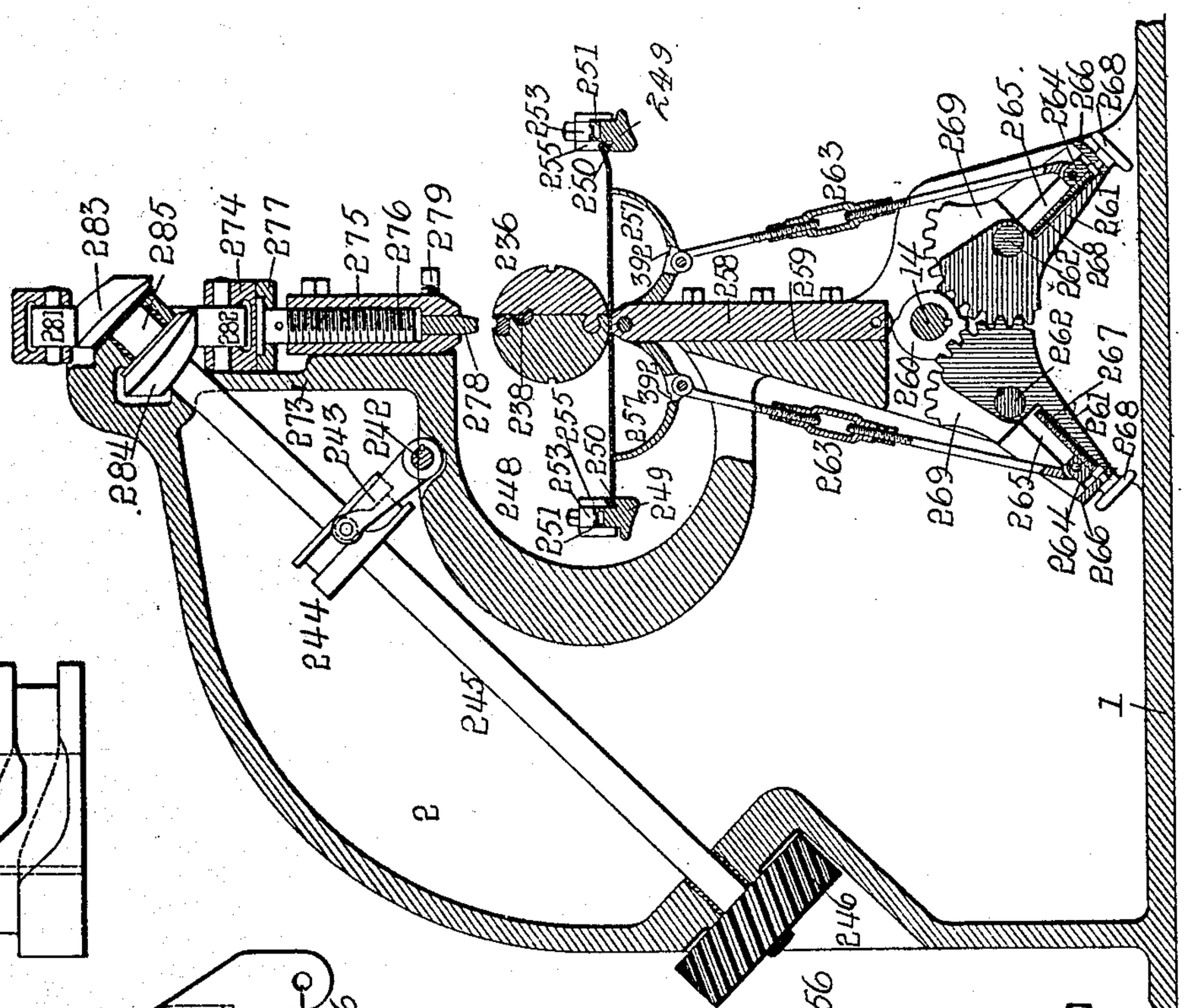


Fig. 107.

Fig. 110.

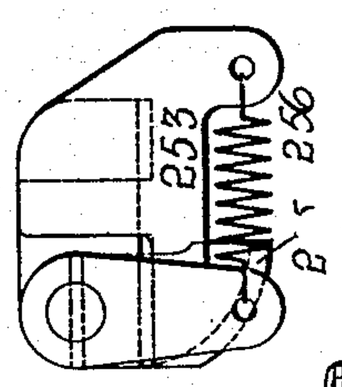
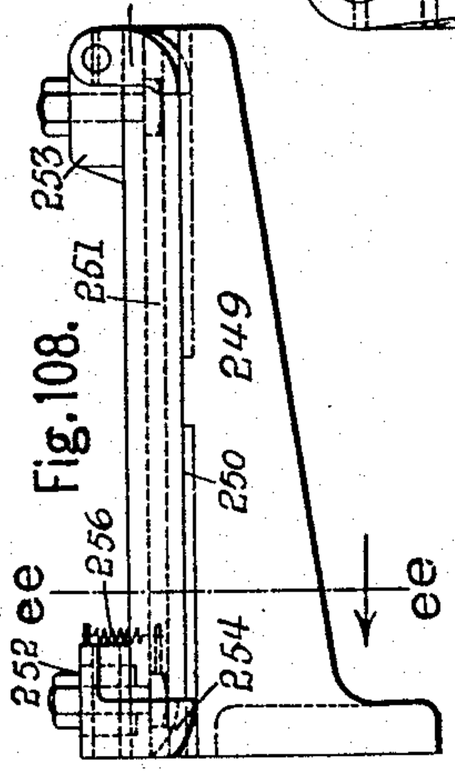


Fig. 108.



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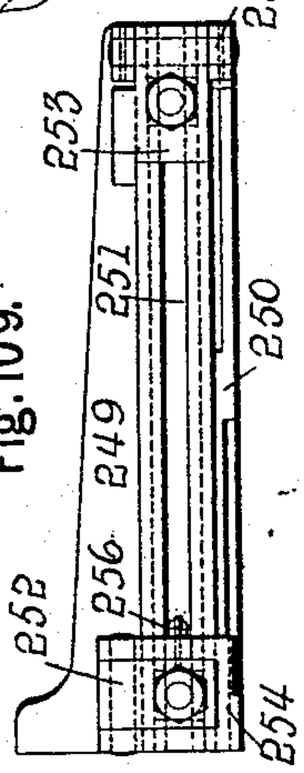

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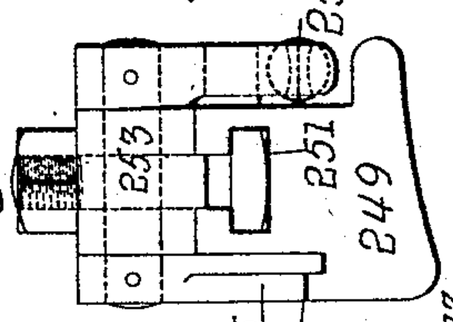

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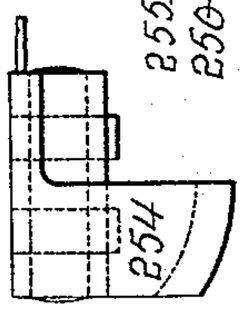

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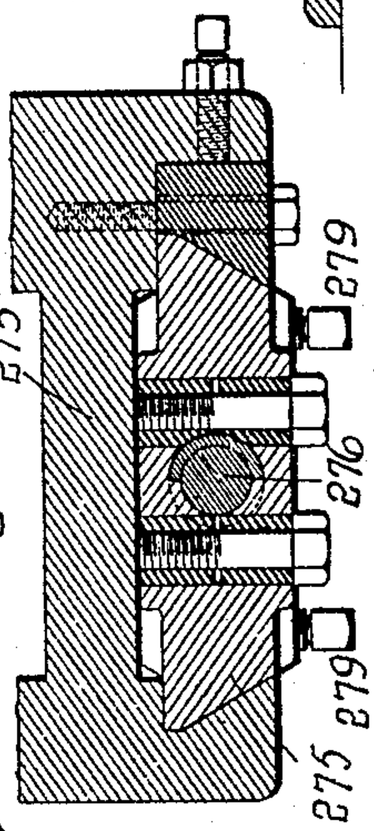
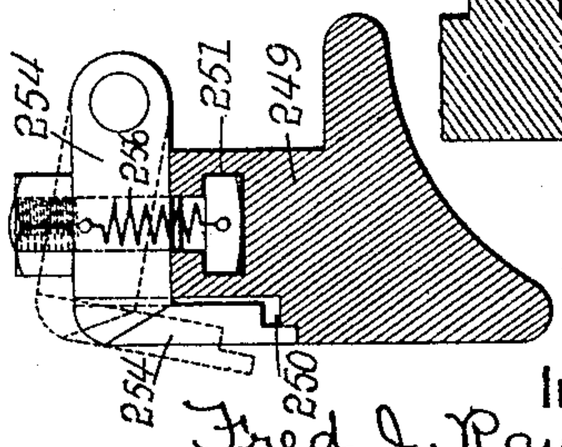


Fig. 111.



Witnesses.

L. M. Sangster.

Geo. A. Neubauer.

Inventor.

Fred J. Ramsey.

By A. J. Sangster. Attorney.

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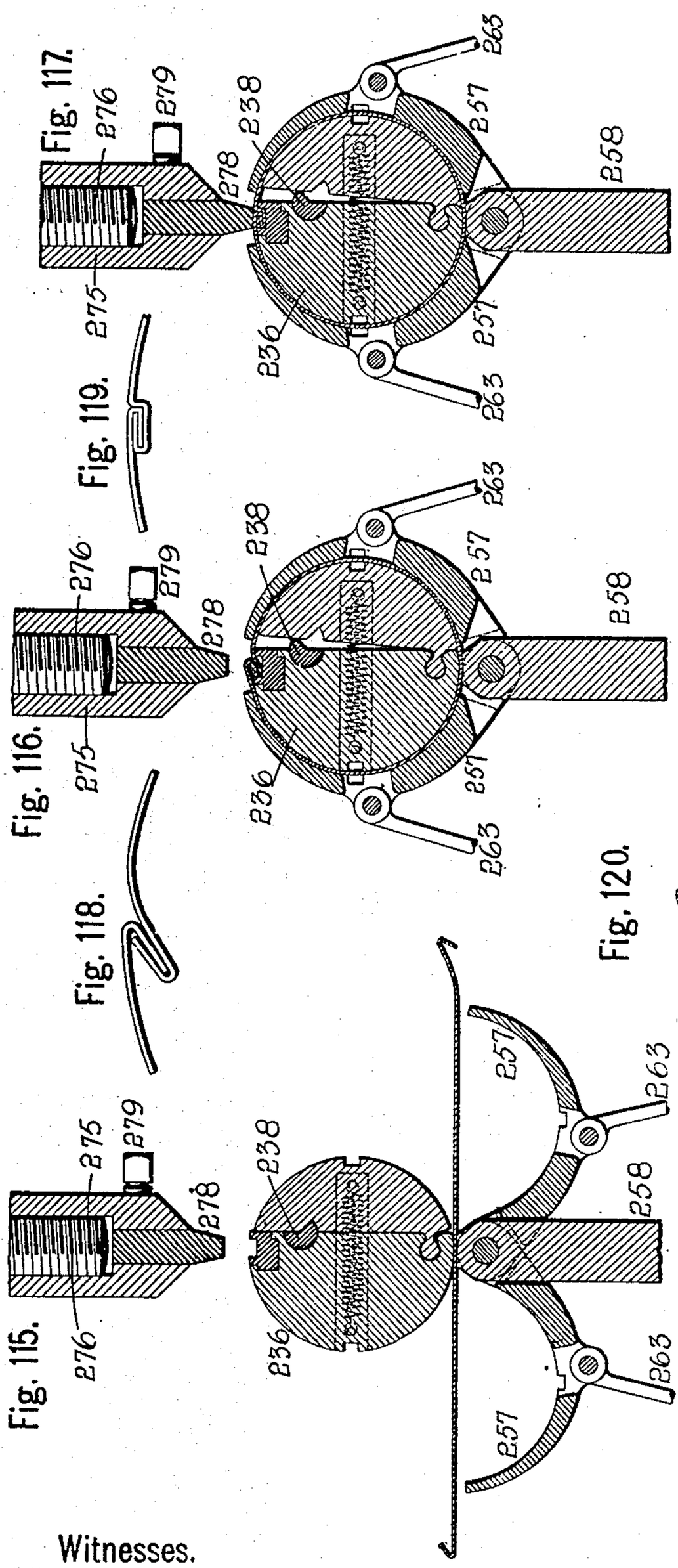
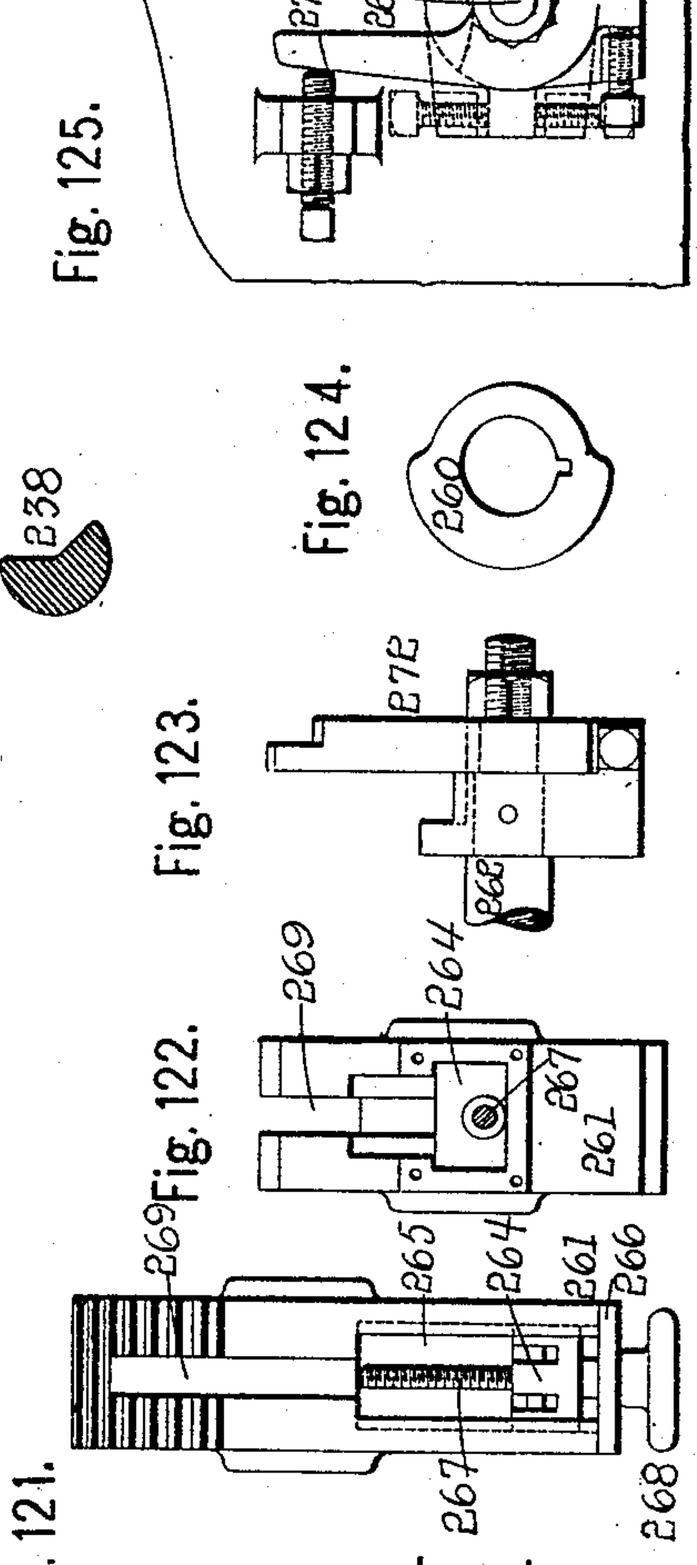
APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 19.





Witnesses.

L. M. Sangster.

Geo. A. Neubauer.

Inventor.

Fred J. Ramsey

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No. 887,269. PATENTED MAY 12, 1908.

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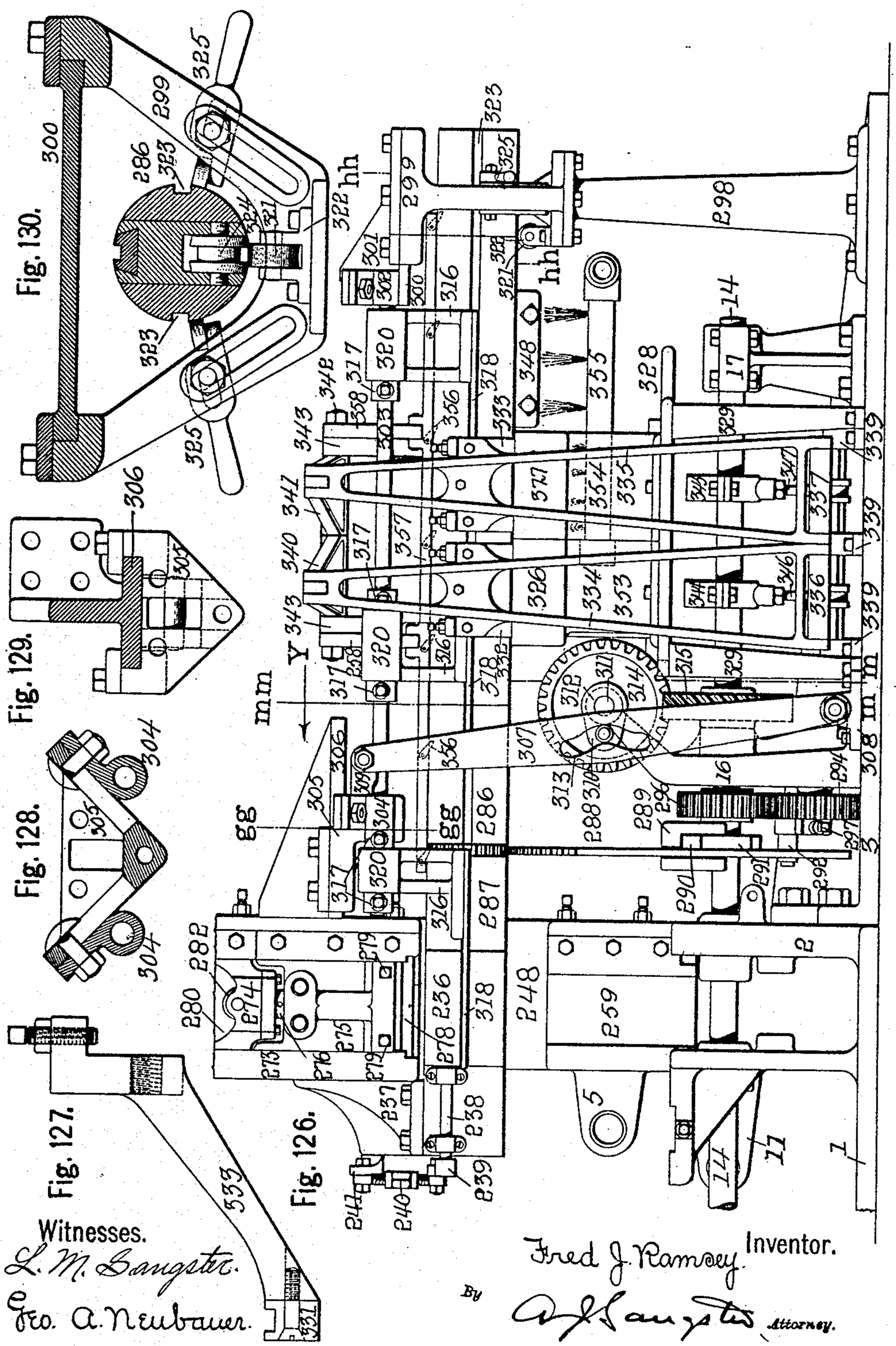
APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 20.



Witnesses.

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Geo. A. Neubauer.

Fred J. Ramsey. Inventor.

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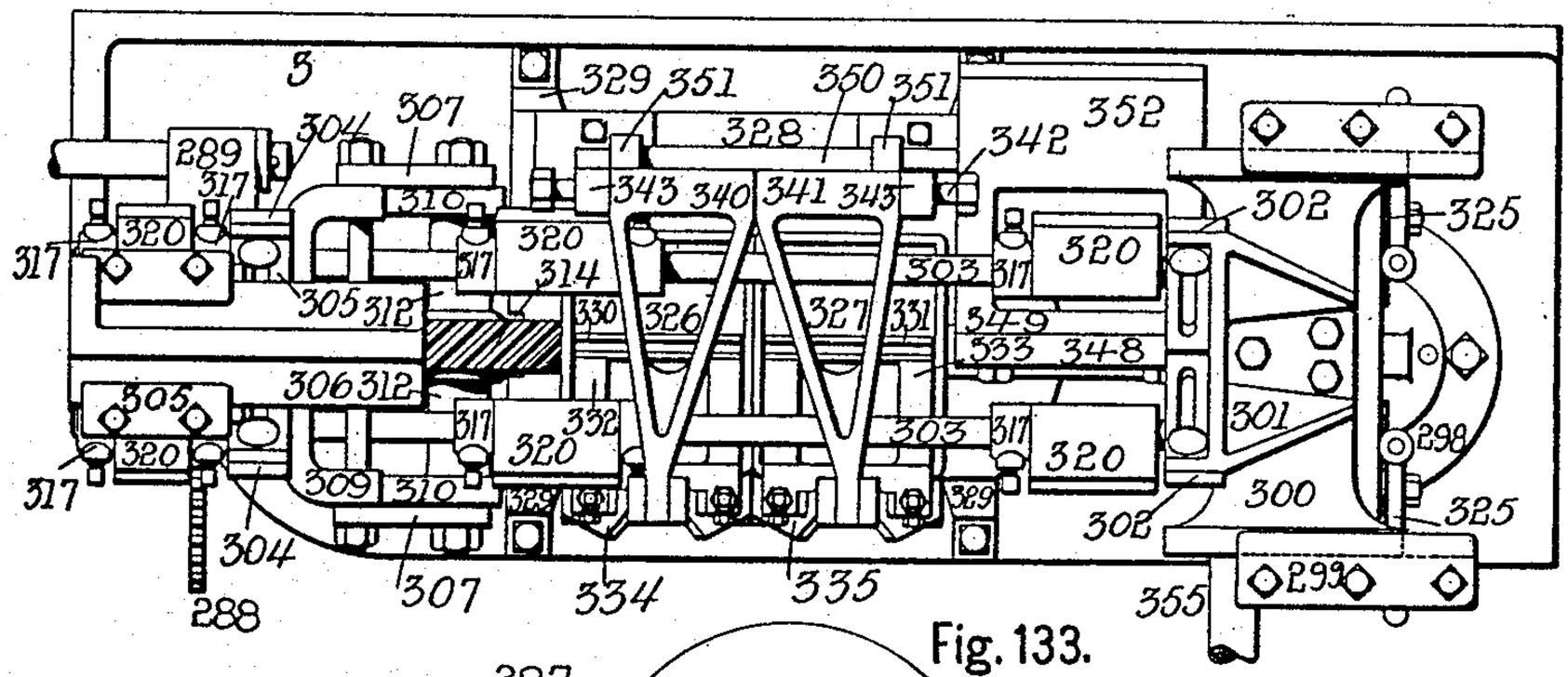
APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 21.

Fig. 131.



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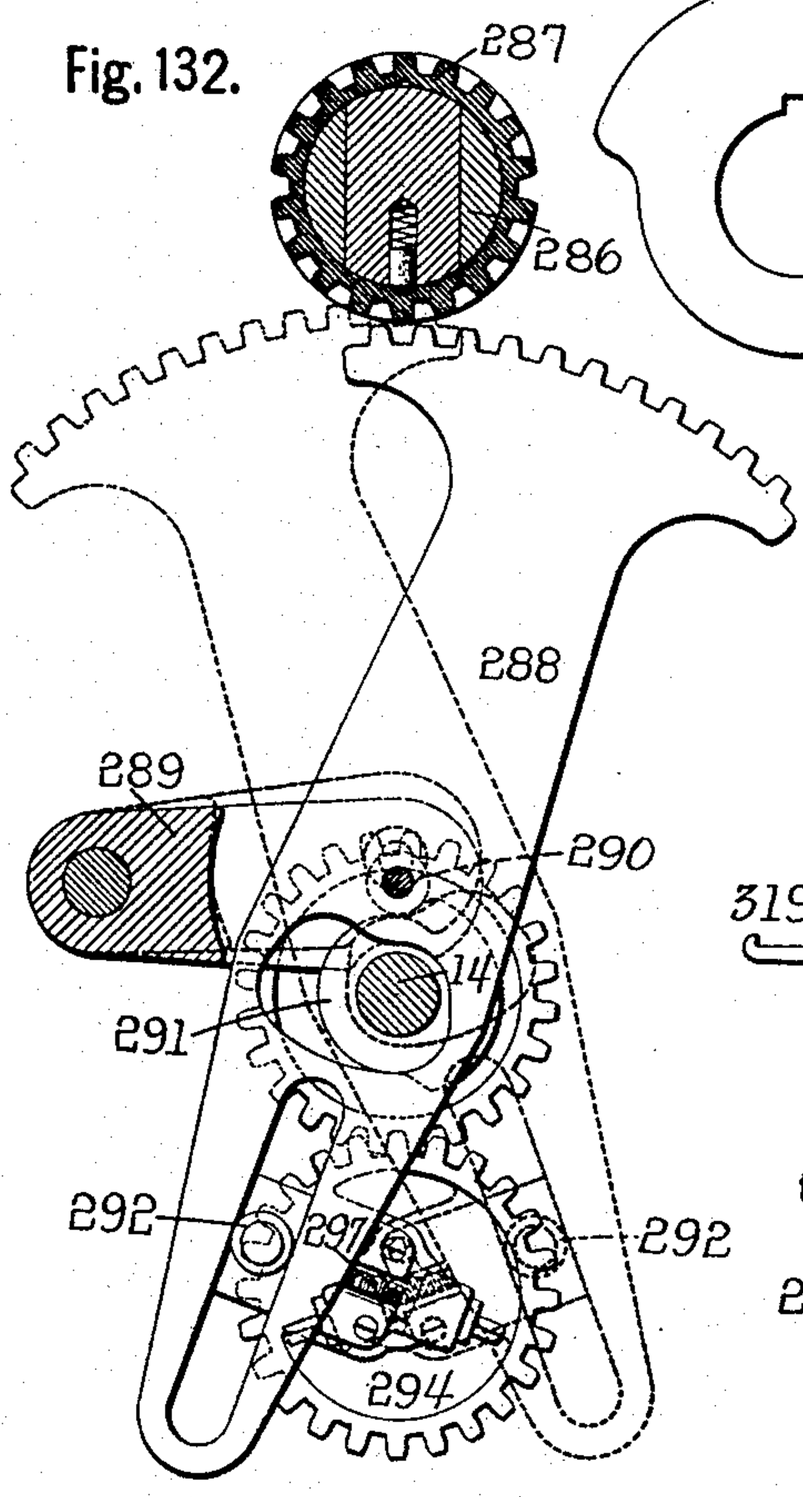

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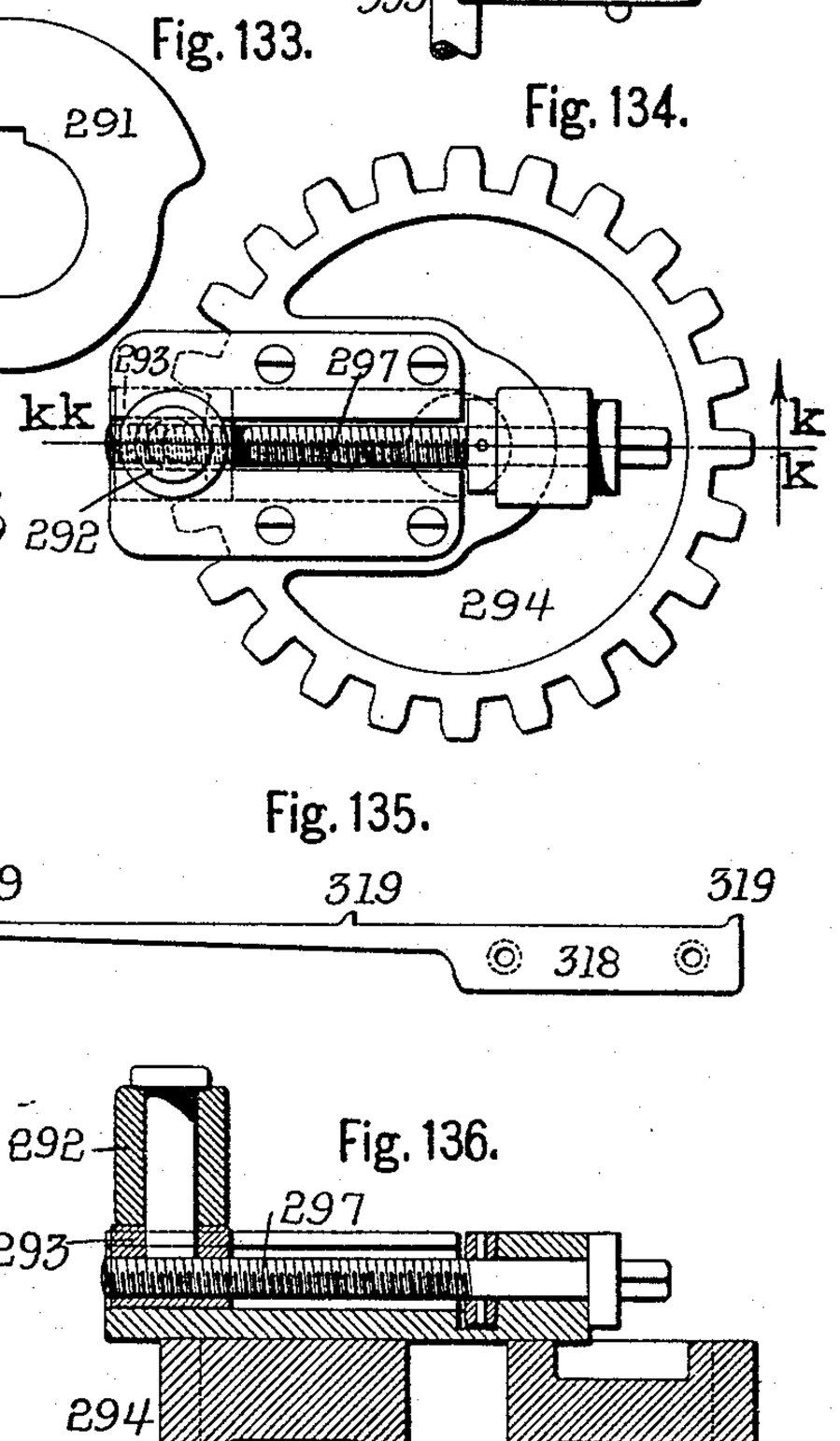

Fig. 134.

Fig. 135.

Fig. 136.

Witnesses.

L. M. Langston.

Geo. A. Neubauer.

Inventor.

Fred J. Ramsey.

By A. J. Langston Attorney.

No. 887,269. PATENTED MAY 12, 1908.

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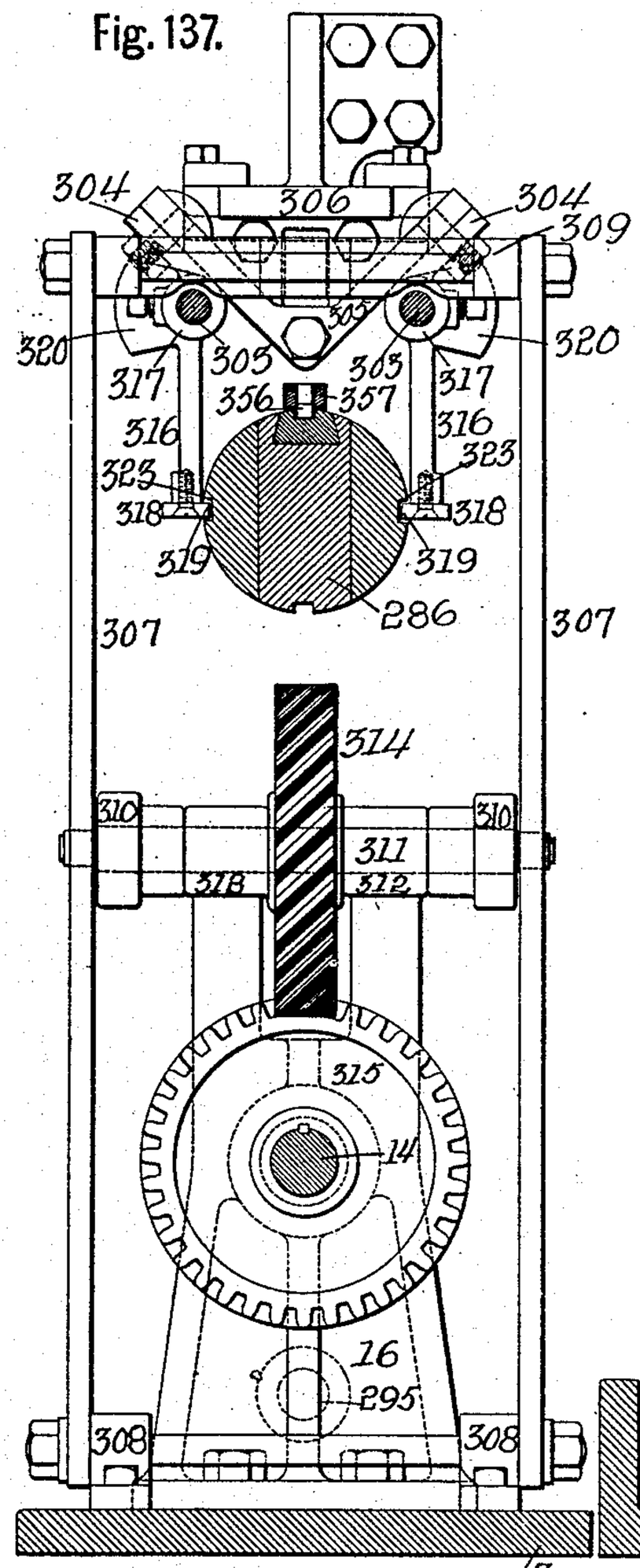
APPLICATION FILED JULY 28, 1905.

22 SHEETS—SHEET 22.

Fig. 137.



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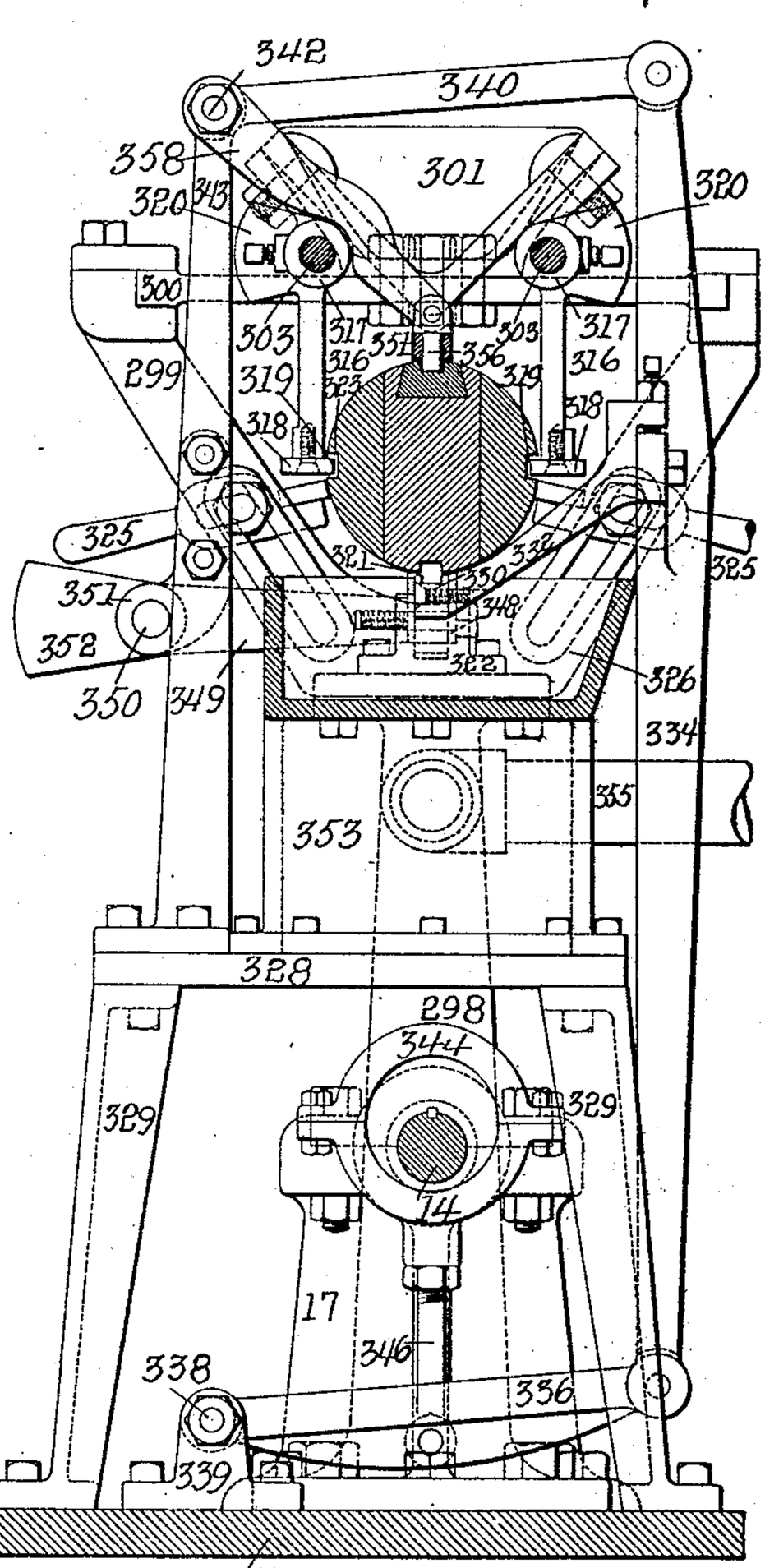


Fig. 139.

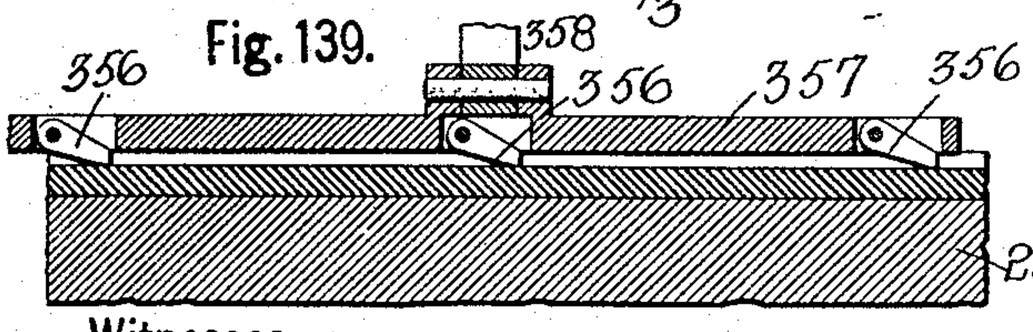
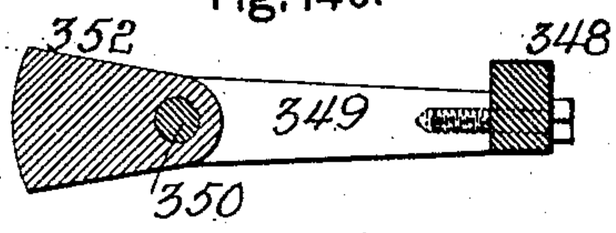


Fig. 140.



Witnesses.

L. M. Langster.

Geo. A. Neubauer.

Inventor.

Fred J. Ramsey.

By A. J. Langster Attorney.

UNITED STATES PATENT OFFICE.

FRED J. RAMSEY, OF BUFFALO, NEW YORK.

CAN-FORMING MACHINE.

No. 887,269. Specification of Letters Patent. Patented May 12, 1908.

Application filed July 28, 1905. Serial No. 271,633.

To all whom it may concern:

Be it known that I, FRED J. RAMSEY, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a certain new and useful Improvement in Can-Forming Machines, of which the following is a specification.

This invention relates to an automatic machine for making cans or other receptacles.

The object of the invention is to produce a machine entirely automatic in operation and of fairly simple and strong construction and maximum capacity.

In this machine the blank is automatically fed step by step from one operating mechanism to another in proper order from the initiatory operation to the final completion of the article.

The invention also relates to certain details of construction, all of which will be fully and clearly hereinafter described and claimed reference being had to the accompanying drawings in which a preferred adaptation of the machine is illustrated.

Figure 1 is a front elevation of the machine, the greater portion of the soldering mechanism being omitted. Fig. 2 is an end elevation of the machine looking in the direction of the arrow V, Fig. 1; Fig. 3 is a top plan view of the machine, the greater portion of the soldering mechanism being omitted. Fig. 4 is a central longitudinal section through the machine on line *a a*, Fig. 3. Fig. 5 is a horizontal section through the machine on line *b b*, Fig. 4, the levers for operating the horizontal feeding mechanism being omitted. Fig. 6 is an enlarged detached central section through the large bevel gear wheel, showing the method of securing the rollers thereto. Fig. 7 is a vertical transverse section through the vertical and revolving feeding mechanisms on line *c c*, Fig. 4, the revolving feeding mechanism being shown in its lower position about to pick up a sheet of tin. Fig. 8 is a view similar to Fig. 7, the revolving feeding mechanism being shown in its upper position after it has picked up a sheet of tin. Fig. 9 is an enlarged top plan view of a fragment of the revolving feeding mechanism. Fig. 10 is a section on line *d d*, Fig. 9. Fig. 11 is a section on line *e e*, Fig. 9. Fig. 12 is an enlarged central vertical section through one of the pneumatic lifting devices for lifting the sheet of tin, showing the device in its normal position. Fig. 13 is a view similar to Fig. 12, showing the device in the position it assumes when lifting or supporting a sheet of tin. Fig. 14 is an enlarged central vertical section on line *f f*, Fig. 16, through the device for operating the valves of the pneumatic lifting devices. Fig. 15 is an enlarged end elevation of said device, a cross section being shown through its supporting bar. Figs. 16, 17, 18, 19, 20, 21 and 22 are enlarged detached inner views of the device on the front side of the machine for operating the valves of the pneumatic lifting devices, showing said device in the different positions it assumes when the revolving feeding mechanism is feeding from the front or right hand vertical feeding mechanism. Figs. 23, 24, 25, 26, 27 and 28 are similar views of the device on the rear side of the machine, showing said device in the different positions it assumes when the revolving feeding mechanism is feeding from the front or right hand vertical feeding mechanism. Fig. 29 is a detached top plan view of the slotted disk cam. Fig. 30 is an enlarged detached top plan view of the cam which is fastened to the hub of the large bevel gear wheel. Fig. 31 is an enlarged fragmentary plan view of the base of the machine showing a plan view of the vertical feeding mechanism and the mechanism for operating the same, a section being cut on line *g g*, Fig. 35. Fig. 32 is an enlarged detached side view of one of the clutch disks of the feed operating mechanism. Figs. 33 and 34 are enlarged detached central vertical sections through the clutch disks of the feed operating mechanism. Fig. 35 is an enlarged detached end elevation of the vertical feeding mechanism and the mechanism for operating the same. Fig. 36 is a section on line *h h*, Fig. 31. Fig. 37 is an enlarged cross section through the main shaft and through the group of rock shafts, showing one of the clutch disks on the main shaft and the arm on one of the rock shafts for operating one of the clutch pins carried by the clutch disk; said arm being in position to release the clutch pin. Fig. 38 is a view similar to Fig. 37 showing the arm in position to withdraw the clutch pin. Fig. 39 is a view similar to Fig. 37 showing another arm on a different rock shaft in position to release the other clutch pin carried by the clutch disk. Fig. 40 is a view similar to Fig. 39 showing the arm in position to withdraw the clutch pin. Fig. 41 is a cross section

through the group of rock shafts and through the main shaft and the sprocket on line *i i*, Fig. 31, showing the arm on one of the rock shafts for operating the clutch pin carried by said sprocket, the arm being shown in its disengaged position as when the sprocket clutch pin is engaged with the bevel gear. Fig. 42 is a view similar to Fig. 41, showing the arm in normal position, that is in position to withdraw the clutch pin from the bevel gear. Fig. 43 is an enlarged detached side view of the left hand clutch sleeve on the main shaft. Fig. 44 is a face view of the same. Fig. 45 is a face view of the right hand clutch sleeve on the main shaft. Fig. 46 is a side view of the same. Fig. 47 is an enlarged detached side view of the right hand sprocket and clutch sleeve on the main shaft. Fig. 48 is a face view of the same. Fig. 49 is a central section through the same on line *k k*, Fig. 48. Fig. 50 is a detached face view of one of the bevel gears carried by the clutch sleeves. Fig. 51 is an enlarged fragmentary view of one of the sprockets carried by the clutch sleeves, showing the clutch pin carried by said sprocket. Fig. 52 is a section on line *m m*, Fig. 51, showing the clutch pin and the means for forcing the clutch pin into engagement with the shoulder on the bevel gear wheel. Figs. 53, 54, 55, 56, 57 and 58, are enlarged detached side views of the arms carried by the rock shafts for operating the clutch pins. Fig. 59 is a section on line *n n*, Fig. 53. Fig. 60 is a section on line *o o*, Fig. 54. Fig. 61 is a section on line *p p*, Fig. 55. Fig. 62 is a section on line *q q*, Fig. 56. Fig. 63 is a section on line *r r*, Fig. 57. Fig. 64 is a section on line *s s*, Fig. 58. Fig. 65 is an enlarged detached side elevation of the front horizontal feeding mechanism, a section being cut through the bracket to more clearly disclose the construction. Fig. 66 is an enlarged transverse section through one of the brackets on line *t t*, Fig. 65. Fig. 67 is an enlarged transverse section through one of the brackets on line *u u*, Fig. 65. Figs. 68 and 69 are enlarged detached fragmentary views of portions of the horizontal feeding mechanism. Fig. 70 is an enlarged fragmentary section through one of the brackets of the horizontal feeding mechanism on line *v v*, Fig. 65. Fig. 71 is an enlarged detached end view of the device located at the rear of the machine for operating the clutch mounted upon the rear worm shaft, looking in the direction of the arrow W, Fig. 31. Fig. 72 is a similar view of the device located at the front of the machine looking in the direction of the arrow X, Fig. 31. Fig. 73 is a central longitudinal section on line *w w*, Fig. 74. Fig. 74 is a central vertical section through the friction clutch for operating the ratchet device on the clutch operating device. Fig. 75 is an enlarged central vertical section through one of the blocks for supporting the lower ends of the vertical sliding rods. Fig. 76 is a vertical transverse section through the machine on line *x x*, Fig. 4, showing the edger mechanism and the mechanism for driving the machine. Fig. 77 is an enlarged detached side view of the clutch which forms a connection between the driving shaft and the edger shaft, showing the clutch in disengaged or open position. Fig. 78 is a section on line *y y*, Fig. 77, showing the cam and lever in their normal positions, that is when the clutch is in engagement to lock the two shafts together. Fig. 79 is a section on line *z z*, Fig. 78, the clutch being shown in the position illustrated in Fig. 77. Fig. 80 is a detached view of the cam on the counter shaft. Fig. 81 is a central longitudinal section through the edger mechanism. Fig. 82 is an enlarged detached rear end view of the edger mechanism, the cover plate of the left hand edger head being removed and a section being cut through the edger shaft. Fig. 83 is an enlarged detached top plan view of the pivoted block of the left hand edger head which carries one of the dies. Fig. 84 is an enlarged fragmentary central vertical section through the right hand edger head. Fig. 85 is an enlarged detached top plan view of the inner slide on the left hand edger head. Fig. 86 is an enlarged transverse section through the edger head on line *aa aa*, Fig. 81. Fig. 87 is an enlarged detached side elevation of the inner slide on the left hand edger head illustrated in Fig. 85. Figs. 88, 89 and 90 represent an enlarged fragmentary central vertical section through the edger mechanism, showing the method of gaging and forming the flanges on the blank sheet. Fig. 91 is an enlarged edge view of a blank after it has passed through the edger mechanism showing the flanges formed thereon. Figs. 92 and 93 are opposite face views of the disk cam on the left hand edger head. Fig. 94 is a section on line *bb bb*, Fig. 92. Figs. 95 and 96 are opposite face views of the disk cam on the right hand edger head. Fig. 97 is a section on line *cc cc*, Fig. 95. Fig. 98 is a detached side view of the barrel cam on the left hand edger head. Fig. 99 is a detached side view of the barrel cam on the right hand edger head. Figs. 100 and 101 are enlarged detached side views of the two dies on the left hand edger head. Figs. 102, 103 and 104 are enlarged detached side views of three dies on the right hand edger head. Fig. 105 is an enlarged detached side view of the gage block on the left hand edger head. Fig. 106 is a central vertical section through the machine on line *dd dd* Fig. 1, the soldering mechanism being omitted. Fig. 107 is an enlarged detached edge view of the cam which operates the cam for expanding the horn. Fig. 108 is an enlarged detached inner view of one of the brackets secured to the edger

heads and which support the gaging devices also showing an inner view of the gaging devices. Fig. 109 is a top plan view of the same. Fig. 110 is an enlarged detached inner view of the right hand gaging device. Fig. 111 is an enlarged transverse section on line *ee ee* Fig. 108. Fig. 112 is an enlarged detached inner view of the left hand gaging device. Fig. 113 is an enlarged end view of one of the brackets showing the right hand gaging device. Fig. 114 is an enlarged cross section on line *ff ff*, Fig. 1. Figs. 115, 116 and 117 represent an enlarged fragmentary central vertical section through the can forming mechanism showing the method of forming the can and clenching the seam. Fig. 118 is an enlarged fragmentary edge view of the blank formed into a cylindrical body with the flanged edges interlocked. Fig. 119 is a view similar to Fig. 117, showing the seam in its completed form. Fig. 120 is an enlarged cross section through the cam for expanding the horn. Fig. 121 is a detached edge view of one of the toothed rock arms. Fig. 122 is a detached end view of one of the toothed rock arms. Fig. 123 is an enlarged detached edge view of one of the forked cranks. Fig. 124 is a detached edge view of one of the cams for operating the slide which carries the formers. Fig. 125 is an enlarged fragmentary view of the frame of the machine showing the mechanism for operating the toothed rock arms. Fig. 126 is a front elevation of the soldering mechanism showing a portion of the main frame. Fig. 127 is an enlarged detached side view of the soldering iron. Fig. 128 is an enlarged detached central section through one of the V shaped portions of the slides and the brackets for carrying the parallel rods. Fig. 129 is an enlarged cross section on line *gg gg*, Fig. 126. Fig. 130 is an enlarged cross section on line *hh hh* Fig. 126. Fig. 131 is a plan view of the soldering mechanism. Fig. 132 is an enlarged section on line *ii ii* Fig. 1, showing the device for turning the can. Fig. 133 is an enlarged detached view of the cam for lifting the toothed crank arm. Fig. 134 is an enlarged detached side view of the gear carrying the adjustable crank. Fig. 135 is an enlarged detached top plan view of one of the feed bars. Fig. 136 is a section on line *kk kk* Fig. 134. Fig. 137 is an enlarged vertical transverse section on line *mm mm* Fig. 126 looking in the direction of the arrow Y. Fig. 138 is an enlarged vertical transverse section on line *nn nn* Fig. 126 looking in the direction opposite to the arrow Y. Fig. 139 is an enlarged fragmentary longitudinal section through the horn, showing the dogs for preventing the return movement of the can bodies. Fig. 140 is a detached cross section through the sweating iron.

In the following description the several mechanisms which make up the machine as a whole will first be described in detail in the order in which they operate upon the can blank, and at the end of the description of each mechanism a thorough account of the operation of that particular mechanism and of its particular function with respect to the can blank will be given. In this way the forming of a can will be followed through from the time when the blank is picked off of the vertical feeder whence it is carried to the edger mechanism where the flanges are formed upon the edges of the blank. From thence the route of the blank will be followed to the forming mechanism where the blank is formed into the desired cylindrical shape and the seam formed and clenched and so on through the can turning mechanism; and the soldering and sweating mechanisms to the end where the can body leaves the machine formed, seamed and soldered.

In describing the various mechanisms and portions of the machine, reference will be had to the accompanying drawings and attention will be repeatedly called to the particular figures in which the parts then being described are best illustrated.

In referring to the drawings in detail, like numerals designate like parts.

The machine frame.—The frame of the machine consists of a main base 1, upon which the feeding mechanism is mounted; an upright hollow frame 2, in which the forming mechanism is supported, and a supplementary base 3, which is bolted to one side of the upright hollow frame 2, and upon which the soldering mechanism is mounted, see Figs. 1, 2, 3, 4, 5, 76, 106 and 126.

A transversely extending main driving shaft 4, is mounted in bearings 5, extending from one side of the upright hollow frame 2, and has a set of pulleys 6 and 7, secured to its projecting rear end. A spur gear wheel 8, is secured to the driving shaft near its other end and meshes with a similar spur gear 9, which is secured to a short transverse counter shaft 10. This counter shaft is journaled in bearings 11, projecting from the side of the upright hollow frame 2, see Figs. 2, 3, 5 and 76.

The counter shaft has a bevel gear wheel 12, mounted upon one end which meshes with a similar bevel gear 13, secured about midway of a long longitudinally extending main shaft 14. This main shaft is journaled in bearings 15, 16 and 17, secured to the base 1, and the supplementary base 3, and is additionally supported by bearings in the upright hollow frame 2, see Fig. 4.

Practically all of the mechanisms of the machine are driven from the main shaft with the exception of the seam clenching mechanism to be hereinafter described.

The blank magazines and vertical feeding mechanism therefor.—The vertical feeding mechanism is illustrated in Figs. 1 to 5 inclu-

sive, and in Figs. 31 to 64 inclusive, to which figures reference will be had in the following description.

The blank magazines and vertical feeding mechanism therefor primarily consist of a plurality of vertical screw bars which are rotated by worm wheels actuated by worms; said bars carrying supports upon which the blanks are stacked in a vertical pile. As the screw bars rotate they gradually elevate the supports and thus feed the blanks.

In the preferred form of feeder illustrated in the drawings, two magazines and sets of vertical feeding mechanisms are employed, being placed opposite each other and upon each side of the main shaft, see Figs. 2, 31 and 35, and means are provided for automatically changing from an empty magazine to a loaded magazine. As both of these sets are practically duplicates of each other but one set will be described, the reference numerals however being applied to like parts on both sets, except in such instances when it is deemed necessary to indicate like parts on both sets by different numerals to better disclose the function or the operation of said parts.

Two vertically extending screw bars 18, have their lower ends journaled in bearings formed in the base 1, and their upper ends journaled in bearings formed in angular brackets 19. These angular brackets are secured by bolts to a diagonally extending supporting plate which is in turn fastened to a vertical standard as will be more fully described further on.

The screw bars 18, are rotated by worm wheels 20, which are secured to the lower ends of the screw bars, and said worm wheels are rotated by worms 21, secured to a comparatively short longitudinally extending shaft 22. This shaft is journaled in bearings 23, which are fastened to the base 1, and said base is gouged out at the proper places to provide room for the operation of the worms and worm wheels, see Figs. 5, 31 and 35.

The shaft 22, is rotated in one direction to feed the blanks by a sprocket chain 24, which runs over a sprocket 25, fastened to the shaft, and over a sprocket 26, on the main shaft 14. This sprocket is formed integral with a sleeve 27, see Figs. 47, 48 and 49, which runs loosely on the main shaft and forms one member of an automatic clutch device whereby said sleeve 27, is automatically locked to the main shaft at the proper time to drive the shaft 22. This clutch is automatically operated by the upward and downward movement of the support for the blanks. This support consists of two nuts or interiorly screw threaded rectangular blocks 28, one of which is mounted upon and engages with the screw thread on each screw bar 18; and of a horizontally extending connecting bar 29, which has its ends forked as shown in Fig. 31. The forked ends of the connecting bar straddle the nuts 28, and are supported by lateral flanges on said nuts, see Fig. 35. A plurality of triangular shaped blocks 30, have depressions formed therein and straddle the connecting bar so that the longest edge of the block is uppermost. These blocks 30, preferably three in number, are spaced equally upon the bar 29, and support the tin blanks 31, which are stacked thereon in a vertical pile, see Figs. 1, 2, 7, 8 and 35.

In the following description of the automatic clutch mechanism and the automatic feed changing mechanism for changing the feed from an empty to a loaded magazine, reference will be had to the right hand set of feeding mechanism marked A, in Figs. 31 and 35.

Two vertical brackets 32, are fastened to the base 1, between the main shaft 14, and the screw bars 18, and have bearings formed in their upper ends in which three longitudinally extending rock shafts indicated by the numerals 33, 34 and 35, are journaled. The lowest shaft 33, is connected by a rock arm 36, to a vertically sliding rod 37, which has its lower end supported in a block 38, bolted to the base 1, and its upper end slidably supported in the angular bracket 19. The outer end of the rock arm is forked and straddles the sliding rod at an intermediate point, being pivoted thereto by a pin, see Fig. 35.

The block 38, is formed as shown in Fig. 75, and has a horizontal opening in which a pin 39 is seated, having a conical point adapted to seat in one of two conical depressions in the rod 37, a spring 40, maintains the pin in its seat, said spring being held in place by a screw 41, which closes the outer end of the horizontal opening. The pin 39, is designed to keep the sliding rod 37, in either its upper or lower position and so prevent the involuntary movement of said rod.

The sliding rod is moved to operate the rock arm 36, and thus rock the shaft 33, by a pin 42, which projects from one of the nuts 28, and engages with pins 43 and 44, projecting from near the upper and lower extremities of the sliding rod 37.

The driving clutch for rotating the shaft 22, is illustrated in Figs. 31, 32, 34 and 36, and consists of a disk 45, rigidly secured to the main shaft 14, which disk contains a pin 46, adapted to engage with one of a series of projections on the sleeve 27. This pin is of a peculiar formation and is released by a latch which in turn is operated by the rocking of the shaft 33. The pin 46, is rectangular in cross section and slides in a rectangular opening in the disk 45. The projecting end of the pin is partially cut away and a latch 47, is adapted to engage with the cut away portion of the pin. The latch is piv-

oted on a short rod 48, passing through the disk and is in turn operated by a transverse pin 49, which is operated by an arm 50, secured to the upper rock shaft 35. This arm 50, is formed as shown in Figs. 31, 37, 38, 53 and 59, the inner end being wedge shaped in longitudinal direction and having the side nearest the clutch disk 45, beveled or inclined toward the center, in cross section, thus forming two inclined surfaces 51, 52, see Fig. 59.

Referring to Fig. 37, where the arm is shown in position to release the latch 47, it will be seen that the pin 49, has a projection 53, on the end nearest the arm, and that said projection has a slight triangular cut or bevel on one of its vertical edges. As the clutch disk revolves the projection 53, on the pin 49, strikes the inclined surface 51, on the arm 50, and owing to the wedge shape of said arm, is forced back into the clutch disk. This moves the latch on its pivot and releases the pin 46, which is forced out by a spring 54, concealed in said pin, see Fig. 34. The end of the pin 46, engages with one of a series of projections on the face of the sleeve 27, and causes said sleeve to revolve, thereby operating the shaft 22.

The three rock shafts 33, 34 and 35, are operated simultaneously by the rock arm 36, said rock arm having a vertical projection which engages with a rock arm 55, on the rock shaft 34. This rock arm 55, also has a vertical projection which engages with a rock arm 56, on the rock shaft 35, see Fig. 35. By referring to said figure it will be seen that an upward movement of the arm 37, will cause an upward movement of the arms 55 and 56, and thus simultaneously rock all shafts 33, 34 and 35.

The shaft 22, is driven in a reverse direction by a sprocket chain 57, which runs over a sprocket 58, formed on a clutch member 59, loosely mounted on the shaft 22; and over a sprocket 60, loosely mounted on a sleeve 61, which is in turn loosely mounted on the main shaft 14, adjacent to the disk 45. This sleeve 61, has a bevel gear wheel 62, secured thereon by a key. This bevel gear wheel meshes with a large bevel gear wheel 63, which is mounted on a short vertical shaft 64, supported in bearings vertically above the main shaft 14, see Figs. 4 and 5.

The disk 45, has another clutch pin 65, which is released by a latch 66, similar to the clutch pin 46, and which is placed oppositely thereto, the cut away portion of the pin facing toward the sleeve 61. This sleeve has a projection 67, see Figs. 45 and 46, with which the pin is adapted to engage to rotate the sleeve.

The latch 66, is operated by a pin 68, which corresponds to the pin 49, of the clutch device before described, and which in turn is operated by an arm 69, secured to the rock shaft 34, see Figs. 39 and 40. This arm is substantially a duplicate of the arm 50, and has a wedge shaped inner end, which has two inclined surfaces 70 and 71, in cross section.

Referring to Fig. 39, where the arm is shown in position to release the latch 66, it will be seen that the pin 68, has a projection 72, on the end nearest the arm 69, which has a triangular cut on one of its vertical edges. As the clutch disk 45, revolves the projection on the pin 68, strikes the inclined surface 70, of the inner wedge shaped end of the arm 69, and is forced into said clutch disk, thereby moving the latch 66, on its pivot and releasing the pin 65, which is forced into engagement with the projection 67, on the sleeve 61, by a spring 73. The sprocket 60, also has a pin 74, which engages with one of a series of shoulders 75, formed in the bevel gear wheel 62, see Fig. 50, and by means of which said sprocket is rotated at the proper time to rotate the shaft 22, and lower the support for the blanks.

The clutch on the shaft 22, is of a peculiar construction, and comprises the movable member 59, which carries the sprocket and a stationary member 76, which is fastened to the shaft by a pin. Both members are provided with projecting shoulders which are adapted to engage with each other when the movable member is being rotated in one direction, and to become disengaged when the movable member is rotated in the opposite direction.

The movable member 59, has a spiral gear 77, formed integral therewith, which spiral gear meshes with a similar spiral gear 78, formed integral with a sleeve 79. This sleeve is loosely mounted on a short horizontal pin which is supported in a bracket 80. A ratchet 81, is formed at the other end of the sleeve 79, and a pawl 82, is adapted to be brought into engagement with the ratchet by a friction clutch 83, which engages with the sleeve 79, when said sleeve begins to rotate in one direction. As the ratchet and pawl prevent the rotation of the sleeve in one direction, the sliding action of the spiral gears 77 and 78, draws the movable member 59, of the clutch out of engagement with the stationary member 76, and permits the rotation of the shaft 22, in the opposite direction, see Figs. 31, 72, 73 and 74.

The clutch pin 74, is forced into engagement with one of the shoulders 75 on the bevel gear wheel 62, by means of two springs 84, which are seated in two depressions formed in the sprocket 60, and parallel with the pin 74. Two pins 85, are seated in the ends of the depression and are connected to the pin 74, by two transverse pins 86, see Figs. 51 and 52. It will be seen that the springs acting against the pins 85, tend to force the pin 74, outwardly and into contact with the clutch shoulders on the bevel gear.

The pin 74, is withdrawn from engagement with the bevel gear, by means of an arm 87, which is fastened to the rock shaft 33, and has its inner end wedge shaped in a longitudinal direction and provided with an inclined surface 88, in cross section, see Figs. 41, 42, 55 and 61, where this arm is clearly shown. The inner end of said arm engages with a notch 89, in the pin 74, see Fig. 52, and owing to its wedge formation withdraws said pin from engagement with the bevel wheel. Fig. 41 of the drawings shows this arm disengaged from the pin, which illustrates its position when the sprocket 60, is locked to the bevel gear 62, and is rotating the shaft 22, to lower the tin support. Fig. 42 shows this arm in engagement with the pin which illustrates its normal position, when the tin support is at rest or moving upward.

The left hand vertical feeding mechanism marked B, in Figs. 31 and 35, is constructed and operated the same way as the one just described.

Three rock shafts 90, 91 and 92, are supported in brackets similar to the brackets 32, and have rock arms 93, 94 and 95, which correspond to the rock arms 36, 55 and 56. The rock arm 93, is operated by a sliding rod 96, which is operated similarly to the sliding rod 37.

The chain 24, which drives the shaft 22, of this feed mechanism, runs over a sprocket 25, on the shaft 22, and over a sprocket 97, which is formed integral with a sleeve 98. This sleeve corresponds to the sleeve 27, and runs loosely on the shaft 14.

A clutch disk 99, is secured to the main shaft and has a clutch pin 100, which engages with one of a series of projections on the face of the sleeve 98, see Fig. 36, and so rotates the sleeve and drives the shaft 22, by means of the sprockets and chains. The shaft 22, is driven in a reverse direction in a manner similar to the other feed mechanism before described.

A sleeve 101, is loosely mounted upon the main shaft 14, adjacent to the disk 99, and a sprocket 102, is loosely mounted on said sleeve. A chain 57, connects this sprocket with a sprocket 58, formed integral with the movable member 59, of a clutch device mounted on the shaft 22. This clutch device is exactly similar to the clutch device on the other shaft 22, as before described.

The disk 99, has a clutch pin 103, which is adapted to engage with a projection 104, see Figs. 43 and 44, on the face of the sleeve 101, to rotate said sleeve; said clutch pin 103, being released by means of a latch similar to the clutch pins 46, 65 and 100.

A bevel gear wheel 105, is rigidly secured to the sleeve 101, adjacent to the sprocket 102, and said bevel gear meshes with the large bevel gear 63. The sprocket 102, has a clutch pin 106, which is adapted to engage with one of a series of shoulders formed in the bevel gear wheel 105. This clutch pin corresponds to the clutch pin 74, in the sprocket 60, see Fig. 36. The clutch pins 100, 103, and 106, are operated by rock arms 107, 108 and 109, on the rock shafts 92, 91 and 90, respectively, in the same manner as the corresponding clutch pins on the other feed mechanism. These rock arms 107, 108 and 109, are illustrated in Figs. 35, 56, 57, 58, 62, 63 and 64 and are constructed similarly to the rock arms 50, 69 and 87, respectively to which they correspond.

The operation of the magazines and their vertical feeding mechanism is as follows,— It will be seen by referring to Fig. 36, that the clutch disks 45 and 99, are rigidly secured to the main shaft 14, and therefore rotate continuously and in the same direction. The bevel gears 62 and 105, however, are secured to the sleeves 61 and 101, which are loosely mounted on the main shaft, and as both gears 62 and 105, mesh with the large bevel gear 63, see Fig. 4, said gears and sleeves rotate oppositely to each other and only at intermittent intervals of time.

Referring to Fig. 35, the various parts of the blank magazines and their vertical feeding mechanisms are shown in the position they occupy when the right hand magazine is loaded with blanks and the feed mechanism therefor, marked A, is feeding the blanks from said magazine to the revolving feeder. While this mechanism is feeding, the left hand magazine which is empty with its feed mechanism resting at its lowest position, is being reloaded with blanks. When the blanks in the right hand magazine have all been fed to the revolving feeder, the pin 42, on the nut 28, comes into contact with the pin 43, at the upper end of the sliding rod 37, and carries said rod upward, thereby rocking the rock arm 36. This rocks the shaft 33, and by means of the rock arms 55 and 56, also rocks the shafts 34 and 35. The first movement of these rock shafts causes the inclined surface 52, of the wedge shaped portion of the arm 50, on the rock shaft 35, to come into engagement with a projection 110, on one end of the clutch pin 46, said projection 110, being formed by cutting away a portion of the pin and having a triangular cut on one of its vertical edges, see Fig. 38, where the arm 50, is shown in the proper position. This forces said pin out of engagement with the projections on the sleeve 27. When the pin is disengaged from the projections the latch 47, retains said pin in its retracted position. The withdrawal of the pin 46, causes the sleeve 27, to cease its rotation and thus stops the upward movement of the feeding mechanism.

The simultaneous movement of the three rock shafts causes the inclined surface 71, of the wedge shaped portion of the arm 69, to come into engagement with a projection 111,

on one end of the clutch pin 65, said projection corresponding to the projection 110, on the pin 46. This forces the pin 65, out of engagement with the projection 67, on the sleeve 61, and releases the sleeve from the clutch disk 45, and thereby permits said sleeve and the sprocket and gear wheel which it carries to remain stationary. Simultaneously with these operations the arm 87, on the rock shaft 33, becomes disengaged from the pin 74, position shown in Fig. 41, and said pin being forced out by the springs 84, as heretofore described, engages with one of the shoulders 75, on the bevel gear wheel 62, and locks the sprocket 60, to the bevel gear. The rocking movement of the rock shaft 34, is transmitted to the rock shaft 91, by means of depending arms 112, which are connected at their lower ends by a rigid connection, preferably a bar 113, see Figs. 39 and 40. This throws the clutch disk 99, into engagement with the sleeve 101, because of the arm 108 operating the latch to release the clutch pin 103, and permitting it to engage with the projection on the face of said sleeve. As the bevel gear wheel 105, is secured to the sleeve, it rotates therewith and causes the large bevel gear 63, to rotate. It will be noted, however, that said gear 63, now rotates in the reverse direction to that in which it rotated when the bevel gear 62, acted as the drive gear, and said bevel gear 62, now also rotates in a reverse direction, or opposite to the rotation of the main shaft 14. As the sprocket 60, is locked to the bevel gear 62, by means of the clutch pin 74, and the sleeve 61, is disengaged from the clutch disk 45, and runs loosely on the main shaft, the right hand feed shaft 22, is rotated in the opposite direction to its previous rotation, and thereby reverses the rotation of the vertical screw bars, and lowers the tin support.

The rocking of the shaft 91, is transmitted to the shaft 92, by means of the arms 94 and 95, which movement throws the clutch disk 99, into engagement with the sleeve 98, by the arm 107, operating the latch to release the clutch pin 100, and thereby permitting it to engage with one of the projections on the sleeve 78. The sleeve now begins to rotate and by means of the sprockets and chain 24, rotates the left hand shaft 22, and the left hand feed mechanism feeds blanks to the revolving feed mechanism.

The rock shafts 35 and 92, are provided with depending arms 114, which are connected at their lower ends by a flexible connection, such as a coiled spring 115, which has one of its ends fastened to each of the depending arms 114, see Figs. 37 and 38. This connection permits the independent movement of each of the rock shafts, and at the same time prevents the involuntary movement of the arms 50 and 107, such as might be caused by the jar incident to the operation of the machine. The rock shafts 34 and 91, are also held against involuntary movement by a pin 116, having a conical point adapted to seat in one of two conical depressions in the bottom surface of the bar 113, said pin being carried by a block 117, and backed by a coiled spring in substantially the same manner as the pin 39, illustrated in Fig. 75.

It will be noted that the sprockets over which the chains 24, run are of the same diameter so that when the blanks are being fed, the shafts 22, rotate at the same speed as the main shaft 14. The sprockets over which the chains 57, run, however, are of different diameters, the proportion being about four to one, and the larger sprockets being mounted on the main shaft. The blank supports are therefore lowered at four times the speed at which they are elevated, so that the support on one side reaches its lowest position when the support on the other side has been elevated but one-fourth of the distance of its travel.

When the right hand support nears its lowest point, the pin 42, on the nut 28, comes into contact with the pin 44, at the lower end of the sliding rod 37, and carries said rod downward. This rocks the shaft 33, in the opposite direction to its previous movement, and disengages the clutch pin 74, from the bevel gear 62, by means of the arm 87. The sprocket 60, now remains stationary while the sleeve 61, and bevel gear 62, rotate.

All of the foregoing movements are practically simultaneous, the intervals of time between the various movements of the different parts being just sufficient to permit the parts of the mechanism to follow each other in their order so as to change the feed from one side to the other.

In general, the moment the last blank is lifted from the support then being elevated, that support immediately begins to move downward, the direction of the revolving feeding mechanism is reversed and the other feeding mechanism is thrown into operation. All the parts of the mechanism are automatically thrown into operation, the only manual operation being to replenish the feeding mechanism with blanks.

The vertical feeding mechanism is automatically regulated so that the blanks will not be elevated faster than they are removed by the revolving feeding mechanism. This is illustrated in Figs. 31 and 35. The angular brackets 19, have vertical projecting portions at their outer ends to which portions horizontal bars 118, are secured. One of these bars 118, is fitted to each pair of angular brackets, and each bar is provided with a dove-tailed groove in its bottom surface in which a block 119, is adjustably secured. This block has a lever 120, pivoted thereto and has a rounded portion near its other end

which is adapted to seat upon the surface of the top blank. A connecting link 121, connects the inner end of the lever to the outer end of a rock arm 122, which is adjustably clamped upon the upper rock shaft 35. When the blanks are elevated too fast the lever 120, is lifted and by means of the connecting link 121, and rock arm 122, rocks the shaft 35. This disengages the clutch disk 45, from the sleeve 27, precisely as though the shaft were rocked by the rock arm 56, as heretofore described, and stops the vertical feeding of the blanks. When the revolving feeding mechanism has removed a sufficient number of blanks the lever 120, drops and permits the shaft 35, to regain its former position and again start the vertical feed. A similar device is attached to the other vertical feeding mechanism, the rock arm 122, being secured to the rock shaft 92.

The revolving feeding mechanism.—The revolving feeding mechanism is illustrated in Figs. 1 to 30, inclusive, and in Fig. 35. This feeding mechanism comprises a plurality of lifting devices which are supported at the ends of radial arms which are joined to a common center or hub. This mechanism not only revolves, but has an up and down movement, said movement being given by a cam mounted in the main shaft 14. As the blanks are fed upward by the vertical feed mechanism, they are picked up one by one and deposited upon a horizontal feeding mechanism which carries them to the edger mechanism. The revolving feeding mechanism is given an intermittent movement by a cam disk which is operated by the large bevel gear 63.

In the preferred form of revolving feeder as illustrated in the accompanying drawings, a comparatively long hollow hub 123, is vertically supported in a bearing 124, which is formed integral with a standard or bracket. This bracket is composed of two vertical leg portions 125, which are connected at their upper ends by a horizontal plate 126, in which the bearing 124 is formed. This horizontal plate 126, has a lateral projection 127, on its inner edge, the end of which constitutes a bearing for the upper end of the short vertical shaft 64. A bracket or standard 128, has a bearing formed in its upper extremity in which the lower end of the shaft 64, is journaled, said bracket being formed so as to straddle the main shaft 14, and the sleeve 98. The large bevel gear 63, has two vertically extending pins which are placed oppositely from each other and which carry rollers 129. These rollers are adapted to engage with a plurality of radial slots 130, in a disk cam 131, and to intermitently rotate said disk cam. This disk is secured to the bottom of the hub 123, by a bolt, as shown in Fig. 4, and said bolt also acts as a fastening means to secure both the hub 123, and the disk 131, to a vertical slide 132. These three parts are so fastened that the disk cam is capable of imparting a rotary motion to the hub 123, but does not affect the slide in any way. This slide is supported in vertical slideways in the legs 125, of the bracket, and said slide is provided with a roller 133, which is adapted to work on the face of a cam 134. The cam 134 is rigidly secured by a key to the main shaft 14, vertically beneath the slide 132, see Figs. 2, 4, 7, 8, and 35. This cam imparts an up and down movement to the hub 123, said hub sliding in its bearing 124. The automatic lifting devices are supported at the outer ends of a series of radial arms 135, which radiate from the hub 123. These arms are preferably four in number and as the arms and lifting devices are exactly similar in construction and operation, a description of one will be sufficient for all, the reference numerals being applied to like parts on the four sets. In the following description reference is particularly called to Figs. 7 to 13, inclusive.

A flat plate 136, is formed integrally with the outer end of each arm 135, and each plate carries a plurality of pneumatic lifters which are formed as shown in Figs. 12 and 13. These are each composed of two members which are connected by a diaphragm 137, of flexible material, preferably rubber. The upper member 138, has a cone shape bottom surface and a hollow vertical stem 139, which passes through an opening in the plate 136, and is secured thereto by a lock nut screwed upon the stem. The lower member 140, has a cone shaped depression 141, in which the cone shaped bottom surface of the upper member is adapted to seat, the diaphragm 137, being interposed between the upper and lower members as shown in Fig. 12, and it also has a vertical tube 142, adapted to slide in the hollow stem 139. A coiled spring 143, is contained in the stem 139, and has its ends seated against shoulders formed in said stem and in the tube 142.

The lower member also has a heavy rubber ring 144, secured to its lower end, said ring projecting below the bottom surface of said lower member. The tube 142, is provided with passages 145, and a passage 146, extends vertically through the lower member from its bottom surface to the cone shaped depression 141. A rubber ring 147 is also fitted around the upper end of the hollow stem 139, and projects slightly above it. Six of these automatic pneumatic lifters are preferably attached to each plate 136, being placed as shown in dotted lines in Fig. 9.

A square shaped frame 148, is supported upon the arms 135, being secured thereto by screws, see Fig. 11. Each side of the frame 148, has a pair of vertical projections 149, in

which a shaft 150, is journaled. Each shaft 150, acts as a support for a swinging U shaped frame 151, which has the extremities of its shorter end portions enlarged and provided with openings through which the shaft passes. A plurality of swinging arms 152, are loosely mounted upon the shafts 150, and have their outer ends supported upon the upper extremities of the hollow stems 139, of the pneumatic lifters, see Fig. 11.

The outer portion of the U shaped frame has a pin 153, extending from about its middle, said pin being adapted to strike against a swinging arm 154, mounted upon the horizontal bar 118, when the feeder is revolving in one direction and thus lift the frame 151. The lifting of this frame lifts the arms 152, from off the hollow stems and admits the air to said stem thereby preventing the pneumatic lifters from picking up a blank from the vertical feeder which has been replenished but has not yet been thrown into operation.

The operation of the pin 153 and the swinging arm 154, is clearly illustrated in Figs. 14 to 28, inclusive, which views are taken as though looking from the center of the revolving feed wheel, and to which reference will be had in the following description. The arm 154, is pivoted to a block 155, which is bolted to the top surface of the bar 118, said block having an extension at one side which forms a shoulder, the purpose of which will be described further on. The arm 154, is weighted by a depending arm 156, formed integral with the arm 154, and depending on the outer side of the bar 118, see Fig. 14. A horizontal bar 157, is supported parrallel to the bar 118, and at some distance above it, being supported by vertical legs 158, bolted to the bar 118. This bar 157, is considerably shorter than the bar 118, as will be noted by reference to Fig. 1, where it will also be seen that the swinging arm is placed at one side of the center of the bar 118, and that side being nearest the upright frame member 2. As the revolving feed wheel comes to a stop at the end of a one-quarter revolution the pin 153, of one set of pneumatic lifters will be in the position shown in Fig. 16. The wheel is now lowered by the cam 134, to the position shown in Fig. 7, and the pin, not meeting with any opposition assumes the position shown in Fig. 17. As the pneumatic lifters come into contact with the topmost sheet of tin the air is forced from within said lifters and the tin held in place, the swinging arms 152, seated upon the rubber ring 147, on the upper end of each stem 139, prevent the admission of any air to the interior of said lifters. The revolving feed wheel is now lifted by the cam 134, carrying a sheet of tin therewith, as shown in Fig. 8. The pin 153 now resumes its former position as shown in Fig. 18, and the wheel begins another quarter revolution.

Following the direction of the arrow in Fig. 19, the pin 153, strikes the swinging arm 154, and slides along said arm until it assumes the position shown in Fig. 20. The upward movement of the pin is now barred by the horizontal bar 157, and the swinging arm 154, is turned still further on its pivot until the pin reaches the position shown in Fig. 21, when the arm 154 is released therefrom and returns to its normal vertical position, the pin 153, meanwhile assuming the position shown in Fig. 22, and continuing its course as indicated by the arrow in said Fig. 22.

It will be seen by referring to Figs. 8, 20 and 21, that after a sheet of tin has been lifted by the pneumatic lifters, the pin 153, cannot be elevated high enough to cause the U shaped frame 151, to lift the swinging arms 52, from off the hollow stems 139, and so release the tin, owing to the horizontal bar 157, which limits the upward movement of said pin. It will also be noticed by referring to Fig. 22, that the pin becomes disengaged from the swinging arm 154, before passing from under the horizontal bar 157. While this operation has been taking place, the pin 153, on the set of pneumatic lifters directly opposite that above described has been passing over a somewhat different path. This operation is clearly illustrated in Figs. 23 to 28 inclusive. In this case, should the opposite vertical feeder have been replenished, the valves of the pneumatic lifters are opened to admit air and thus prevent the lifting of a sheet of tin. Owing to the fact that the swinging arm 154, is placed to one side of the center, the pin 153, strikes said arm before the revolving wheel comes to a standstill, see Fig. 23. The pin, after striking the arm 154, takes the course indicated by the arrow in Fig. 24, and when the feed wheel comes to a rest said pin is in the position shown in said figure. The feed wheel is now lowered by the cam 134, and as the weight of the levers 152, is added to the U shaped frame 151, the swinging arm 154, is forced down into the position shown in Fig. 25. At this point the shoulder on the pivot block 155, stops the movement of the swinging arm 154, and as the revolving feed wheel continues its downward movement, the pin 153, remains stationary in the position shown in Fig. 25. This downward movement of the feed wheel brings the swinging arms into contact with the U-shaped frame 151, and they are lifted from the hollow stems 139, of the pneumatic lifters, thereby admitting air and so preventing the lifting of a sheet of tin. The feed wheel is now raised by the cam 134, and resumes its rotation and the pin 153, follows the course illus-

trated in Figs. 26, 27 and 28. The disk 131, is locked in position between the intervals of its intermittent rotation by means of an enlargement 159, formed at the end of a lever 160, pivoted to a lateral projection on the horizontal plate 126. The enlargement 159, has a roller seated therein, and a cam 161, secured to the hub of the bevel gear 63, is adapted to engage with said roller and move the lever 160, so as to seat the enlargement 159, in one of a plurality of notches 162, in the periphery of the disk cam 131, see Fig. 15.

The operation of the revolving feeding mechanism is as follows: The parts of the feeding mechanism being in the position shown in Figs. 1, 2, 3, 4 and 8, the rotation of the bevel gear 63, causes the rollers 129, to engage with the radial slots 130, in the disk cam 131, and to give said disk cam, and with it the revolving feed mechanism, one-fourth of a complete revolution. When this is done, the roller disengages from the slot in the disk cam and the feeding mechanism comes to rest. Immediately the cam 134, lowers the entire feeding mechanism and the pin 153, on the U shaped frame 151, of the set of pneumatic lifters which had just previously picked up a blank, comes in contact with a flat bar 163, extending horizontally from a lateral extension on the upright portion of the main frame. This lifts the U shaped frame 151, which in turn lifts the arms 152, from off the hollow stems 139, thereby admitting air into the interior of the pneumatic lifters and depositing the blank upon the horizontal feeder. The same downward movement of the feeding mechanism brings the next following set of pneumatic lifters into contact with the top blank of the stack; the continued downward movement forcing the air out of the interior chamber of the pneumatic lifters and as the air inlets are closed by the arms 152, the blank is held to the rubber rings on the pneumatic lifters by suction. The cam 134, now elevates the entire feeding mechanism and it is given another partial rotation by the bevel gear wheel 63, and the disk cam 131. The same operation above described is now repeated and the blank deposited upon the horizontal feeders. When one stack of blanks is exhausted the rotation of the feeder is reversed by the reversing of the bevel gears 62 and 105, when the vertical feed mechanism is changed as heretofore described.

The horizontal feeding mechanism.—The horizontal feeding mechanism conveys the blank from the revolving feeding mechanism and delivers it to the edging mechanism. This mechanism is illustrated in Figs. 1, 3, 4, 65, 66, 67, 68, 69 and 70. Briefly this mechanism consists of a plurality of sliding bars supported in brackets, the bars being given a reciprocating movement by means of levers operated by cranks. In the specific form of this mechanism as illustrated in the drawings, two horizontal brackets 164, have plates formed at one end through which bolts are passed to secure the brackets to the edger heads, see Fig. 1. Each bracket has a longitudinally extending groove substantially square in cross section, and in which a pair of sliding bars are fitted. One of these bars, numbered 165, has a plurality of diagonally extending slots 166, and the other bar, numbered 167, has a plurality of laterally extending pins 168, which fit in the diagonal slots 166. The bar 165, is retained against vertical movement by a plate 169, secured to the top of the bracket and which projects over the bar, see Figs. 66, 67 and 70. Each bar 167, has a series of short vertical projections 170, see Figs. 3, 65 and 69, which come in contact with the edge of the blanks and carry them forward. The bars 167, are given a short vertical movement by the pins 168, riding in the inclined slots 166. Two conical depressions are formed in the bottom of each of the bars 165, and a pin 171, seated in the pocket 172, formed on the bottom side of each bracket 164, has a conical point adapted to seat in either one of the conical depressions, the pin being maintained in its seat by a coiled spring 173, see Figs. 65 and 67. These pins hold the bars 165, stationary until the pins 168, have reached the upper ends of the slots 166, when the pins 171, are forced down against the springs and the bars 165 and 167, carried forward together. Each bar 167, has a depending lug 174, which is connected to the upper end of a lever 175, by an adjustable connection 176. A transverse rod 177, connects the upper ends of the levers 175, and serves as a pivot by which the connections 176, are pivoted to the levers 175. The lower ends of the levers 175, are pivoted to blocks 178, bolted to the base 1, see Figs. 1, 3, 4 and 65. The other end of the connection 176, is pivoted to the depending lug 174, by a pin as shown in Fig. 65. The levers 175, are swung back and forth on their pivots by means of two cranks 179, secured to a transverse shaft 180, journaled in bearings 179^a, which are bolted to the edger frame, see Figs. 1, 4 and 65. Each crank 179, is connected to one of the levers 175, at a point about midway thereof, by a connecting link 179^b, said connecting link having its ends pivoted to the lever and to the crank, see Fig. 65. The transverse shaft 180, is driven from the countershaft 10, by intermeshing gears 181 and 182, see Fig. 65. Motion being transmitted to the transverse shaft 180, the rotation of the cranks 179, imparts a swinging movement to the levers 175. This movement causes a reciprocating movement of the bars 165 and 167, and thereby feeds the blanks to the edging mechanism. It will be seen that at the beginning of each movement toward the edging mechanism, the bars 167, will begin a

slight upward movement caused by the pins 168, operating in the inclined slots 166, in the bars 165, thereby permitting the vertical projections on the bars to contact with the edge of the blank and carry it along. At the beginning of each reverse movement, the bars 167, will be lowered so that the projection will pass beneath the blank on the return movement. A vertical strip of metal 183, is secured to each bracket and prevents any lateral or side movement of the blanks, see Figs. 66 and 67.

The edging mechanism.—The mechanism for forming the flanges upon the two edges of the blank, which interlock to form the seam when the blank is bent into its cylindrical shape and which I term the edging mechanism is illustrated in Figs. 1, 2, 3, 4, 76, and Figs. 81 to 105 inclusive. Briefly stated, this mechanism, which I term the edging mechanism, consists of two edger heads adjustably supported upon a sub frame or edger frame and carrying the necessary dies for forming the flanges upon the edge of the blank, and also the slides which support the dies. The cams for operating the slides are mounted upon a shaft which is in fact a continuation of the main driving shaft 4. The edger heads are practically duplicates of each other, the only essential difference being in the shape of the dies which form the flanges; in the construction of one of the slides and in the formation of the cams which operate the slides.

In the following description like parts on both edger heads will be indicated by like numerals, the minor differences being pointed out later on.

The edger heads are slidably supported upon a sub-frame or edger frame 184, which is supported by two brackets 185, extending laterally from the upright frame member 2. The frame of each edger head comprises a vertical inner wall 186, and two vertical side walls 187, connected at their upper ends by a triangular shaped cross piece 188. The bottom edges of the side walls are dove-tailed and fit into longitudinally extending dove-tailed grooves in the top edge of the edger frame 184, see Fig. 82. A curved cross piece 189, connects the bottom edges of the side walls 187, and serves to strengthen the construction. The shaft 190, which operates the mechanism of the edger heads, and is practically a continuation of the main driving shaft 4, is supported in a bearing 191, on the edger frame 184, and in bearings 192, in the inner walls 186, of the edger heads, see Fig. 81. The edger heads are moved toward or from each other by means of a screw bar 193, having one end journaled in a bearing 194, formed in the edger frame 184, and said screw bar 193, is provided with a right and left hand screw thread which threads engage with screw threaded openings in lugs 195, depending from the inner walls 186, of the edger heads, see Fig. 81. Inner and outer collars 196, 197, prevent any end movement of the screw bar and the outer end of the screw bar is made square in cross section over which a crank handle is fitted to rotate the screw bar when it is desired to move the edger heads. The edger heads are held in their adjusted position by hooks 198, which have their straight portions screw threaded and loosely passed through openings in the side walls of the edger heads. The inner hook ends are adapted to catch over the wall of the longitudinal groove in the top edge of the edger frame 184, and be drawn tightly against it by nuts 199, screwed upon the projecting screw threaded ends of the hooks 198, and adapted to be manipulated by hand, see Fig. 82. Each edger head has two slides 200 and 201, the slide 200, carrying a swinging block 202, which supports a die. The slides are supported in vertical slideways formed of vertical bars 203, which are triangular in cross section and are secured in place side by side on the inner surface of the side walls 187, of the edger heads by bolts 204, see Fig. 86. The swinging block 202, on the right hand edger head carries a gage block 205, and a die 206, secured in place by bolts, the gage block having elongated openings through which the bolts pass to provide for adjustment.

The swinging block 202, has two ears 207, which fit in openings in the slide 200, and said block is pivoted to the slide by a transverse pin 208. This pin passes through an elongated opening in the side wall 187, of the edger head and through the openings in the slide and in the ears 207, see Fig. 86. The slide 200, is operated by means of a roller 209, pivoted on a pin 210, passing through the lower end of the slide, said roller operating in a cam depression 211, in the face of a disk cam 212. The slide 201, carries a die 213, having an inclined upper surface 214, and a diagonal surface 215, which meets the inclined surface at its upper edge and forms a point 216, and terminates at its lower end in a curved surface 217, see Fig. 103. This die is secured to the slide by screws, see Fig. 81. The slide 201 also carries a gripping plate 218, which is slidably supported by a pin projecting from the die 213, and seating in an elongated opening in the gripping plate. The purpose of this plate is to grip the blank and rigidly hold it while the flanges are being formed on its edges. The triangular cross piece 188, carries a die 219, which is secured thereto by bolts. This die is formed as shown in Fig. 102, and has a bottom surface which is partially inclined as shown at 220, and partially curved as at 221. The curved surface 221, registers with the top surface of the gripping plate 218, between which two surfaces the blank is gripped, and the in-

clined surface 220, registers with the inclined surface 214, of the die 213, and slightly raises the extreme end of the blank. The flange is formed between the beveled surface 222, on the die 206, and the diagonal surface 215, on the die 213. The slide 201, is operated by a roller 223, pivoted to the lower end of the slide and operating in a cam depression 224, in the disk cam 212. This disk cam is rigidly secured to the projecting portion of a barrel cam 225, which is secured to the shaft 190, by a feather or key so as to be capable of a longitudinal movement on said shaft, see Fig. 81. This barrel cam has an annular cam groove in which a roller pivoted to the lower end of a depending tail piece 226, on the swinging block 202, operates; said cam giving a swinging movement to the block 202, see Fig. 82.

Referring to the left hand edger head, the swinging block 202, carries a die 227, and a gage block 228, secured thereto by bolts. The die 227, is formed as shown in Fig. 101, having a diagonal face 229, and a perpendicular face 230. The triangular cross piece 188, of the left hand edger head carries a die 231, secured thereto by bolts. This die is formed as shown in Fig. 100, and has a diagonal surface 232, which registers with the diagonal surface 229, on the die 227, and forms the flange on the left hand edger of the blank. The gripping plate on the slide 201, is dispensed with on the left hand edger head, the blank being gripped between the horizontal top surface of the slide and the horizontal bottom surface of the die 231. The roller 223, which operates the slide 201, of the lett hand edger is supported on a pin projecting from an inverted T shaped piece 233, adjustably secured by bolts to said slide, see Fig. 87. A plate 234, is bolted to the outer edge of the side walls of the edger heads and serves as a cover to partially inclose the interior mechanism, see Figs. 76, 81 and 86. The outer extremity of the shaft 190, is provided with a hand wheel 235, by means of which said shaft may be rotated to any position desired when the machine is not in operation for the purpose of cleaning, oiling or repairing any part of the edger heads.

The operation of the edging mechanism is as follows,—The gage blocks 205 and 228, having been adjusted to aline a blank of a certain length, the horizontal feeding mechanism carries a blank to the edger heads, as heretofore described, see Fig. 88. The instant the blank is in position between the gage blocks the slides 201, are raised by the cams and grip the blank as above described. The right hand slide 201, has a trifle greater movement than its corresponding left hand slide and said movement carries the die 213, upward and presses the edge of the blank between it and the die 219, thereby slightly curving the right hand edge of the blank. The slides 201, now remain stationary and the slides 200, which carry the swinging block 202, begin their operation. The slide on the right hand edger head moves downward and the extreme edge of the die 206, on the swinging block, catches the projecting edge of the blank and bends it vertically downward at right angles, see Fig. 89. Simultaneously the slide 201, on the left hand edger head moves upward and the extreme edge of the die 227, catches the projecting edge of the blank and bends it vertically upward at right angles, see Fig. 89. When both slides have reached the limit of this movement, the barrel cams 225, tilt or swing the blocks 202, inwardly on the pivot pins 208, and the vertical flanges on the edges of the blank are pressed between the diagonal surfaces of the dies 206 and 213, and the dies 227 and 231, thereby forming the diagonal flanges on the blank, see Fig. 90. The movements of the slide are now reversed and the blank fed forward while another blank takes its place and the operation is repeated.

The can forming and seam pressing or clenching mechanism.—The mechanism for forming the can into its cylindrical shape and then pressing and clenching the seam, is illustrated in Figs. 1, 2, 3, 4, 5, 76, 106, 107, 114, and Figs. 115 to 125 inclusive. This mechanism is located in the upright member 2, of the frame and comprises a forming horn supported from the frame member 2; lower slide mechanism carrying the forming mechanism, and upper slide mechanism carrying the seam clenching mechanism. The forming horn 236, is supported from a lateral extension 237, on the side of the upright frame member 2, and is made in two parts which are hinged together at their lower edges, see Figs. 106, 115, 116 and 117. The horn is cylindrical in cross section and the two parts are adapted to be spread slightly to form a true cylinder by a bar cam 238, which operates in longitudinal openings in the halves of the horn, see Figs. 115 and 116. The projecting end of the cam bar 238, has a crank 239, secured thereto which is connected by a link 240, to a crank 241, secured to the projecting end of a rock shaft 242. This shaft is journaled in bearings in the upright frame member 2, and has a rock arm 243, secured thereto which carries a roller at its end. The roller operates in a cam slot in a cam 244, secured to an inclined shaft 245, which extends through the interior of the hollow frame member 2, and is journaled in bearings in said frame member, see Fig. 106. The shaft 245, has a spiral gear 246, at its lower end which meshes with a spiral gear 247, on the main driving shaft 4, see Figs. 2 and 3. The frame member 2, is gaped as shown at 248, in Fig. 106, to provide room for the forming horn and formers.

To form the gap or opening that portion of

the frame partially surrounding the gap is curved in approximately a C-shape. It will be noted that the gap is sufficiently large to permit the fitting of the forming mechanism, the edging mechanism and the seam clenching mechanism in proper position. The shaft 245 is inclined sufficiently to avoid the gap in the frame and still bring the cams mounted at its upper extremity vertically over the seam clenching mechanism in position to operate the same.

After leaving the edging mechanism the blanks pass beneath the forming horn and are supported upon two brackets 249, one of which is bolted to the rear side wall 187, of each edger head, see Figs. 1, 3, and 106. Each bracket is provided with a horizontal shoulder 250, upon which the edges of the blank rest and a longitudinal T slot 159 in its top surface. Each bracket also has two blocks 252 and 253, adjustably secured to the top surface thereof, by bolts seated in the T slots. The blocks have swinging arms 254 and 255, which operate against the tension of springs 256, and act as gages to accurately center the blank beneath the forming horn, see Figs. 3, 106 and Figs. 108 to 113 inclusive. The means for forming the blank into a cylindrical shape consists of a pair of semi-circular forming wings 257, pivoted by a horizontal pin to the upper end of a vertical slide 258, and which are adapted to be closed around the horn 236, by the action of a pair of toothed rock arms. The vertical slide 258 is supported in slideways 259, in the upright frame member 2, and is given a vertical up and down movement by a pair of cams 260, mounted on the main shaft 14, and operating against a pair of rollers seated in depressions in the lower end of the slide and pivoted thereto by pins, see Figs. 1, 4 and 106. The forming wings 257, each have a pair of ears which straddle the upper end of the slide and through which the horizontal pivoting pin passes, see Figs. 4, 115, 116 and 117. Two rock arms 261, are fastened to a pair of rock shafts 262, journaled in bearings in the upright frame member 2, below and to either side of the main shaft 14. The rock arms are provided with intermeshing teeth so that a movement of one rock arm will cause a corresponding movement of the other rock arm, see Fig. 106. The forming wings are connected to the toothed rock arms by extensible connecting rods 263, having their upper ends pivoted to the forming wings and their lower ends pivoted to the sliding blocks 264, slidably supported in recesses 265, in the toothed rock arms. A plate 266, closes the end of the recess in each rock arm and a screw bar 267, is journaled in said plate and operates in a screw threaded opening in the slide block 264. The screw bar has a hand wheel 268, by which it is rotated to move the slide block and so vary the movement of the forming wings. The rock arms are provided with depressions 269, which provide room for the operation of the connecting rods 263. The rock shafts 262, are rocked by means of a double crank 270, mounted on the main shaft 14, adjacent to the upright frame member 2, said double crank 270, having a crank pin 271, adapted to engage alternately with a pair of forked cranks 272, on the rock shafts 262, see Fig. 125.

The seam clenching mechanism.—The seam clenching mechanism is located above the horn 236, and consists of a pair of slides adjustably secured to each other and operated by a double cam on the diagonal shaft 245, and an anvil or die carried by the lower slide. The vertical portion 273, of the upright frame member 2, above the gap 248, is constructed so as to form vertical slideways in which a pair of slides 274 and 275, are adapted to operate. These slides are adjustably secured to each other by a vertical screw bar 276, flanged at its upper end and rotatably secured to the bottom edge of the upper slide 274, by a plate 277, see Fig. 4. The screw bar engages with a vertical screw threaded opening in the lower slide 275, and is adapted to be rotated so as to adjust the slides toward or from each other. The screw bar is provided with a plurality of transverse openings in any one of which a bar may be inserted to rotate said screw bar. The bottom edges of the lower slide 275, is recessed and an anvil or die 278, is fitted in the recess and is secured in place by set screws 279. The upper slide 274, is gaped as shown at 280, in Fig. 4, and has two rollers 281 and 282, which are mounted upon pins in the upper and lower portions of the slide. These rollers are adapted to operate upon the cam surfaces 283 and 284, of a double cam 285, mounted on the upper extremity of the diagonal shaft 245, see Fig. 106.

The operation of the can forming and seam clenching mechanism is as follows:—A blank having its edges flanged as before described, is delivered to the forming mechanism being supported upon the brackets 249, beneath the horn 236. The slide 258, is now raised by the cams 260, on the main shaft and presses the blank between its upper edge and the horn, as shown in Figs. 106 and 115. The crank pin 271, of the double crank 270, on the main shaft 14, now engages with one of the forked cranks 272, and rocks one of the rock shafts 262. This operates the rock arm 261, on the shaft which in turn rocks the other arm 261, by means of the intermeshing teeth. This movement closes the wings 257, around the horn 236, said wings carrying the blank around the horn as they close and interlocking the flanged edges of said blank. The horn is now expanded as before described to draw the interlocking flanges taut, see Figs. 116 and 118. The upper pair of

slides 274, and 275, now descend and the anvil or die 278, coming into contact with the interlocking edges of the can blank, clenches or presses them tightly together, thereby forming an interlocked seam, see Figs. 117 and 119. The upper surface of the horn has a slight longitudinal depression formed therein in which the seam is formed, thereby giving a smooth exterior surface to the can body, see Fig. 119. The various parts of the mechanism now return to their former positions and the formed can body is fed forward another step.

The can turning mechanism.—This mechanism consists of a sleeve loosely mounted upon the horn adjacent to the forming mechanism, and rotated by means of a toothed rock arm supported by a link. This arm is given a vertical movement by means of a cam on the main shaft 14, and a rocking movement by means of a crank supported on a pin beneath the main shaft. The purpose of this mechanism is to rotate the can body, so as to bring the seam beneath the horn in such position that the flux and solder may be easily applied and the seam sweated.

Referring to Figs. 1, 126, 131, 132, 133, 134 and 136, a portion of the horn 286, which forms a continuation of the forward horn is of reduced diameter and a sleeve 287, is rotatably mounted thereon, the outside diameter of the sleeve being of about the same diameter as the main portion of the horn, see Figs. 1, 4 and 126. A rock arm 288, is supported at one end of a forked arm or link 289, the other end of which is pivoted to the upright frame member 2, by a pin. The rock arm 288, is pivoted to the link 289, by a pin and said pin carries a roller 290, adapted to travel on the face of a cam 291. This cam is mounted upon the main shaft 14, and gives a vertical upward movement to the rock arm 288. The pivot pin of the rock arm is located vertically above the main shaft, and said rock arm has a comparatively large irregular opening through which the main shaft 14, passes. The arm 288, is rocked by means of a crank pin 292, extending laterally from an adjustable slide block 293, and operating in a slot in the lower end of the rock arm 288, and said block is slidably mounted in a slideway on the side of a spur gear wheel 294. This gear is journaled on a pin 295, extending laterally from the bearing standard 16, vertically beneath the main shaft 14, and said gear meshes with a similar gear 296, secured to the main shaft, see Fig. 126. The slide block carrying the crank pin is adjusted by a screw bar 297, which operates in a screw threaded opening in the slide block. The upper end of the rock arm 288, is provided with teeth which mesh with a set of peripheral teeth on the sleeve 287, when the arm is elevated and rocked to give the sleeve a partial rotation sufficient to bring the seam on the can body underneath the horn, as shown in dotted lines in Fig. 132. The arm is elevated by the cam 291, operating against the roller 290, to bring the teeth into engagement and is also lowered by said cam after the can body has been turned to permit said can to be fed to the soldering mechanism.

The soldering mechanism.—The soldering mechanism is supported upon the supplementary base 3, and is located to the right of the mechanism above described. Briefly described, it consists of a horizontal feeding mechanism for feeding the cans one after another to the flux receptacle where the flux is applied, then to the solder receptacle where the solder is applied to the seam, then to the sweating iron where the final operation of sweating the seam is performed and then to the extreme end of the machine where they are removed; and also consists of a device for applying the flux, of a duplicate device for applying the solder and of a sweating iron, all of which are automatically brought into position to perform their operations.

In the following detailed description reference will be had to Figs. 1, 3, 4, 5, 126 to 131 inclusive, 135 and 137 to 140 inclusive.

A Y shaped standard is secured by bolts to the end of the supplementary base 3, and consists of two members, an I shaped lower member 298, and a V shaped upper member 299, which is bolted to the upper end of the I shaped member. The upper ends of the V shaped member 299, are formed so as to constitute slideways in which a slide is supported. This slide consists of two members, a horizontal member 300, the ends of which are supported in the slideways, and a V shaped member 301, which is secured by bolts to about the middle of the horizontal member. The V shaped member 301, carries adjustable brackets 302, in which the rear ends of two parallel longitudinally extending rods 303, are secured. The opposite ends of these rods are secured in similar brackets 304, adjustably secured to a V shaped slide 305. This slide has longitudinal grooves in which the longitudinal edges of a horizontal plate 306, are adapted to fit, said plate being secured to the side of the upright frame member 2. A horizontal intermittent to-and-fro movement is given to these two slides and the parallel rods by means of a pair of upright parallel swinging arms 307, the lower ends of which are pivoted to blocks 308, bolted to the supplementary base 3, and the upper ends of which are connected to the V shaped slide 305, by a connecting link 309. The arms are swung intermittently to-and-fro by a pair of cranks 310, secured to the ends of a short horizontal shaft 311. This shaft is journaled in bearings 312, above the main shaft 14, and extends transversely thereto, the bearings 312, extending from and forming part of the main

bearing 16. Each crank 310, has a crank pin which carries a roller adapted to operate in an irregularly formed slot 313, in one of the swinging arms 307, which gives to said arms an intermittent to-and-fro movement. The shaft 311, is rotated by a spiral gear 314, which meshes with a similar spiral gear 315. secured to the main shaft 14, see Figs. 1, 4, 126 and 137. The parallel rods 303, carry a plurality of depending arms 316, which swing loosely thereon and are prevented from longitudinal movement on said rods by collars 317, fastened to the rods by set screws. These depending arms are arranged side by side in pairs upon the rods 303, and each depending arm has a feed bar 318, secured to its lower end, said feed bar having lateral projections 319, see Figs. 135, 137 and 138. The projections on the feed bars of each pair extend toward each other and are adapted to catch over the edge of the can body and carry same one step onward. The depending arms are weighted so that the feed bars have a tendency to swing toward each other and so continuously maintain the projections on said feed bars in engagement with the can body except when the feed bars are making the return movement to engage with the succeeding can. The arms are weighted by blocks 320, of metal formed integral therewith, see Figs. 137 and 138. While the cans are being fed through this mechanism, they are supported upon the horn 286, one end of which is secured to the forming horn so as to form a continuation thereof, and the other end of which is supported upon a roller 321, supported in a block 322, bolted to the base of the V shaped member 299, of the Y shaped standard. The main portion of this horn is formed of four pieces, a central piece of comparatively light material, such as wood, two metal side pieces each having a longitudinal groove 323, in which the projections on the feed bars operate, and a metal top piece dovetailed into the central piece and having a longitudinal groove in it in which dogs are adapted to seat to prevent the backward movement of a can, see Fig. 130. The bottom surface of the central piece also has a longitudinal groove in which the seam of the can seats. A depression is formed in the bottom surface of the horn vertically above the roller 321, and a roller 324, is seated therein and is pivoted upon a transverse pin. This roller 324, is vertically above the roller 321, and has a peripheral groove in which the seam of the can seats as the can leaves the horn. The horn is trued longitudinally by means of adjustable arms 325, which are secured by bolts to the V shaped member 299, and have rollers pivoted to their inner ends, said rollers being adapted to come into contact with the horn and prevent any movement thereof, see Fig. 130. The arms 325, are provided with elongated openings through which the fastening bolts pass, and the V shaped member is also provided with elongated openings so that a large range of adjustment is secured.

The mechanism for applying the flux and the solder are exact duplicates of each other and in the following description attention is particularly called to Figs. 126, 131 and 138. The flux and the solder are contained in two receptacles 326 and 327, which are duplicates and are supported upon a table having a flat top plate 328, and four supporting legs 329. These receptacles are located directly beneath the horn 286, and about midway of its length. The flux applying iron 330, and the solder applying iron 331, are carried at the inner ends of diagonally extending brackets 332, and 333, which are supported by two vertically rising and falling arms 334 and 335. The lower ends of these arms are supported by the outer ends of two rock arms 336, and 337, whose opposite ends are pivoted upon a horizontal bar 338, which has its ends supported in blocks 339, secured to the supplementary base 3. The upper ends of the arms 334 and 335, are pivoted to the outer ends of two rock arms 340 and 341, which correspond to the lower rock arms 336 and 337, and extend parallel thereto. The opposite ends of these upper rock arms are pivoted to a bar 342, which is supported in the upper ends of two vertical standards 343, having their bases bolted to the flat plate 328, of the table. The arms 334 and 335, are given a rising and falling movement by two eccentrics 344 and 345, mounted upon the main shaft 14, and connected by eccentric rods 346 and 347, to the lower rock arms 336 and 337. The sweating iron 348, is supported upon the inner end of an arm 349, which is loosely mounted upon a horizontal bar 350. This bar is supported by brackets 351, bolted to the vertical standards 343. The arm 349, is weighted so as to maintain the sweating iron in contact with the seam of the can, the weight being in the form of a metal block 352, made integral with the arm, see Fig. 140. The bases 353 and 354, of the flux and solder receptacles 326 and 327, are made hollow and form fire boxes in which a gas burner is located to heat the solder and keep the fluxing acid at the proper temperature. This burner is in the form of a pipe 355, having a series of openings in its top surface. By referring to Fig. 126, it will be seen that the flame is only beneath the solder receptacle and the sweating iron, sufficient heat coming in contact with the flux receptacle to keep the flux at the proper temperature without burning it. A longitudinal groove is formed in the top surface of the flux applying iron and the soldering iron which form wells that are filled with flux and solder as the irons are elevated to the can, see Fig. 127.

The operation of this mechanism is as follows.—The can having been turned to bring

the seam beneath the horn as heretofore described, the horizontal feeding mechanism being in the position shown in Fig. 126, carries the can forward to the flux applying mechanism. The rising and falling arm 334, carrying the flux applying iron is elevated to the position shown in Figs. 126 and 138, by the eccentric 344, so that the iron comes in contact with the can and the fluxing acid which is contained in the well or groove in the rim, applied to the seam, the previous downward movement of the arm 334, having immersed the rim and filled the well with acid. When the flux has been applied the arm 334, moves downward and the horizontal feeder carries the can another step forward to the solder applying mechanism where the same operation is performed in precisely the same way except that solder is applied instead of flux. These mechanisms, however, operate simultaneously, the solder being applied to the seam on one can at the same instant that the flux is being applied to the seam on the succeeding can. When the solder has been applied to the seam the can is fed forward to the sweating iron where the final operation of sweating the seam is performed, the seam passing over the heated sweating iron 348, which is automatically maintained in contact therewith by the weight 352. The complete can body is now fed forward one more step and removed from the machine.

In order to prevent the return movement of the feeder from carrying back the cans on the horn, a series of dogs 356, are supported in a longitudinal bar 357, said bar being pivotally supported from the horizontal bar 342, by diagonal arms 358, and resting upon the cans on the horn. The dogs permit the forward movement of the cans but prevent the return movement thereof by catching over their edges as the feeder makes its return movement, see Figs. 126, 137, 138 and 139.

A device is provided for alining the edges of the tin blanks as they are stacked upon the vertical feeders, said device being illustrated in Figs. 1, 2, 3 and 4. Vertical rods 359, support the ends of the angular brackets 19, and one of these rods on each side of the machine pivotally supports a vertical alining device consisting of a vertical bar 360, having horizontal arms 361, at their ends, said arms extending parallel with each other. Openings are formed in the ends of these parallel arms through which the vertical rod 359, passes. Collars 362, secured to said rod by set screws support the alining device, see Figs. 1 and 2. The vertical bar 360, of the alining device has a handle which is grasped by the operator to swing the alining device toward the stack of blanks and thus aline said blanks by striking the bar against their edges.

Guides for guiding the tin blanks as they are stacked are provided and consist of tapered vertical bars 363, having horizontal foot plates 364, which are secured to the base 1, by bolts, see Figs. 2 and 31. The edger shaft 190, is coupled to the main driving shaft 4, by a clutch so that it may be disconnected therefrom to stop the edger mechanism and also the horizontal feeding mechanism for feeding the blanks at any time if it is found that two blanks have stuck together and become wedged in the edger heads. The remainder of the machine continues to operate so that the cans in the soldering mechanism are not overheated and ruined. This clutch is illustrated in Figs. 76 to 80 inclusive.

The end of the shaft 4, has a flange formed therein, and said end has an opening into which the end of the shaft 190, extends and loosely fits. A clutch member 365, fits loosely upon the flanged end of the shaft 4, and has a screw threaded depression in which a screw threaded collar 366, pinned to the shaft 190, screws. Another clutch member 367, is mounted upon the shaft 4, adjacent to the clutch member 365, and is unrotatably secured thereto by a feather. This clutch member 367, has a longitudinal movement upon the shaft toward and from the clutch member 365, and said clutch member is moved back and forth by a lever 368, pivoted on a pin projecting from a block 369. This block is bolted to the side of the upright frame member 2. The lever 368, has a forked upper end 370, the ends of which carry small blocks 371, adapted to fit loosely in an annular groove in the clutch member 367. The lower end of the lever 368, is connected by means of connecting levers 372 and 373, and a bell crank 374, to a foot lever 375. A downward movement of the foot lever will disengage the clutch and instantly stop the edging mechanism and the mechanism for feeding blanks thereto. The clutch member 365, has a gear wheel 376, formed integral therewith, and said gear meshes with an idle gear 377, journaled on a pin supported by the block 369. This idle gear meshes with a gear 378, which is formed integral with a sleeve 379, loosely mounted on the counter shaft 10. The gear 182, is also formed integral with the sleeve. It will be seen that when the clutch member 365, is disengaged from the clutch member 367, and the shaft 190, stops rotating the gears 376, 377, 378 and 181, will also stop and so stop the horizontal feeding mechanism.

In order to prevent the vibration of the machine from throwing the two clutch members into engagement, a cam 380, is secured to the side of the gear 378, and operates against a lever 381, pivoted to the side of the upright frame 2. The cam 380, is so placed that when the machine is in operation, the clutch cannot be disengaged when the horizontal feeding mechanism is in the position

shown in Figs. 1 and 4. When the feeding mechanism is in this position the cam 380, and lever 381, are in the position shown in Fig. 78, and a lug 382, on the lever 368, contacts with the side of the lever 381, as shown in dotted lines in Fig. 78, and prevents any movement of the lever 368. When the feeding mechanism is in the position shown in Fig. 65, however, the cam 380, and lever 381, assumes the position shown in Figs. 77 and 79, where the lever has been forced down by the cam, permitting the lug 382, to pass over said lever 381, as shown in said figures. The purpose of the lever 381, is to provide an obstruction to the movement of the lever 368, at certain times, said obstruction being removed by the cam 380, when the remainder of the mechanism is in the proper position to cease the operation of flanging the blanks. By this device the edging mechanism cannot be stopped while a blank is being fed thereto, nor while the feeding mechanism is on its return movement, but only when it has reached the end of its return movement. The lever 381, is maintained in contact with the cam 380, by a coiled spring 383, see Fig. 78.

Owing to the dampness or similar causes, the tin blanks sometimes adhere to each other and two or more blanks are lifted by the pneumatic lifters. To prevent more than one sheet at a time being fed to the edger mechanism, a device is provided which is shown in Figs. 3 and 4. A block 384, is adjustably secured to the bottom of the horizontal bar 118, and said block carries a horizontal arm or finger 385. The block is adjusted so that the inner edge of the finger just scrapes the edge of the tin blank as it is lifted from the stack by the pneumatic lifters.

It will be seen that should two blanks adhere together the lower blank, being merely held to the upper one by moisture, would be removed as its edge came in contact with the finger 385, and would drop back upon the stack.

Two brackets 386, are bolted to the edger frame 184, and extend parallel to the brackets 164. The purpose of these brackets is to support the blank and prevent it from bending at the center from the weight and falling down between the brackets 164, see Figs. 3 and 4.

As the blanks are stacked upon the supports of the vertical feeding mechanism their edges are alined by means of vertical bars 387, which are adjustably secured at their upper and lower ends to blocks 388, bolted to the top plate 126, of the vertical standard, and to angular brackets 389, secured by bolts to the legs 125, of the vertical standard, see Fig. 35. The openings in the blocks 388, and the brackets 389, through which the fastening bolts pass are elongated to provide means for adjusting said parts.

The edger frame 184, is provided with two depending pins 390, which fit in elongated openings in the brackets 185, and against which set screws 391, seated in the edges of said brackets are adapted to operate, see Figs. 5 and 76. By this means a minute adjustment of the edger frame can be obtained to accurately center the edger heads with respect to the forming-mechanism.

The wings 257, have longitudinal grooves 392, which provide space for the passage of the feed bars 318, as they remove the can body from the forming horn, see Figs. 76 and 106.

Occasionally when a comparatively small number of cans are desired to be formed, the vertical feeding mechanism and the revolving feeding mechanism are dispensed with and the blanks fed to the horizontal feeding mechanism by hand. This is done by removing the bolt which fastens the revolving feed wheel to the slide 132, and removing said feed wheel.

A diagonally extending plate 393, is secured to the bearing 124, and is additionally supported by the angular brackets 19, see Fig. 4. The tin blanks are stacked upon this plate and are fed one by one to the horizontal feeding mechanisms.

In general the operation of the machine is as follows:—The support of the vertical feeding mechanism having been supplied with blanks, the machine is started and one set of vertical feeding mechanisms thrown into operation as heretofore described. The blanks are fed upward and are lifted one by one off the top of the stack by the revolving feeding mechanism and deposited one by one on the horizontal feeding mechanism. The blanks are then carried to the edging mechanism and the edges thereof flanged as before described. They are now fed forward another step to the can forming mechanism where the flat blank is formed into a cylindrical shape and the seam clenched. The formed can body is now fed step by step to the can turning mechanism, the flux applying mechanism, the soldering mechanism and the sweating mechanism where the final operation is performed and the can body leaves the machine, formed, seamed and soldered. These various operations are all performed on each blank one after another as they have been more fully heretofore described.

This improved machine is designed to run at high speed and is entirely automatic in operation with the one exception that the magazines when emptied are refilled by hand.

The greatest advantage of the invention resides in its continuous operation owing to the fact that the magazines are interchangeable, one being in operation while the other is being refilled. The high speed and continuous operation results in practically a

maximum capacity of output for this class of machine. Other advantages reside in the great range of adjustment and the manner in which all parts of the machine are open to the eye for the inspection and repairs.

I claim as my invention.

1. In a machine of the class described, the combination with automatic feeding mechanism, of a plurality of automatic operating mechanisms to each of which the blank is fed in proper order from the initiatory operation to the final completion of the article, a plurality of magazines for blanks and automatic means for disengaging the feeding mechanism from an exhausted magazine and operatively engaging the feeding mechanism with a loaded magazine.

2. In a machine of the class described, automatic step by step feeding mechanism, a plurality of automatic operating mechanisms to each of which the blank is carried by one step of the feeding mechanism, a plurality of magazines for blanks and automatic means for disengaging the feeding mechanism from an exhausted magazine and operatively engaging the feeding mechanism with a loaded magazine.

3. In a machine of the class described, a plurality of magazines for blanks, edge forming mechanism, cylinder forming mechanism, soldering mechanism, automatic feeding mechanism for carrying a blank step by step in proper order from one of said mechanisms to another, and automatic means for disengaging the feeding mechanism from an exhausted magazine and operatively engaging the feeding mechanism with a loaded magazine.

4. In a machine of the class described, the combination with blank feeding mechanism, of a plurality of operating mechanisms to each of which the blank is fed in proper order from the initiatory operation to the final completion of the article, a plurality of magazines for blanks and means for disengaging the feeding mechanism from an exhausted magazine and operatively engaging the feeding mechanism with a loaded magazine.

5. In a machine of the class described, a series of automatic operating mechanisms for turning the edges of a blank, for forming the blank into cylindrical shape, for interlocking the turned edges, for clenching the interlocked turned edges and for soldering the seam, a plurality of magazines arranged to hold blanks, automatic mechanism for feeding the blank from a magazine and step by step to each of the series of automatic operating mechanisms, and automatic means for disengaging the feeding mechanism from an exhausted magazine and engaging the feeding mechanism with a loaded magazine.

6. In a machine of the class described, a plurality of magazines for blanks, a series of automatic operating mechanisms for forming the blank into proper shape and soldering the seam, automatic mechanism for feeding the blank step by step from a magazine to each of the series of automatic operating mechanisms, and automatic means for disconnecting an exhausted magazine and connecting a loaded magazine.

7. In a machine of the class described, a plurality of magazines for blanks, a plurality of mechanisms for shaping and forming a blank into a can body, a plurality of independent feed mechanisms, one of which feeds the blanks in a magazine as they are taken therefrom, another of which removes the blanks from a magazine and another of which feeds the blanks in proper order to the shaping and forming mechanisms and means whereby a sufficient number of feed mechanisms may be disconnected from an exhausted magazine and connected to a loaded magazine to change the feed from an exhausted magazine to a loaded magazine.

8. In a machine of the class described, a plurality of magazines for blanks, a plurality of vertical feeding mechanisms one for each magazine for elevating the blanks in said magazine a revolving feeding mechanism for taking blanks from a loaded magazine, means for disconnecting a magazine from the revolving feeding mechanism when empty, horizontal feeding mechanism to which blanks are carried by the revolving feeding mechanism, and a plurality of operating mechanisms for forming a blank into a can body to which a blank or partially formed can body is fed by the horizontal feeding mechanism.

9. In a machine of the class described, a plurality of magazines for blanks, a plurality of feeding mechanisms including a plurality of sets of vertical feeding mechanisms, one for each magazine, revolving feeding mechanism for taking blanks from the vertical feeding mechanism of a loaded magazine, horizontal feeding mechanism for taking blanks from the revolving feeding mechanism and a plurality of operating mechanisms for forming a blank into a can body, to each of which a blank is fed by the horizontal feeding mechanism.

10. In a machine of the class described, a plurality of magazines for blanks, a plurality of vertical feeding mechanisms one for each magazine for feeding the blanks in said magazine, revolving feeding mechanism operatively connected to a loaded magazine, horizontal feeding mechanism for taking the blanks from the revolving feeding mechanism, and a plurality of operating mechanisms to each of which a blank or partially formed can body is fed by the horizontal feeding mechanism.

11. In a machine of the class described,

vertical feeding mechanisms, and automatic feed changing mechanisms whereby when the blanks of one vertical feeding mechanism are exhausted another is automatically brought into feeding position.

12. In a machine of the class described, a plurality of magazines for blanks, means for vertically elevating the blanks in the magazines, a revolving feeding mechanism for taking blanks from the magazines, means for reversing the direction of rotation of the revolving feeding mechanism to disconnect an exhausted magazine therefrom and connect a loaded magazine thereto, a plurality of forming mechanisms and feeding mechanism for taking blanks from the revolving feeding mechanism and carrying them to each of said forming mechanisms to be shaped and formed into a can body.

13. In a machine of the class described, a plurality of magazines for blanks, means for feeding the blanks in the magazines, mechanism connecting said magazines, feeding means whereby the feeding mechanism of blanks from magazines is transferred from one magazine when exhausted to a loaded magazine, a plurality of forming mechanisms for shaping blanks into can bodies, a revolving feeding mechanism comprising a hub, a series of radial arms and a plurality of lifting devices at the ends of said arms for taking blanks from a loaded or partially loaded magazine and feeding mechanism for taking the blanks from the revolving feeding mechanism and carrying them in proper order to the forming mechanism.

14. In a machine of the class described, a plurality of magazines for blanks, a plurality of forming mechanisms for shaping blanks into can bodies, a revolving feeding mechanism for taking blanks from the magazines, means for intermittently revolving said revolving mechanism, means for reversing the direction of rotation of the revolving feeding mechanism and independent feeding mechanism for taking blanks from the revolving feeding mechanism and carrying them in proper order to the forming mechanisms.

15. In a machine of the class described, a plurality of magazines for blanks, a plurality of forming mechanisms for shaping blanks into can bodies, a revolving feeding mechanism for taking blanks from the magazines, means for intermittently revolving said revolving mechanism and imparting an up and down movement thereto, means for reversing the direction of rotation of the revolving feeding mechanism, and independent feeding mechanism for taking the blanks from the revolving feeding mechanism and carrying them in proper order to the forming mechanisms.

16. In a machine of the class described, a plurality of magazines for blanks, a plurality of forming mechanisms for shaping blanks into can bodies, a revolving feeding mechanism for taking blanks from the magazines comprising a hub, arms radiating from said hub and a plurality of automatic lifting devices at the ends of said arms, means for reversing the direction of rotation of the revolving feeding mechanism, and independent feeding mechanism for taking the blanks from the revolving feeding mechanism and carrying them in proper order to the forming mechanisms.

17. In a machine of the class described, a plurality of magazines for blanks, a plurality of forming mechanisms for shaping blanks into can bodies, a revolving feeding mechanism including a plurality of automatic pneumatic lifting devices arranged to lift the blanks from the magazines; said revolving feeding devices having operative engagement with but one of the magazines, means for changing the direction of rotation of the revolving feeding mechanism to disengage said mechanism from one magazine and connect to another magazine, and independent feeding mechanism for taking the blanks from the revolving feeding mechanism and carrying them in proper order to the forming mechanisms.

18. In a machine of the class described, a plurality of magazines for blanks, a plurality of forming mechanisms for shaping blanks into can bodies, a reversible revolving feeding mechanism having a series of automatic lifting devices for removing blanks from the magazines and capable of disconnection from one and connection to another magazine, and independent feeding mechanism for carrying the blanks in proper order to the forming mechanisms.

19. In a machine of the class described, a plurality of magazines for blanks, a plurality of forming mechanisms for shaping blanks into can bodies, a revolving feeding mechanism having a series of automatic pneumatic lifting devices for removing blanks from one of the magazines, means for reversing the direction of rotation of the revolving feeding mechanism, to change the feeding from one magazine to another, and independent feeding mechanism for carrying the blanks in proper order to the forming mechanisms.

20. In a machine of the class described, a plurality of magazines, one of which is in operative connection while another is being loaded, a plurality of forming mechanisms for shaping blanks into can bodies, a plurality of vertical feeding mechanisms one for each magazine for elevating the blanks in the magazine, revolving feeding mechanism for taking the blank from said magazine; said revolving feeding mechanism being adapted to be operatively connected to any one of the magazines and reversible to disconnect from

one and connect to another magazine, and horizontal feeding mechanism for conveying the blank from the revolving feeding mechanism and delivering it to the forming mechanism.

21. In a machine of the class described, a plurality of magazines one of which is in operative connection while another is being loaded, a plurality of forming mechanism including an edging mechanism consisting of a plurality of edger heads for forming the flanges upon the edges of the blank, mechanism for soldering the interlocked flanges of said blank, mechanism for feeding the blank in the operatively connected magazine, a revolving feed mechanism for lifting a blank from the loaded magazine; said revolving feed mechanism being reversible to change its connection from one magazine to another, and independent feed mechanisms for carrying the blank from the revolving feed mechanism to the edging and soldering mechanisms.

22. In a machine of the class described, a plurality of magazines, one of which is in operative connection while another is being loaded, a plurality of forming mechanisms including an edging mechanism consisting of a plurality of edger heads for forming the flanges upon the edges of a blank, clenching mechanism for interlocking the flanged edges of a blank and soldering mechanism for soldering the interlocked flanges, mechanism for feeding the blank in the operatively connected magazine, an automatic reversible revolving feed mechanism for lifting a blank from the magazine and independent feed mechanism for carrying the blank from the revolving feed mechanism to the edging and soldering mechanisms.

23. In a machine of the class described, a magazine for blanks, a gap frame, a plurality of forming mechanisms including edging mechanism for forming the flanges on the edges of a blank, mechanism for shaping the blank into a cylinder and interlocking the edges having an expanding forming horn a pair of opposed semi-circular wings, means for expanding the horn and means for opening and closing the wings, means for operating at least some of said forming mechanisms including a shaft mounted in the gap frame and inclined sufficiently to avoid the gap, soldering mechanism for soldering the seam and a plurality of automatic feed mechanisms for feeding the blank in the magazine and successively from the magazine in proper order to each of said forming mechanisms.

24. In a machine of the class described, a gap frame, mechanism for shaping the blank into a cylinder and interlocking the edges at least in part located in the gap in the frame and means for operating said mechanism including a shaft journaled in the gap frame and inclined sufficiently to avoid the gap.

25. In a machine of the class described, a frame having a gap; edging mechanism for forming the flanges on the edges of a blank at least in part located in the gap of said frame, forming mechanism for shaping the blank into a cylinder and interlocking the edges at least in part located in the gap in said frame and comprising a forming horn, a cylindrical forming device, a seam clenching journaled in the frame and having a double device supported from the frame, a shaft cam for operating the seam clenching device; said shaft being inclined sufficiently to avoid the gap, means for operating the forming device, and mechanism for feeding the blank successively in proper order to said mechanisms.

26. In a machine of the class described, a frame having a gap, edging mechanism for forming the flanges on the edges of a blank at least in part located in the gap of said frame, forming mechanism for shaping the blank into a cylinder and interlocking the edges at least in part located in the gap of said frame; said forming mechanism including a circular forming horn in a plurality of parts and means for relatively adjusting said parts, a pair of forming wings adapted to be closed around the forming horn to bend a flat blank into cylindrical form, a seam clenching mechanism above the forming horn, a shaft journaled in the frame and inclined sufficiently to avoid the gap, means on said inclined shaft for operating the seam clenching mechanism, and mechanism for feeding the blanks successively in proper order to said mechanisms.

27. In a machine of the class described, edging mechanism for forming the flanges on the edges of a blank, forming mechanism for shaping the blank into a cylinder and interlocking the edges of said blank including a multi-part forming horn and a plurality of opposed forming wings, means for opening or closing the forming wings, a seam clenching mechanism, an inclined shaft, double cam mechanism on said inclined shaft for operating the seam clenching mechanism, cam mechanism on the inclined shaft for spreading the forming horn, soldering mechanism for soldering the seam and mechanism for feeding the blank successively in proper order to said mechanisms.

28. In a machine of the class described, the combination with soldering mechanism, feed mechanism and forming mechanism for shaping a flat body into a cylindrical can body with an interlocking seam at the top, of can body turning mechanism for turning the can body to bring the seam below and in position to easily apply the solder including a swinging arm having a segmental gear at one

extremity, and a support for the can body having a gear meshing with the segmental gear.

29. In a machine of the class described, the combination with soldering mechanisms, feed mechanism and forming mechanism for shaping a flat body into a cylindrical can body with an interlocking seam at the top, of can body turning mechanism for turning the can body to bring the seam below and in position to easily apply the solder including a swinging arm having a segmental gear at one extremity, a support for the can body having a gear meshing with the segmental gear and means for disengaging the segmental gear from the gear on the support to permit the can body to pass between said gears.

30. In an automatic machine of the class described, the combination with a plurality of forming mechanisms for shaping a flat blank into a cylindrical can body with a seam on top and soldering mechanism, of a support upon which the cylindrical can bodies are mounted, means for feeding the can bodies on the support, means for turning the support to bring the seams on the can bodies in position to be soldered including two meshing toothed elements and means for temporarily unmeshing said toothed elements to permit the feeding of the can bodies between them to the soldering mechanism.

31. In a machine of the class described, a gap frame, a plurality of mechanisms for forming cylindrical can bodies from flat blanks including two edger mechanisms one for each end of the blanks and at least one of said edger mechanisms being located in the gap, a cylinder forming mechanism comprising an adjustable forming horn and two opposed semi-circular wings at least in part located in the space formed by the gap in the frame, seam clenching mechanism, a shaft journaled in the gap frame and inclined sufficiently to clear the gap in said frame, double cam mechanism on the inclined shaft for operating the seam clenching mechanism, and a soldering mechanism and a plurality of feed mechanisms for feeding the blanks in proper order to the forming mechanisms.

32. In a machine of the class described, a gap frame, a plurality of mechanisms for forming cylindrical can bodies from flat blanks including two edger mechanisms one for each end of the blanks, a cylinder forming mechanism comprising an adjustable forming horn and two opposed semi-circular wings located at least in part in the space formed by the gap in the frame, seam clenching mechanism mounted in the upper portion of the gap frame above the forming horn, an inclined shaft journaled in the frame and inclined sufficiently to avoid the gap in the frame, double cam mechanism on the upper end of the inclined shaft for operating the seam clenching mechanism, soldering mechanism and a plurality of feed mechanisms for feeding the blanks in proper order to the forming mechanisms.

33. In a machine of the class described, a plurality of mechanisms for forming cylindrical can bodies from flat blanks including an edger mechanism, a cylinder forming mechanism, including a forming horn and a pair of semi-circular wings a support for the cylindrical can bodies which is practically a continuation of the forming horn, a seam clenching mechanism, can turning mechanism including two toothed elements, means for temporarily unmeshing said toothed elements to permit the feeding of the can bodies between them on the support, soldering mechanism and a plurality of feeding mechanisms for feeding the blanks in proper order to the forming and soldering mechanisms.

34. In a machine of the class described, a plurality of mechanisms for forming cylindrical cans from flat blanks including an edger mechanism, a cylinder forming mechanism, a top seam clenching mechanism, a support for the can body, mechanism for giving a half turn to the can to bring the seam below including a swinging arm normally engaging said support, means for temporarily disconnecting the swinging arm from said support to permit the passage of the can between said support and swinging arm, soldering mechanism and a plurality of feeding mechanisms for feeding the blanks in proper order to the forming and soldering mechanisms.

35. In a machine of the class described, a plurality of mechanisms for forming cylindrical cans from flat blanks including an edger mechanism, a cylinder forming mechanism having a forming horn, a support for the cylindrically formed can bodies which is practically a continuation of the forming horn and is in part reduced, a sleeve on the reduced part of said support which is approximately of the same circumference as the remainder of the support, a top seam clenching mechanism and can turning mechanism including a swinging arm geared to the sleeve and means for unmeshing the swinging arm from the sleeve to permit the passage of the can bodies.

36. In a machine of the class described, a gap frame, a magazine for blanks, edger mechanism, cylinder forming mechanism, a seam clenching mechanism comprising a plurality of adjustable slides, a shaft inclined sufficiently to avoid the gap in the frame and a double cam on the inclined shaft for operating said slides.

37. In a machine of the class described, the combination with the edger mechanism and cylinder forming mechanism of a seam clenching mechanism comprising a plurality of ad-

justable slides, a die carried by one of said slides, a gap frame in which portions at least of the seam clenching mechanism are mounted, a shaft journaled in the gap frame and inclined sufficiently to avoid the gap therein and cam mechanism on the shaft for operating the seam-clenching mechanism.

38. In a machine of the class described, the combination with edger mechanism and cylinder forming mechanism, of a gap frame in the gap of which at least portions of the cylinder forming mechanism are located, a seam clenching mechanism in the upper portion of the gap frame above the cylinder forming mechanism comprising adjustable upper and lower slides, a die carried by the lower slide, an inclined shaft in the gap frame which is inclined sufficiently to avoid the gap, a double cam at the upper extremity of the inclined shaft and rollers carried by the upper slide and engaging the double cam.

39. In a machine of the class described, a magazine for blanks, a gap frame, an edger mechanism, a cylinder forming mechanism, a seam clenching mechanism, a shaft inclined sufficiently to avoid the gap in the frame, a double cam on the inclined shaft for operating said seam clenching mechanism and a plurality of feed mechanisms for feeding blanks from the magazine in proper order to the edger mechanism, cylinder forming mechanism and the seam clenching mechanism.

40. In an automatic machine of the class described, a magazine for blanks, edger mechanism, a gap frame, cylinder forming mechanism mounted in the gap in the frame and including a forming horn and a pair of semicircular forming wings, a shaft in the gap frame which is inclined sufficiently to avoid the gap in said frame, seam clenching mechanism in the upper portion of the gap frame and cam mechanism on the inclined shaft for operating the seam clenching mechanism.

41. In a machine of the class described, two magazines for blanks, mechanism for forming blanks into can bodies, mechanism for feeding blanks from one of the magazines to the forming mechanism, and means for changing the feed mechanism from operative connection with one magazine when exhausted to operative connection with the other magazine.

42. In a machine of the class described, a plurality of magazines for blanks, a mechanism for forming blanks into can bodies, mechanism for feeding blanks from a magazine to the forming mechanism, and means for changing the feed mechanism from operative connection with an exhausted magazine to operative connection with a loaded magazine.

43. In a machine of the class described, a plurality of magazines for blanks, mechanism for forming blanks into can bodies, mechanism for feeding blanks from a magazine to the forming mechanism, and means for changing the feed from an exhausted magazine to a loaded magazine, whereby the machine is continuous in operation.

44. In a machine of the class described, a plurality of magazines for blanks, automatic mechanism for forming blanks into can bodies, automatic mechanism for feeding blanks from a magazine to the forming mechanism, and automatic means for changing the feed from an exhausted magazine to a loaded magazine, whereby the machine is entirely automatic and continuous in operation.

45. In a machine of the class described, the combination with soldering mechanism, feed mechanism and forming mechanism for shaping a flat body into a cylindrical can body with an interlocking seam at the top of can body turning mechanism for turning the can body to bring the seam below and in position to easily apply the solder including a swinging arm having an element at one extremity which is at least in part toothed, a support for the can body having a gear meshing with the teeth of said element and means for disengaging the teeth of said element from the gear on the support to permit the can body to pass between.

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Witnesses:
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