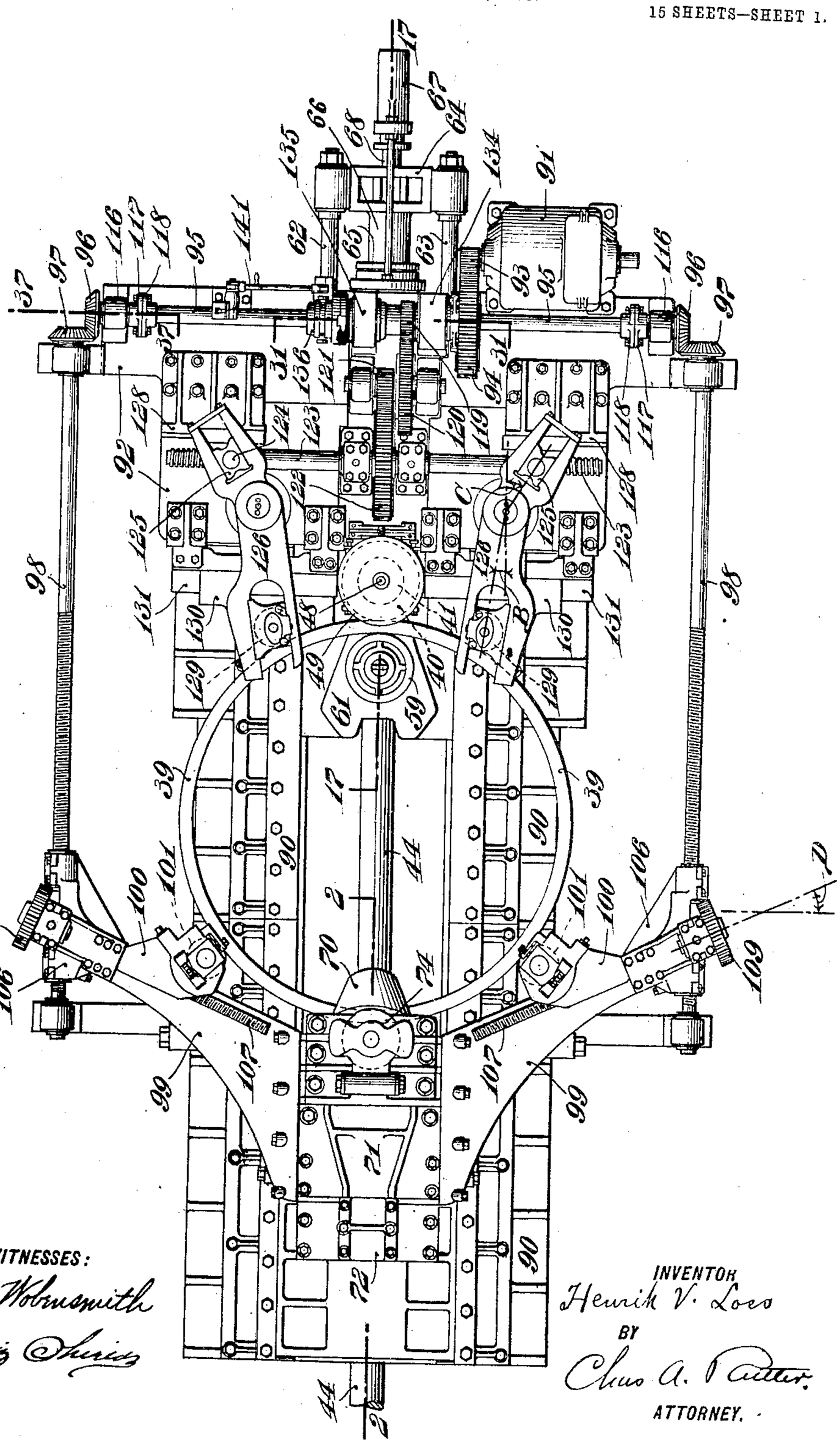
No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 1.



WITNESSES:

Jas. C. Wobmanith

Craig Sheridan

INVENTOR

Henrik V. Loss

BY

Chas A. Patten.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

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15 SHEETS—SHEET 2.

Fig. 3.

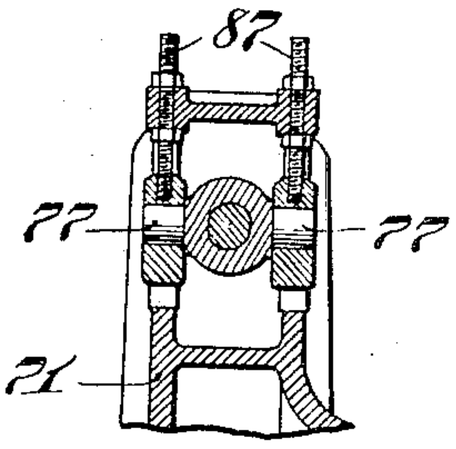


Fig. 2.

WITNESSES:

Jas. C. Wobensmith

Horace Sinclair

INVENTOR

Henrik V. Loss

BY

Chas A. Carter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 3.

Fig. 4.

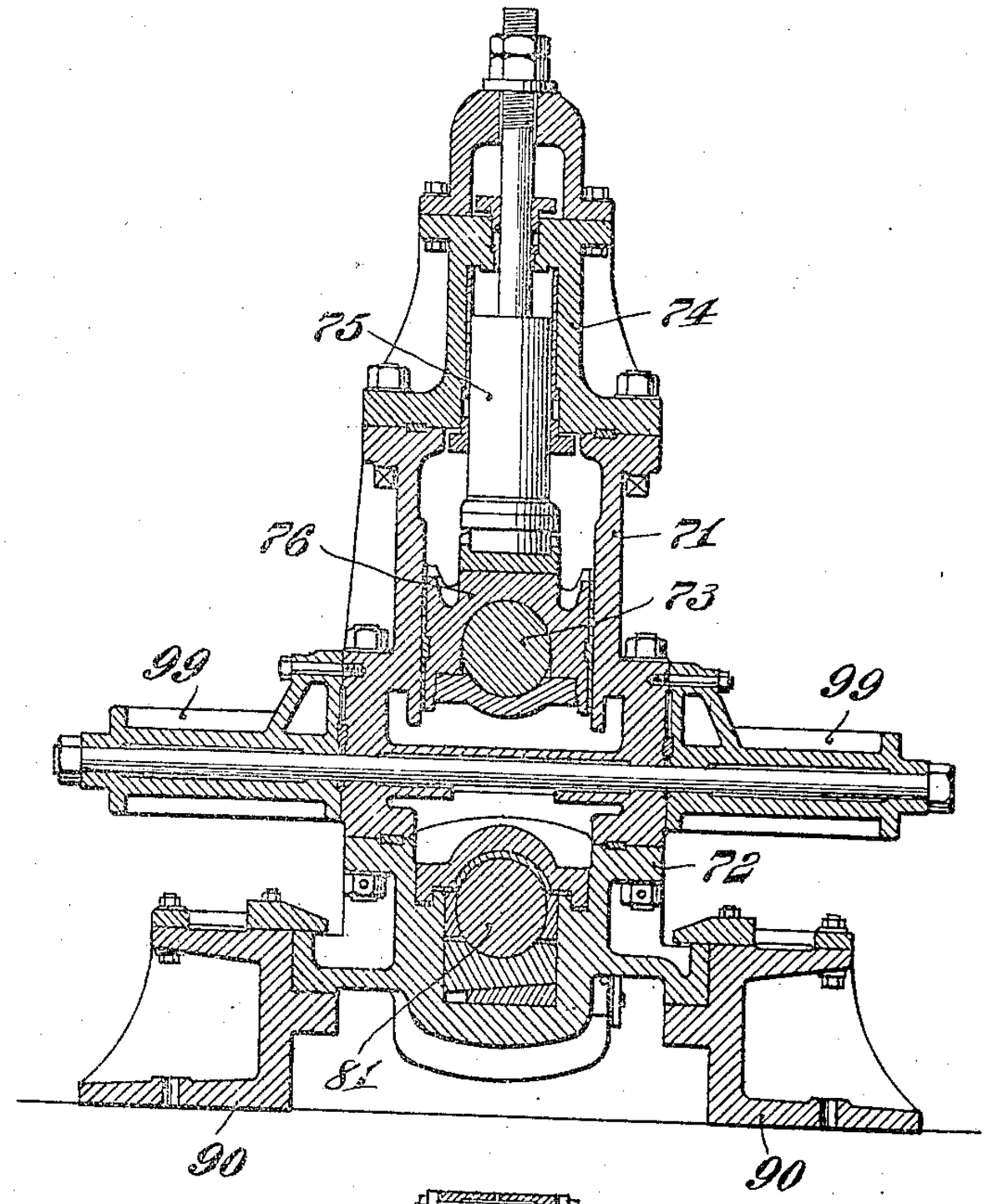
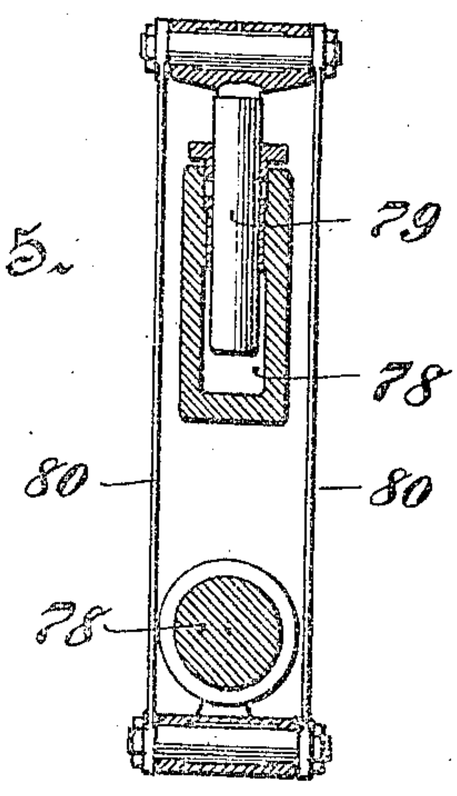


Fig. 5.



WITNESSES:

Jas. C. Wobensmith

Henry Bruce

INVENTOR

Henrik V. Loss

BY

Chas A. Rutter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 4.

Fig. 6.

Fig. 7.

WITNESSES:

Jas. C. Wolvenswith

Henry Lewis

INVENTOR

Henrik V. Loss

BY

Chas A. Carter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

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Fig. 8.

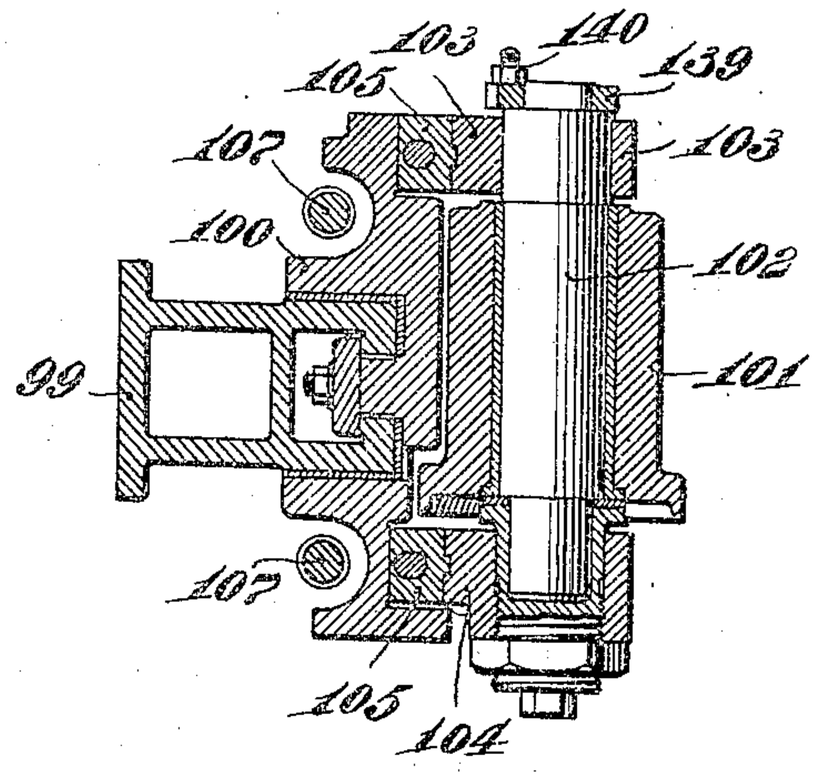


Fig. 9.

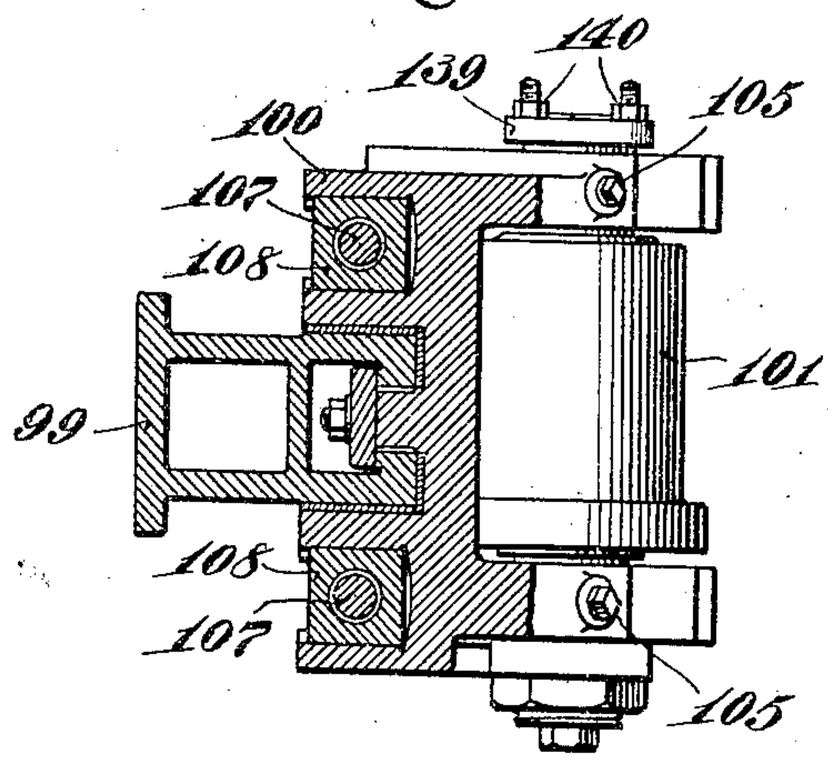
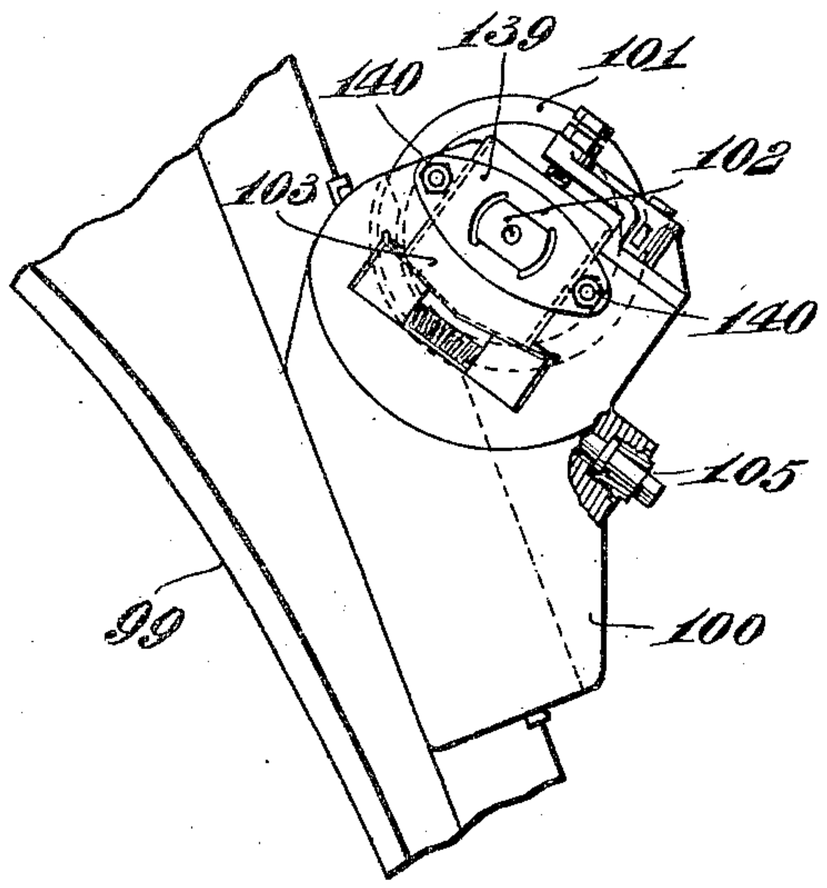


Fig. 10.



WITNESSES:

Jas. C. Wobensmith

Harry Shreve

INVENTOR

Henrik V. Loss

BY

Chas A. Potter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 6.

Fig. 11.

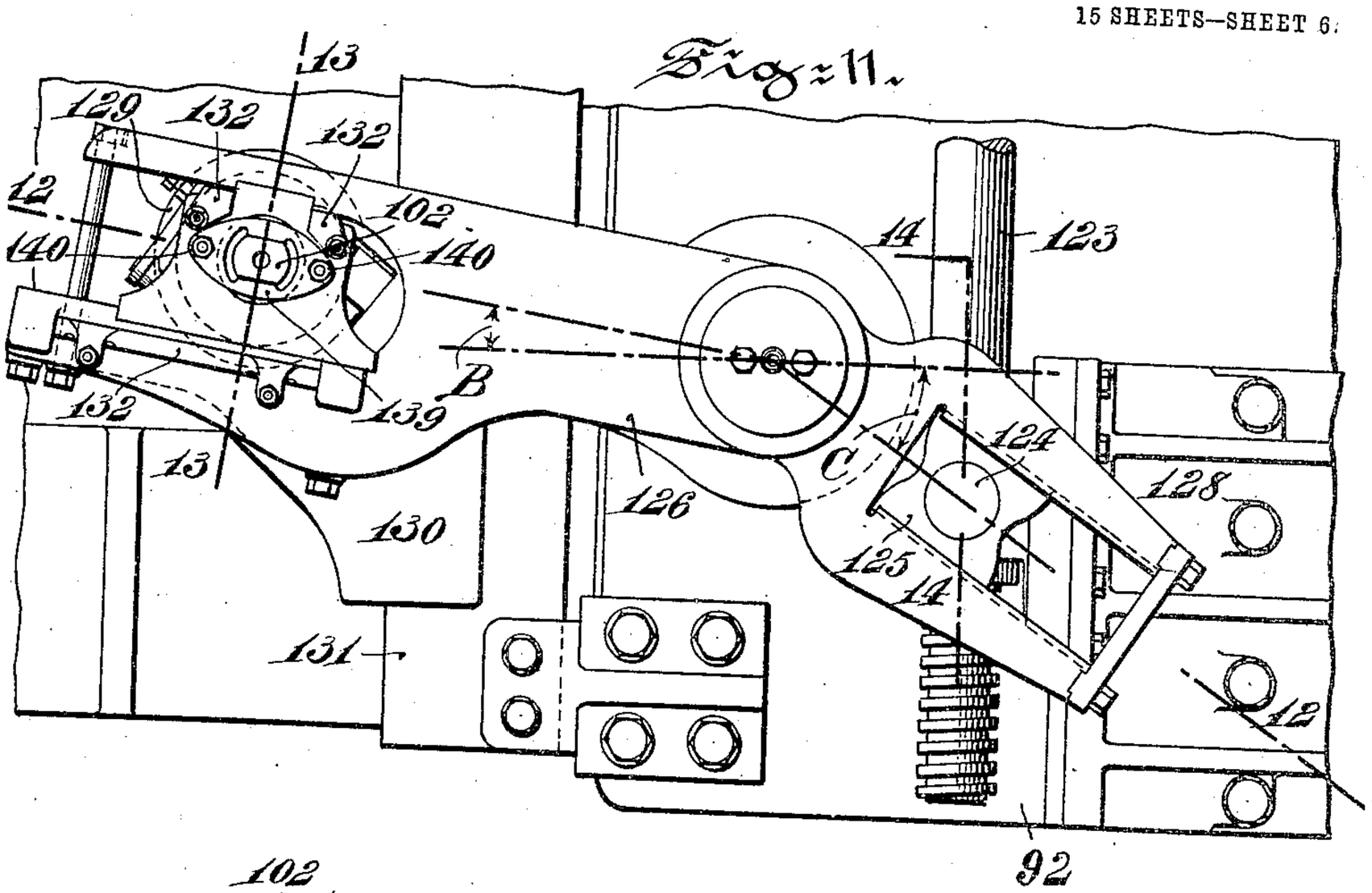
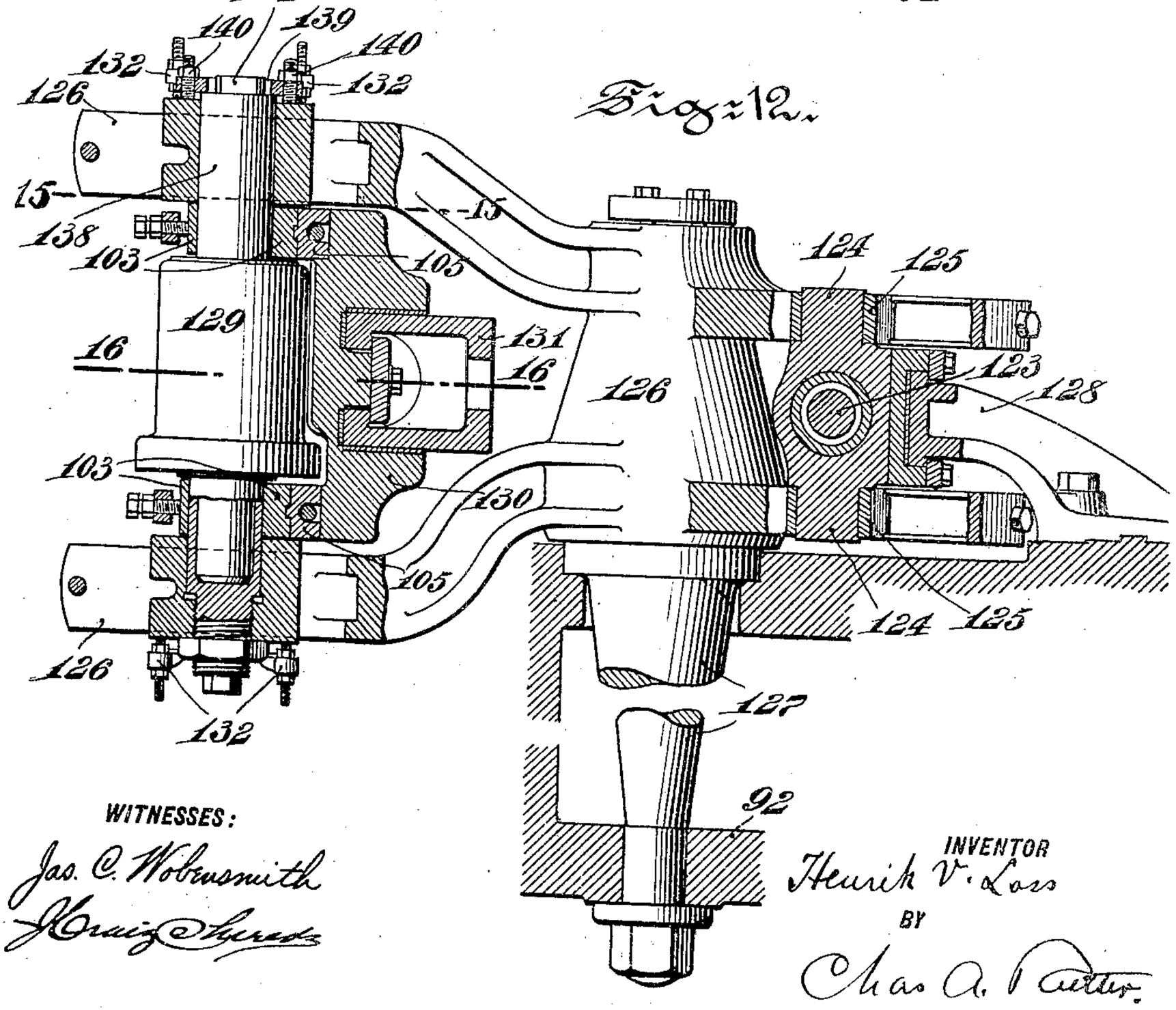


Fig. 12.



WITNESSES:

Jas. C. Wobensmith

Craig Sheads

INVENTOR

Henrik V. Loss

BY

Chas A. Carter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 7.

Fig. 13.

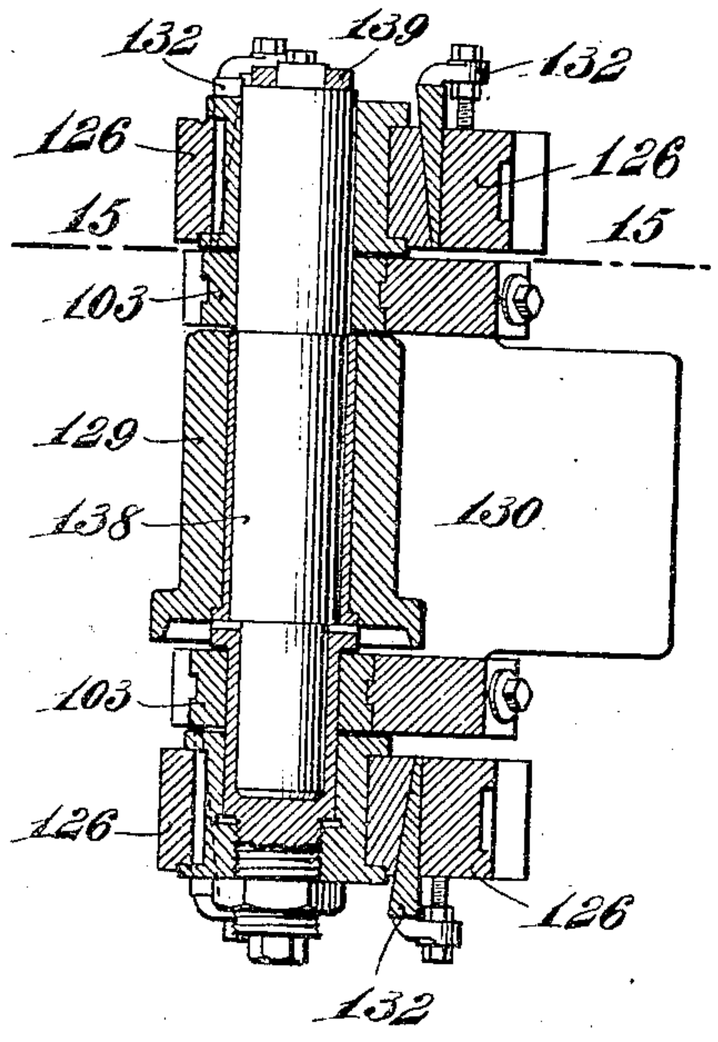


Fig. 14.

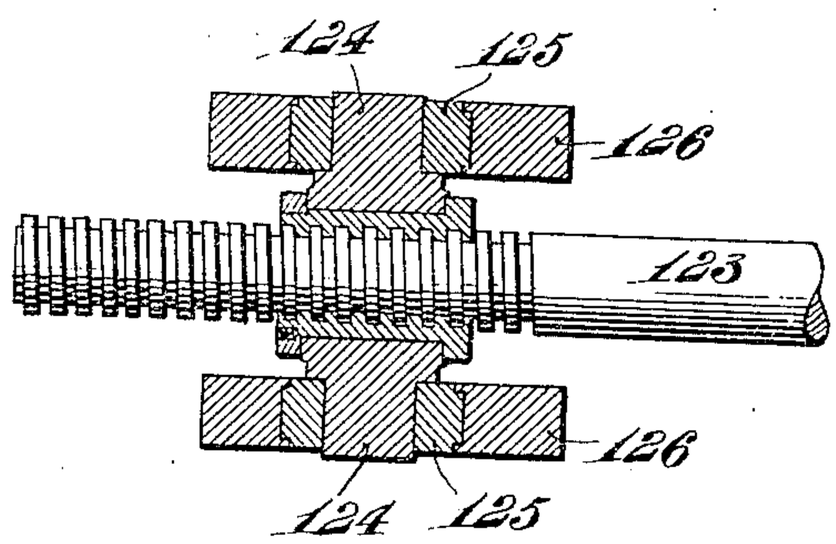


Fig. 15.

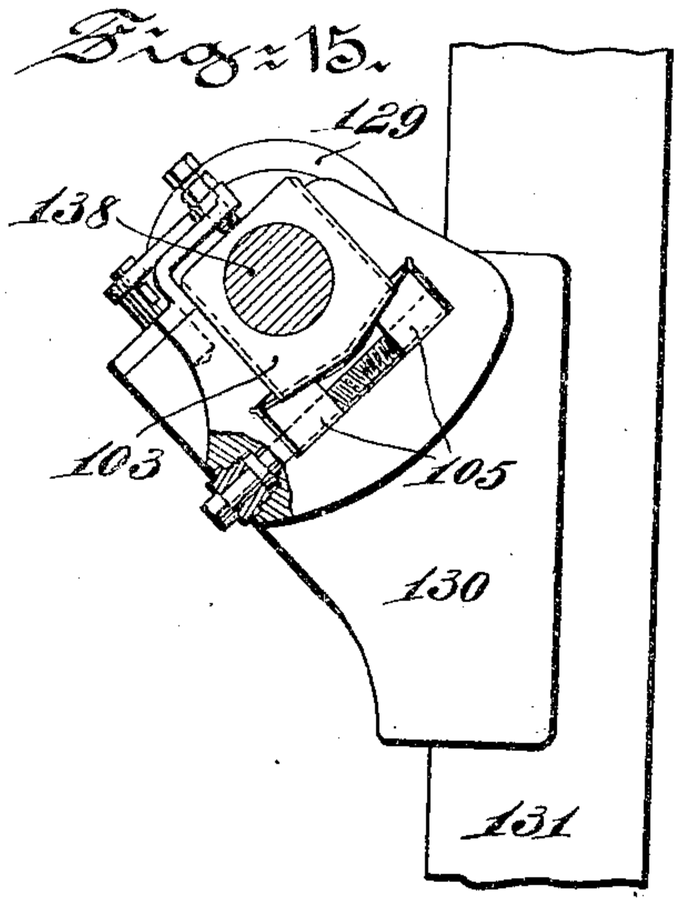
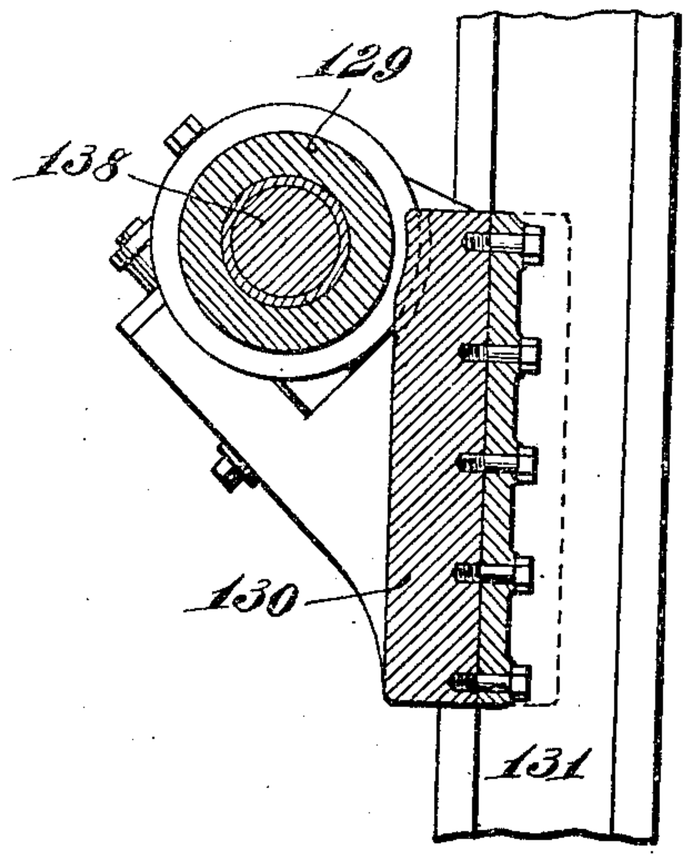


Fig. 16.



WITNESSES:

Jas. C. Wobensmith

Louis Schmidt

INVENTOR

Henrik V. Loss

BY

Chas A. Pattee.

ATTORNEY.

No. 863,544.

PATENTED AUG. 13, 1907

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 8.

Fig. 17.

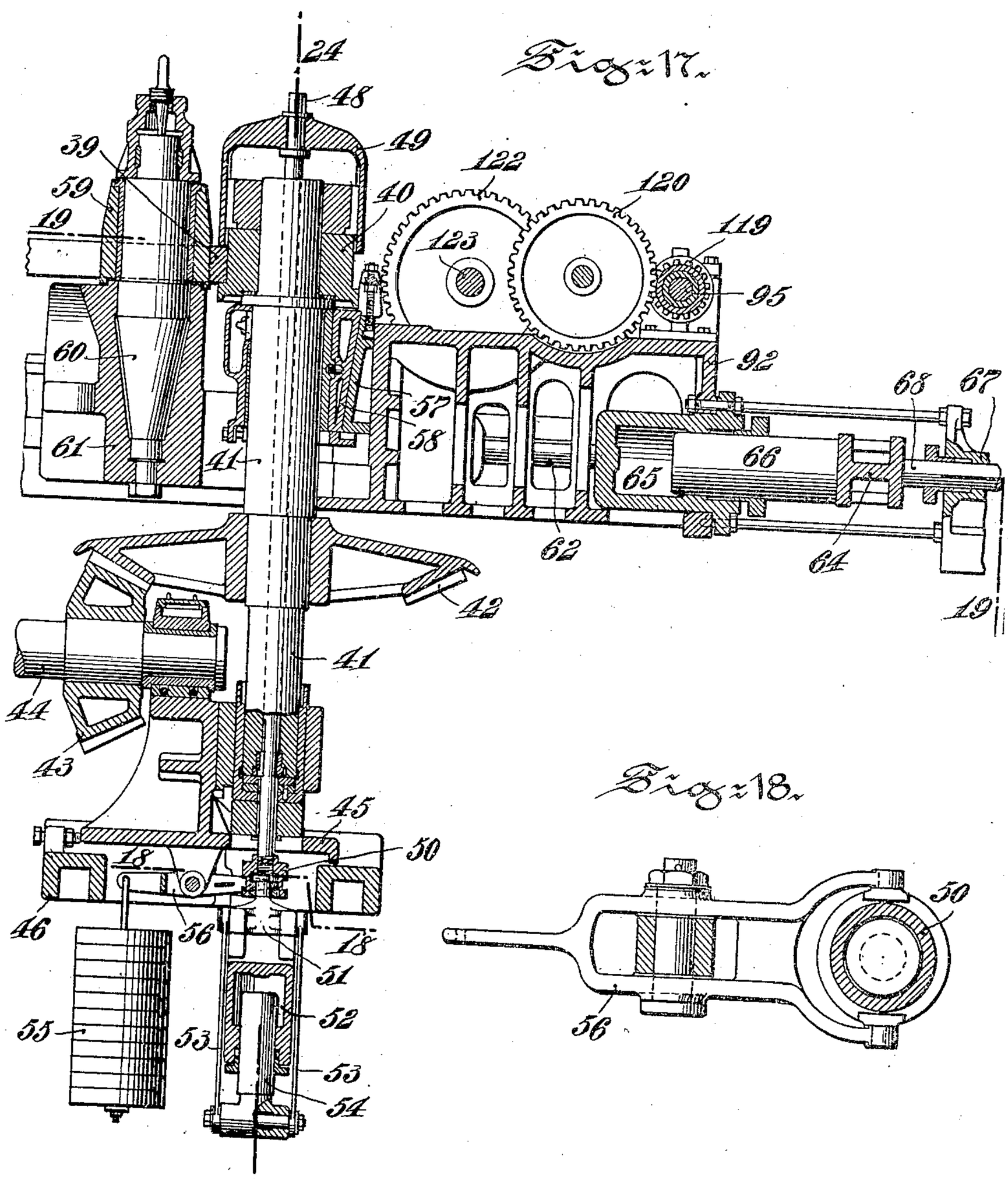


Fig. 18.

WITNESSES:

Jas. C. Hobensmith

Harry Edmonds

INVENTOR

Henrik V. Loss

BY

Chas A. Carter

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

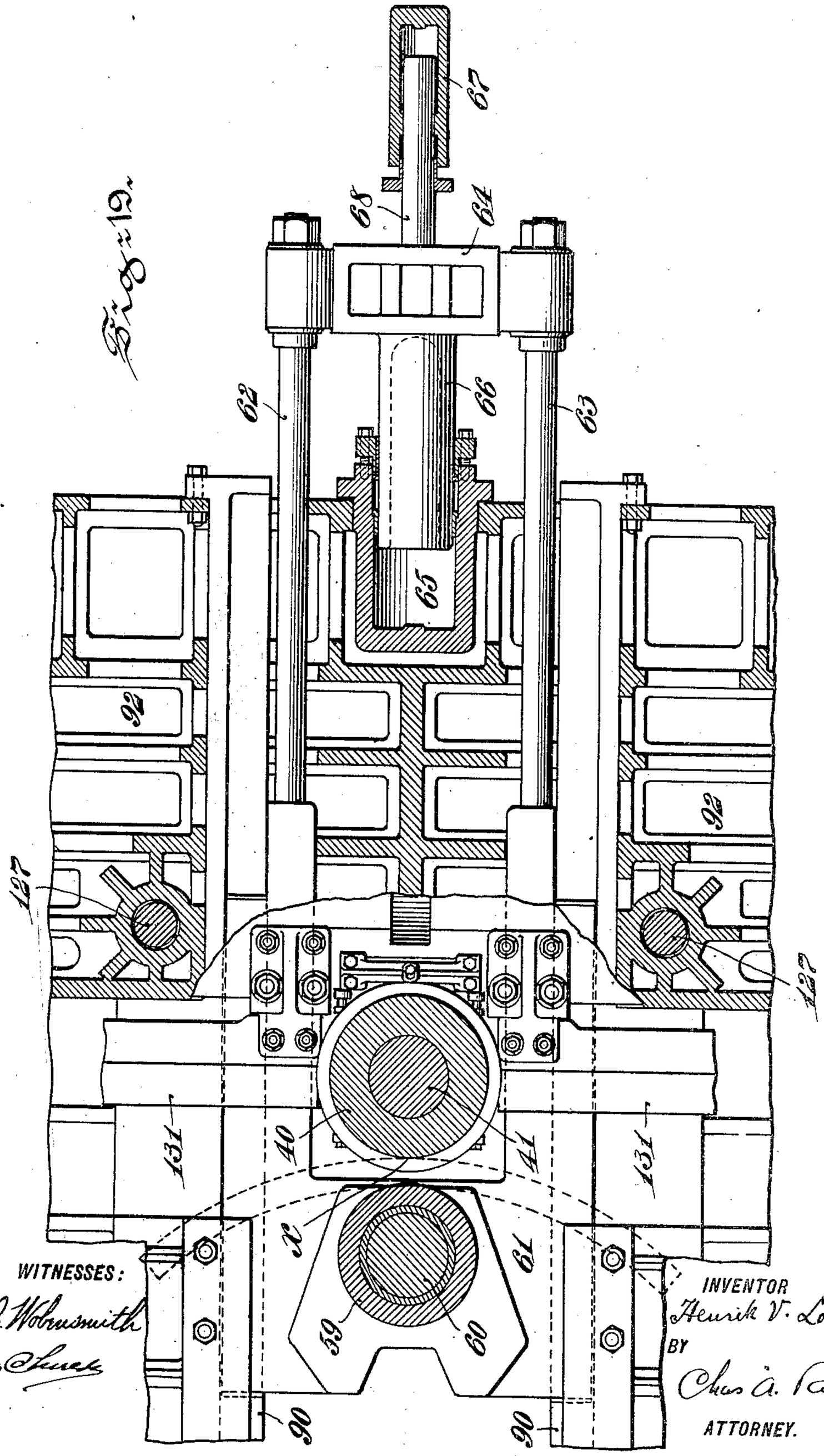
H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 9.

Fig. 19.



WITNESSES:

Jas. C. Wolcumsmith

Craig Thurston

INVENTOR

Henrik V. Loss

BY

Chas A. Carter

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 10.

Fig. 23.

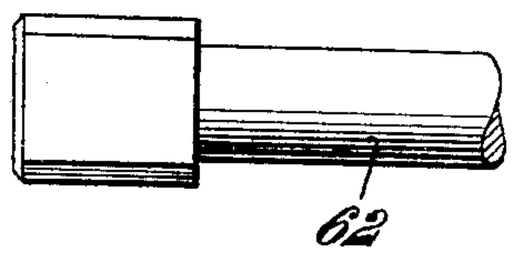
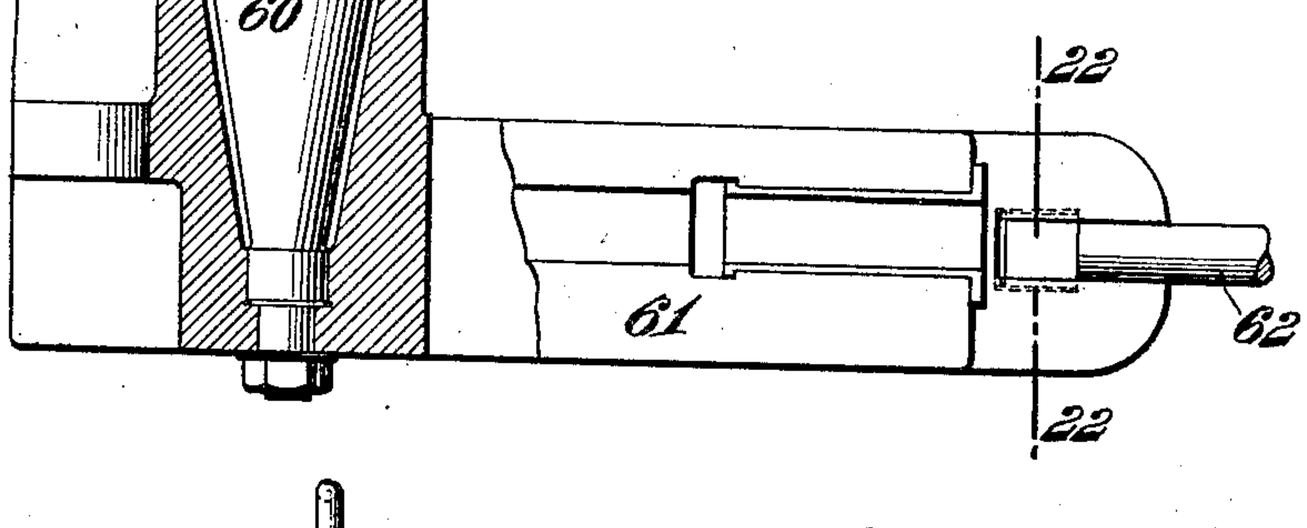


Fig. 20.



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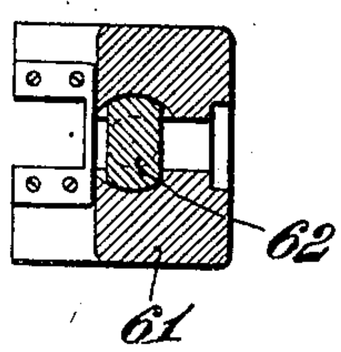


Fig. 21.

WITNESSES:

Jas. C. Wobensmith

Craig Sparks

INVENTOR

Heinrik V. Loss

BY

Chas A. Rutter

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

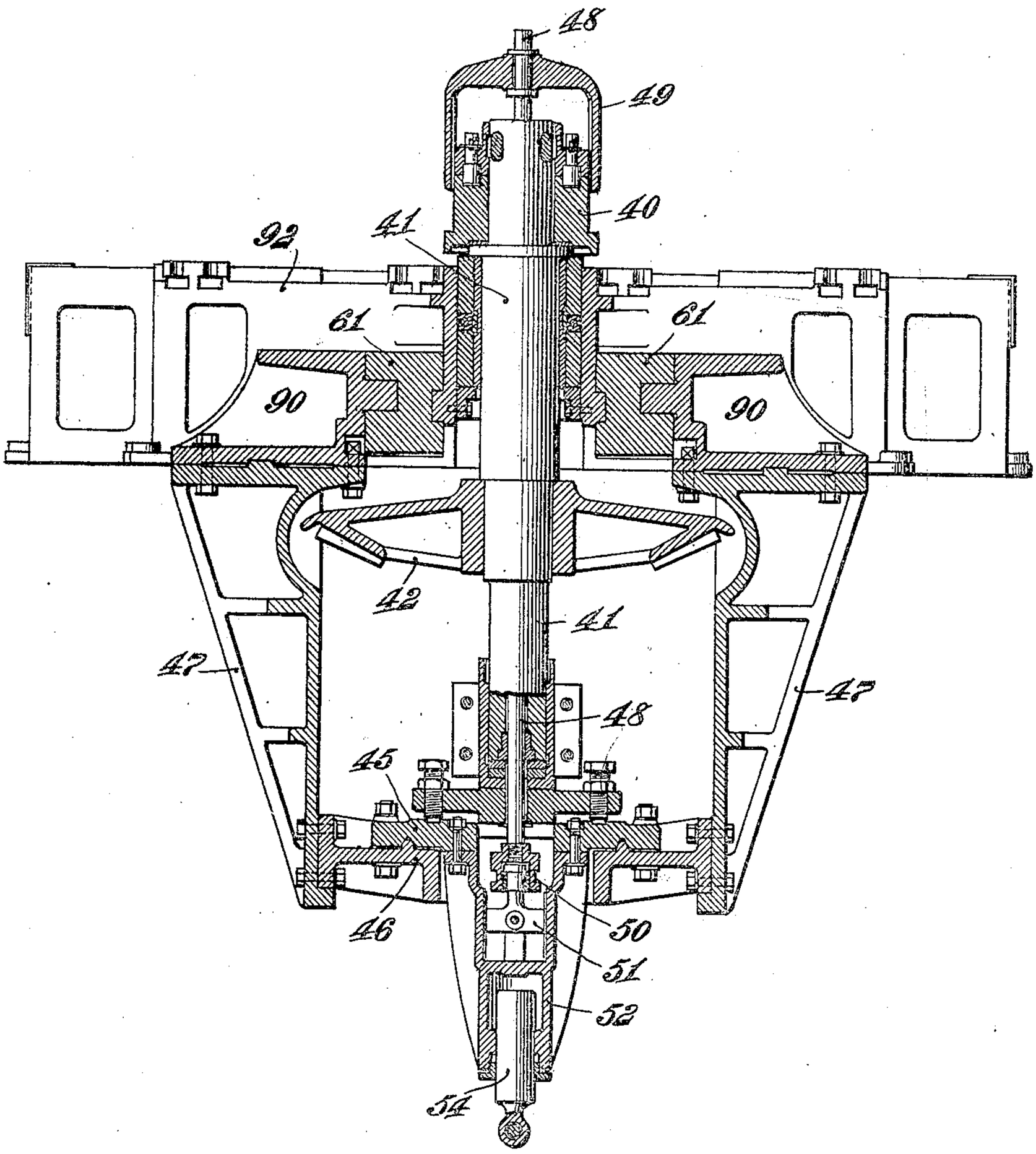
H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 11.

Fig. 24.



WITNESSES:

Jas. C. Wobensmith

Harry Theed

INVENTOR

Henrik V. Loss

BY

Chas A. Carter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 12.

Fig. 25.

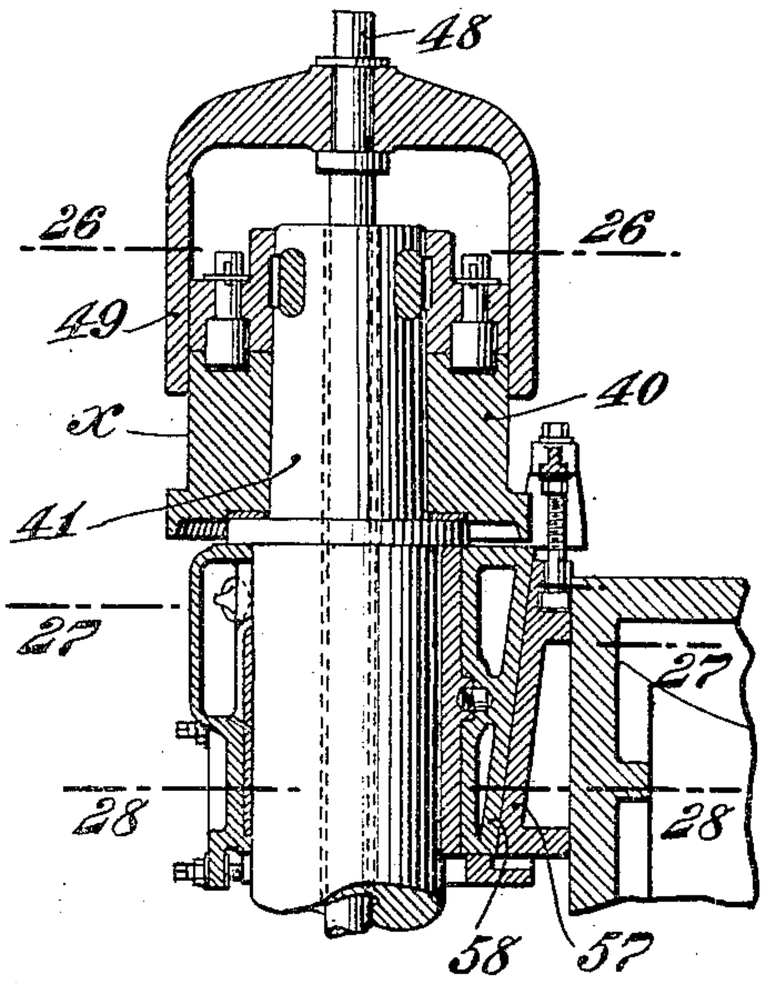


Fig. 26.

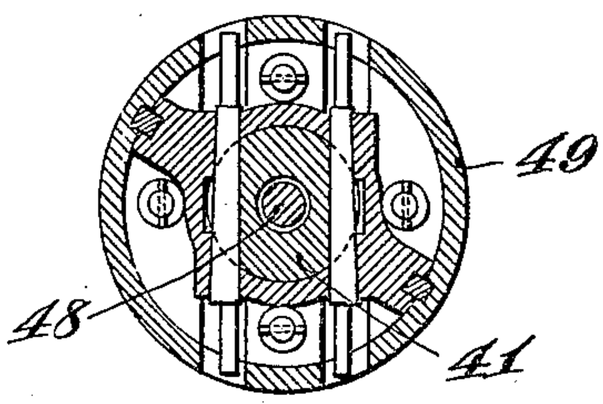


Fig. 27.

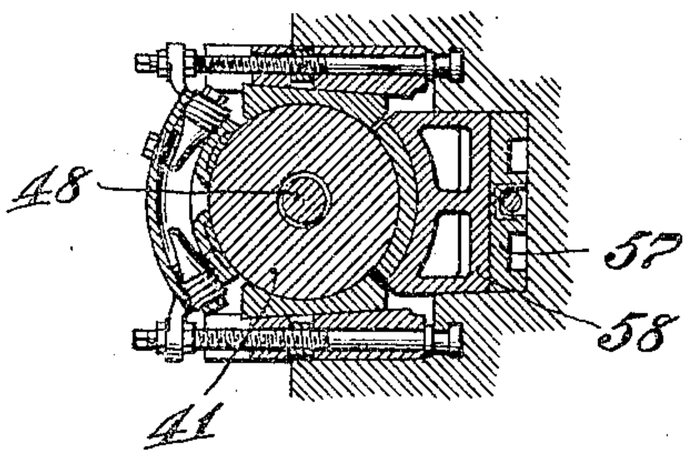
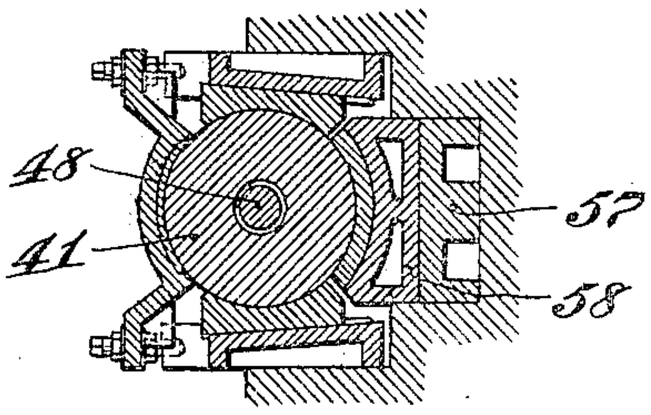


Fig. 28.



WITNESSES:

Jas. C. Wobensmith

Louis Lucas

INVENTOR

Henrik V. Loss

BY

Chas A. Carter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 13.

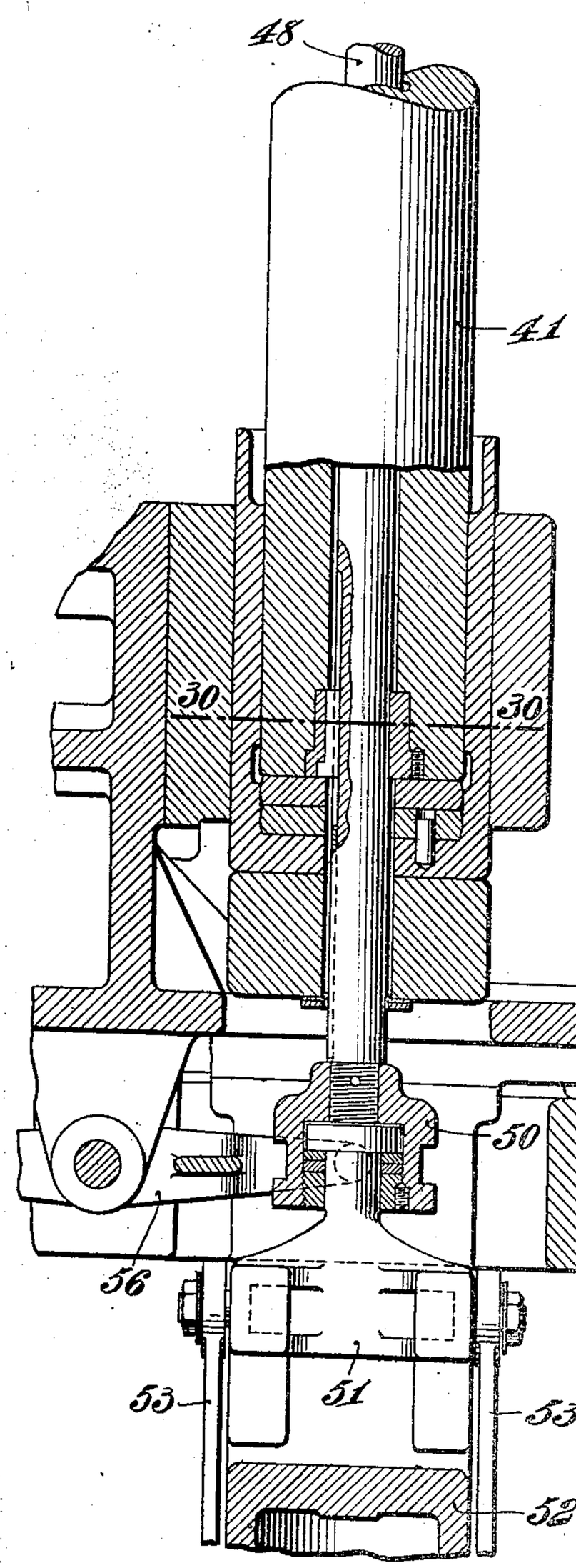


Fig. 29.

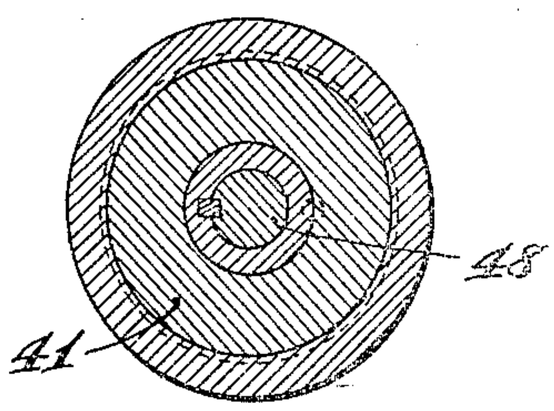


Fig. 30.

WITNESSES:

Jas. C. Wobrenschmith

Henry Lucas

INVENTOR

Henrik V. Loss

BY

Chas. A. Carter.

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 14.

Fig. 31.

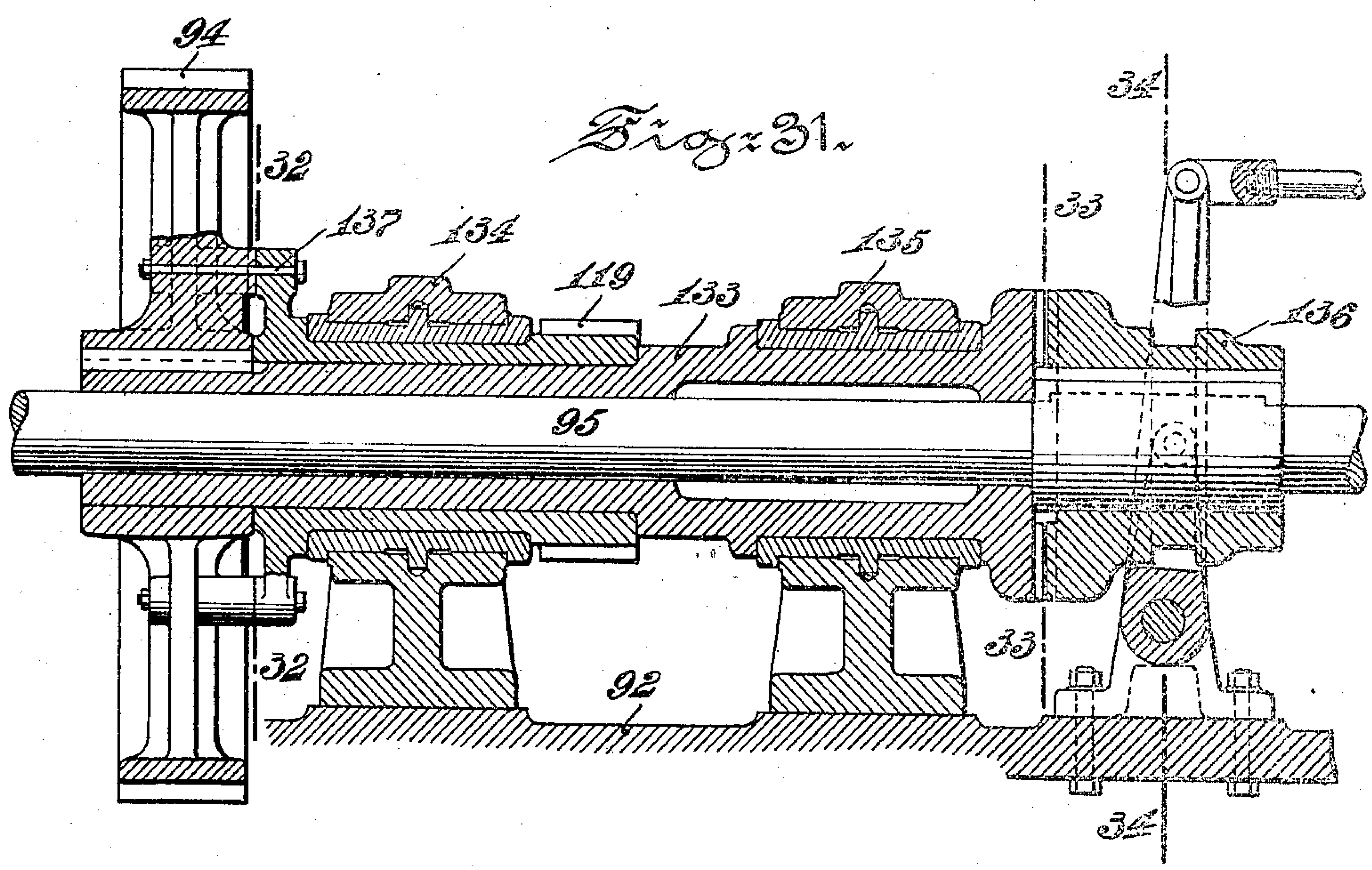


Fig. 32.

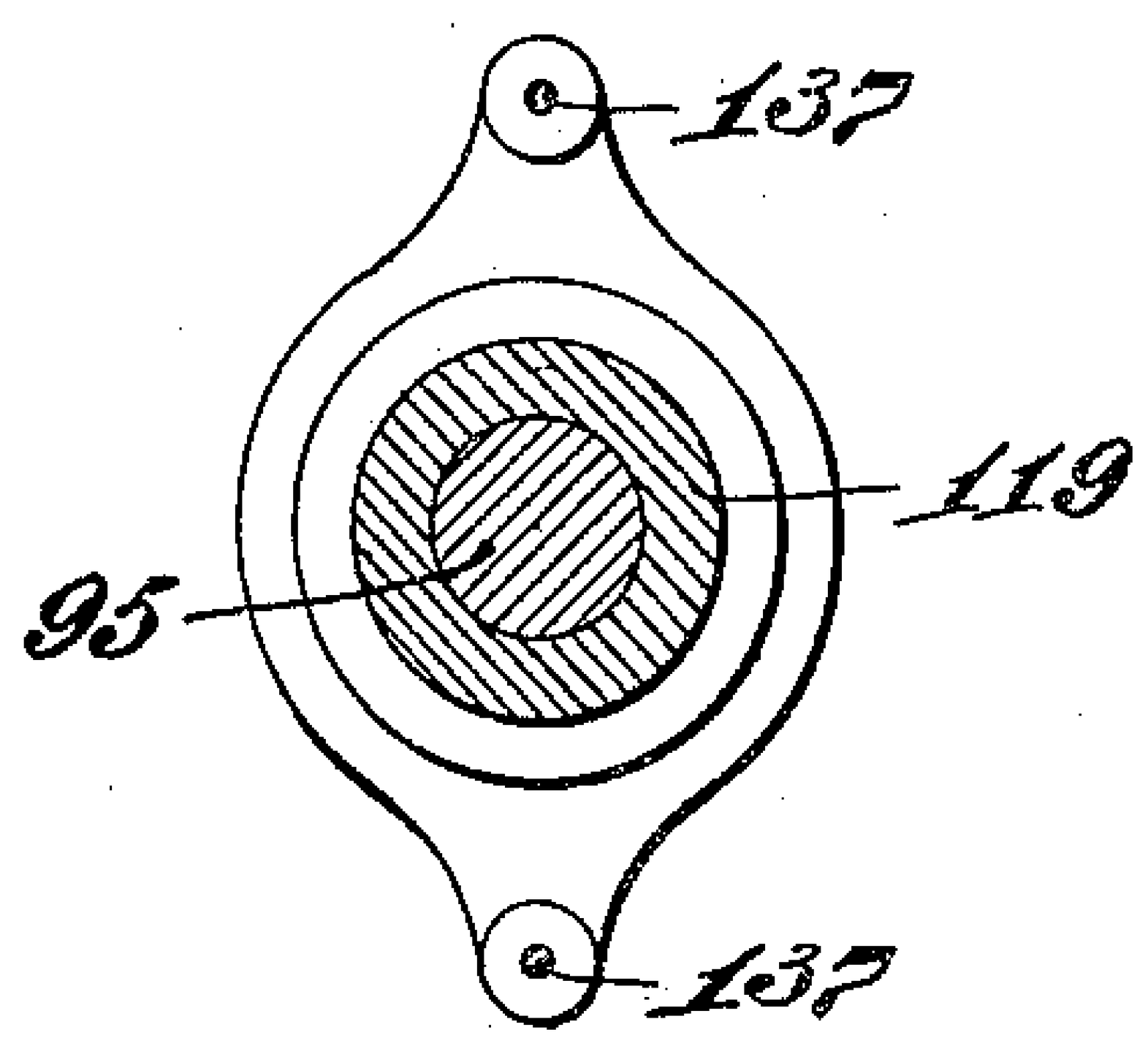


Fig. 33.

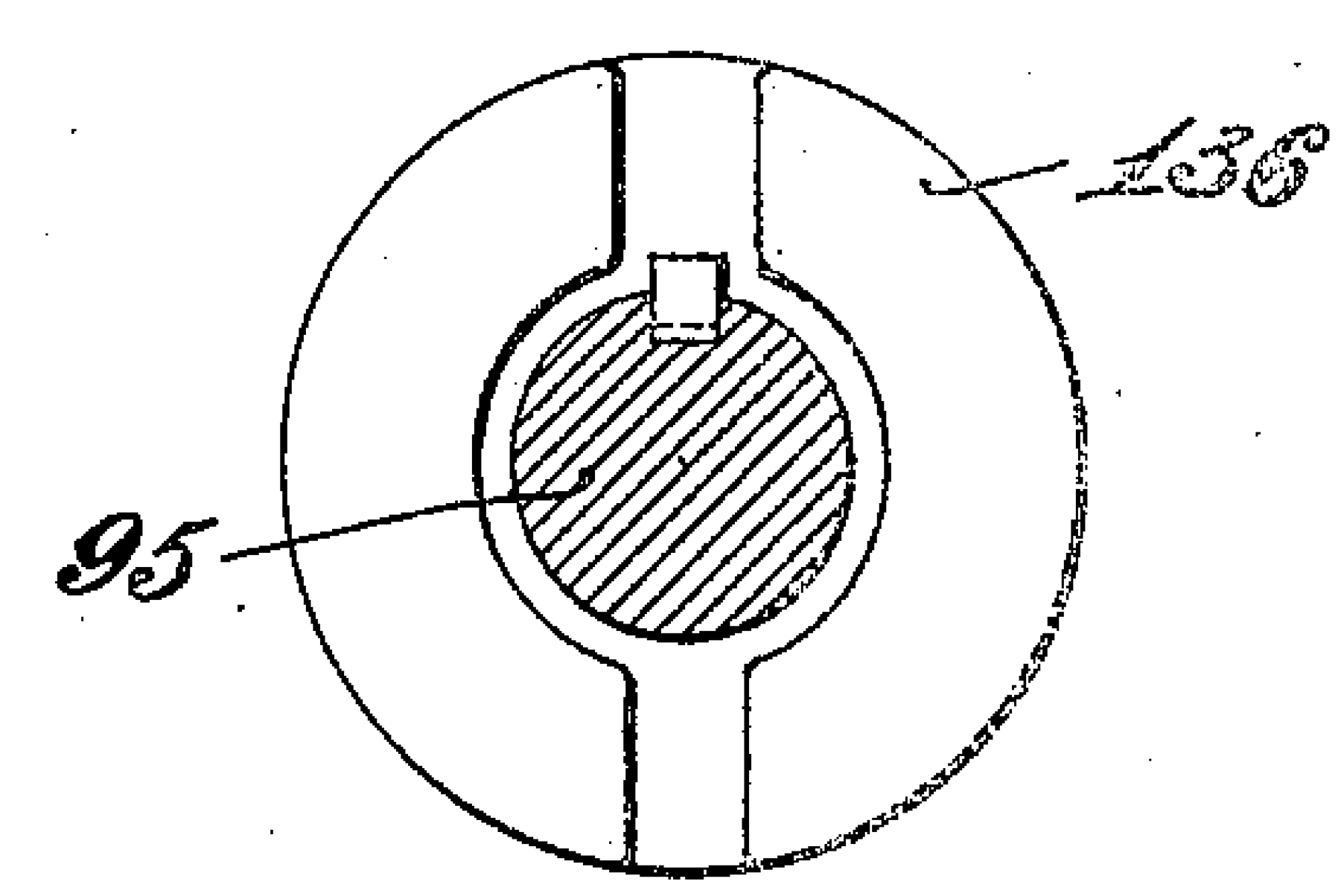
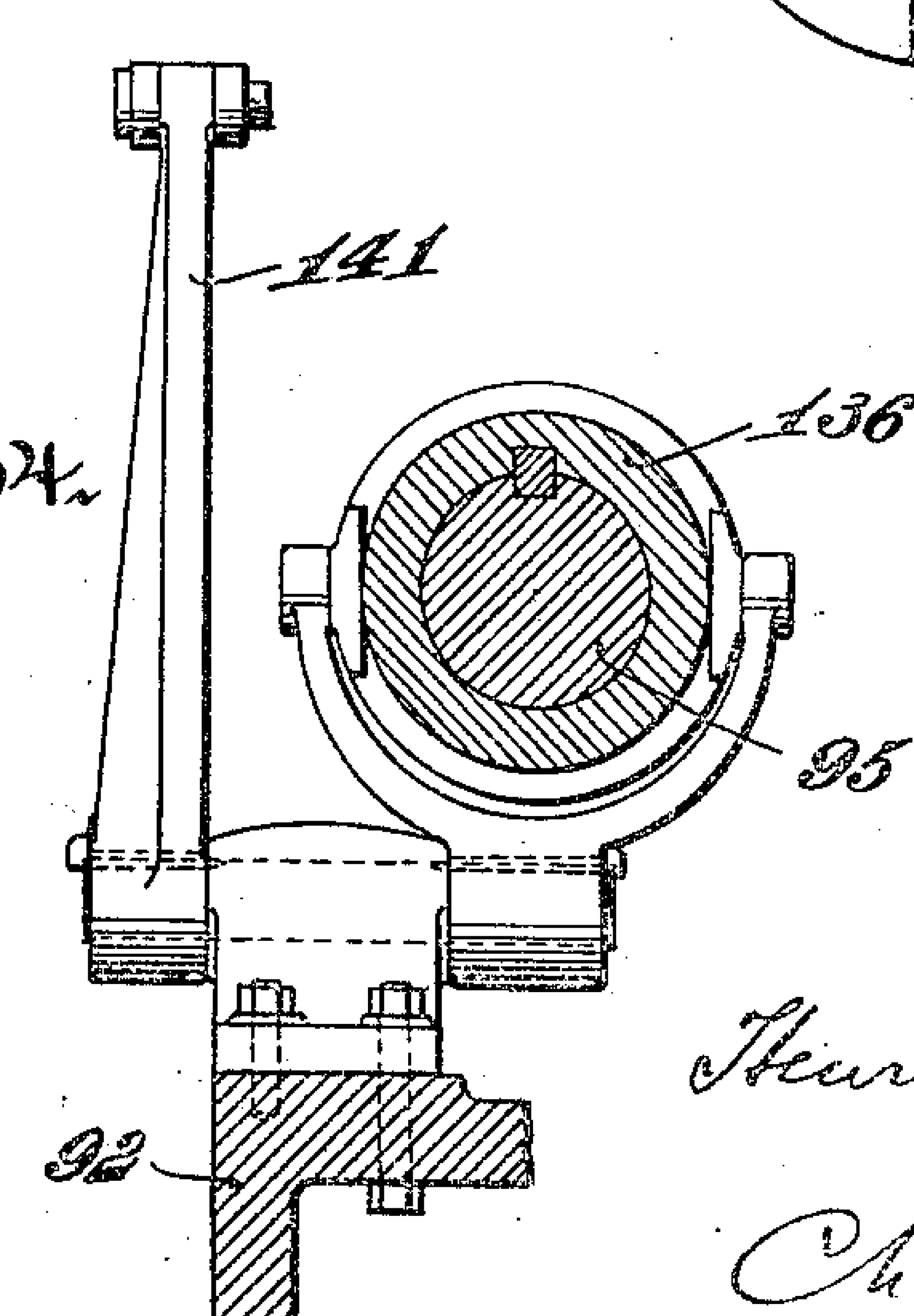


Fig. 34.



WITNESSES:

Jas. C. Wobensmith

Horsiz Lunch

INVENTOR

Henrik V. Loss

BY

Chas A. Potter

ATTORNEY.

No. 863,544. PATENTED AUG. 13, 1907.

H. V. LOSS.

MACHINE FOR ROLLING TIRES.

APPLICATION FILED OCT. 2, 1906.

15 SHEETS—SHEET 15.

Fig. 35.

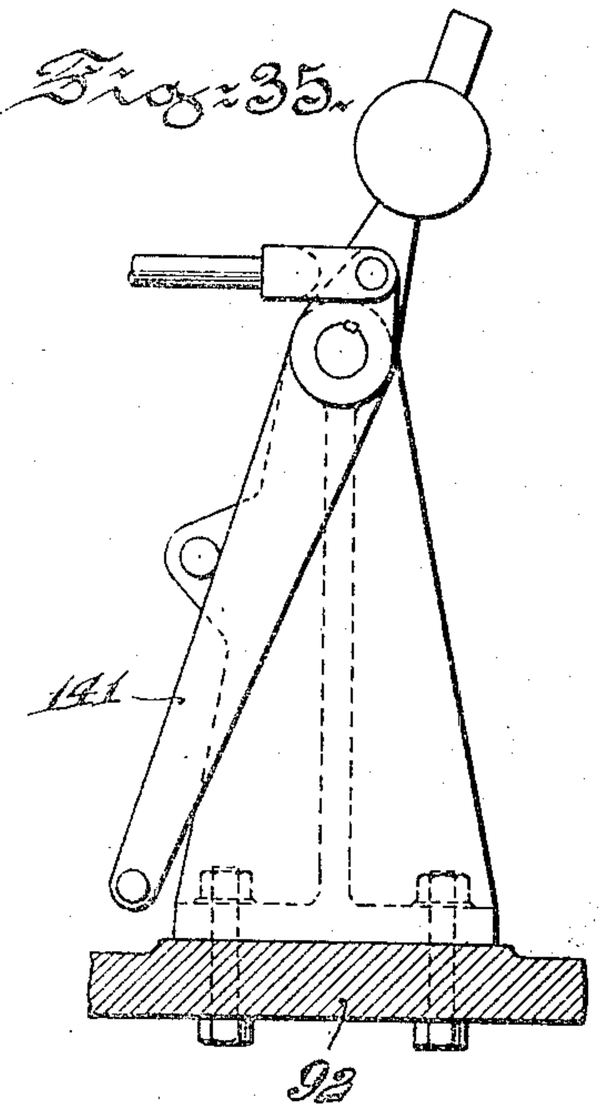


Fig. 36.

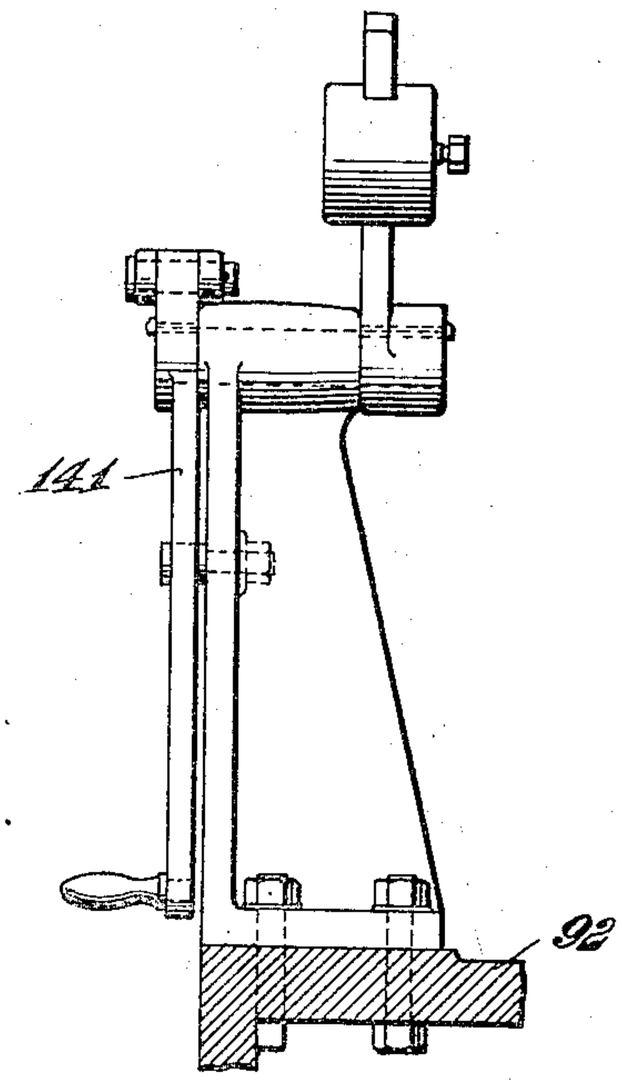


Fig. 37.

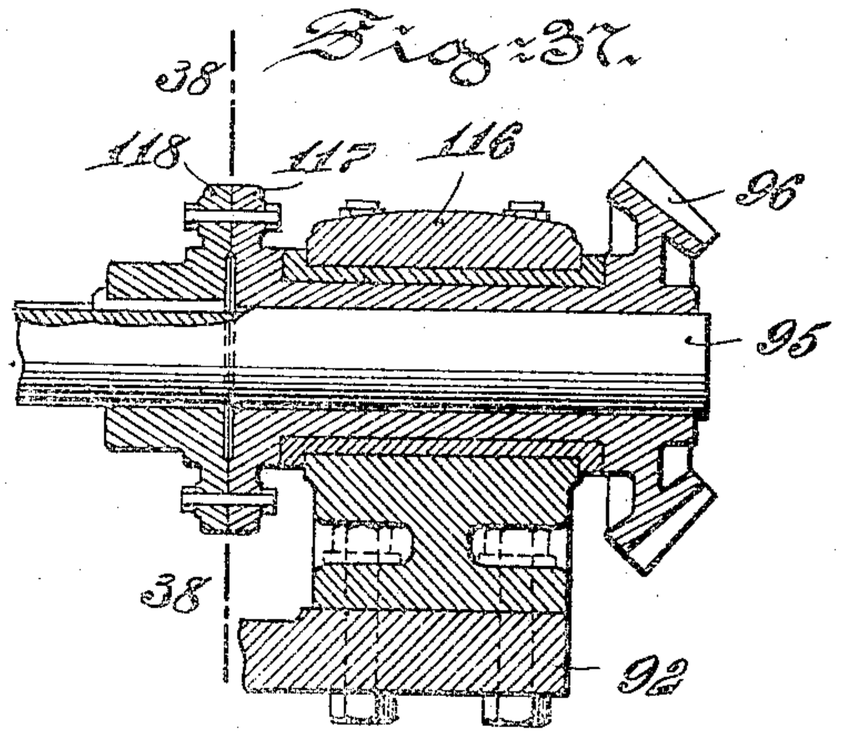
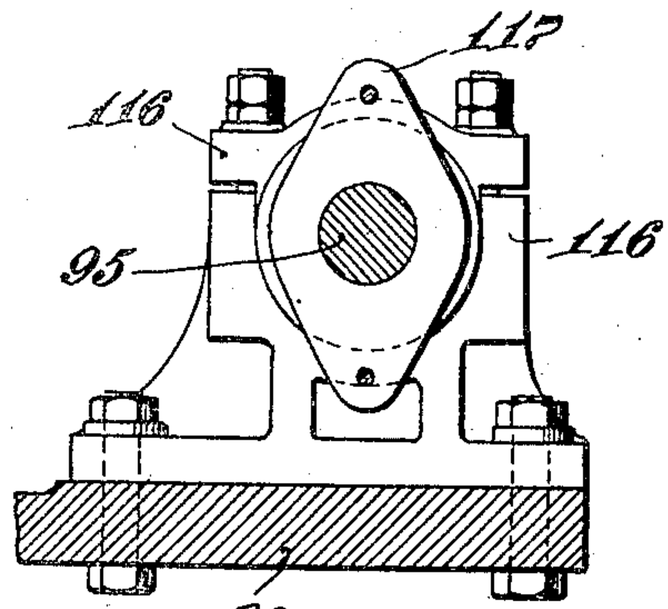


Fig. 38.



WITNESSES:

Jas. C. Hobbsmith

Henry Steele

INVENTOR

Henrik V. Loss

BY

Chas A. Cutter.

ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRIK V. LOSS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO CHARLES T. SCHOEN, OF MOYLAN, PENNSYLVANIA.

MACHINE FOR ROLLING TIRES.

No. 863,544. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed October 2, 1906. Serial No. 337,116.

To all whom it may concern:

Be it known that I, HENRIK V. LOSS, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Machines for Rolling Tires, of which the following is a specification.

My invention relates to improvements in machines for rolling wheel tires, and more particularly tires for locomotive or railway car wheels, and the objects of my invention are to furnish a machine of this character all the rolls of which will be so disposed as to roll the metal at all points equally, that is to say, without dragging or drawing certain parts of the metal in lines not concentric with the center of the tire; to furnish a machine of this character, the guide or truing up rolls of which will act automatically, and to embody such details as will compensate for the wear of the rolls, thus enabling the operator at all times, by mere adjustment, to maintain the true circular shape of the tire.

In the present case the standard hydraulic cylinders for operating the guide or truing up the rolls have been replaced by a central electric motor which working through its proper connections, screws, levers, &c. furnishes a more positive and exact movement to the rolls in question.

In the traveling carriage the lower driven edging roll has been made a cone of similar dimensions to the upper one, this detail is believed to be new and its value is apparent. These coned rolls are so proportioned that the point of intersection of the center line of each roll with its corresponding elongated face line coincides with the center of a five foot tire, this dimension (five feet) being settled upon because of representing from 90% to 95% of the total number of tires (locomotive and car wheels) owned and operated by one of the largest trunk lines in the United States, but of course this dimension can be changed without in any way altering my invention. The standard construction of these edging rolls is either two parallel cylindrical rolls, or one cylindrical bottom roll operating in conjunction with a conical top roll. The purpose of these rolls is to reduce the width of the tire down to its finished dimensions; and the purpose of the automatic arrangement of the guide rolls is two fold, first to produce a tire so true that little or no turning is necessary; second, to minimumize labor by saving one or more operators, as well as doing away with his or their personal errors.

In the accompanying drawings forming part of this specification, and in which similar figures of reference indicate similar parts throughout the several views: Figure 1, a plan of my improved tire rolling mill; Fig. 2, an enlarged section on line 2—2, Fig. 1, showing the flanged edging rolls and the means for carrying them; Fig. 3, a section on line 3—3, Fig. 2; Fig. 4, a section on line 4—4, Fig. 2; Fig. 5, a section on line 5—5, Fig. 2, showing pull back cylinder and piston and tie rods for lifting upper conical edging roll; Fig. 6, a sectional plan view of part of main movable carriage, the section being on line 6—6, Fig. 7; Fig. 7, a section on line 7—7, Fig. 6, showing the mechanism for driving the guide rolls 101; Fig. 8, a section on line 8—8, Fig. 6; Fig. 9, a section on line 9—9, Fig. 6; Fig. 10, a plan view of one of the guide rolls shown in Figs. 8 and 9; Fig. 11, an enlarged plan view of one of the swinging guide rolls, its carrying lever and connected parts; Fig. 12, a section on line 12—12, Fig. 11; Fig. 13, a section on line 13—13, Fig. 11, that is, through one of the swinging guide rolls, its bearings, etc. Fig. 14, a section on line 14—14, Fig. 11, that is, through the sliding and trunnioned nut for actuating lever 126, the driving screw being shown in plan; Fig. 15, a section on line 15—15, Fig. 12; Fig. 16, a section on line 16—16, Fig. 12; Fig. 17, a section on line 17—17, Fig. 1, that is, a vertical section through the driven and compression rolls and connected parts; Fig. 18, a section in line 18—18, Fig. 17; Fig. 19, partly a plan and partly a section of the main compression roll and connected parts taken approximately on line 19—19, Fig. 17; Fig. 20, a sectional elevation of compression roll and carriage, part of the latter being shown in elevation; Fig. 21, a similar view of a smaller roll that can, if need be, be used in place of roll shown in Fig. 20; Fig. 22, a section of Fig. 20 on line 22—22; Fig. 23, a detailed view of bolt, shown in line 22—22; Fig. 23, a detailed view of bolt, shown in Figs. 20—22; Fig. 24, a vertical section of Fig. 17 on line 24—24; Fig. 25, a detailed sectional view of driven roll and part of upper end of its carrying shaft and upper bearings; Fig. 26, a section of Fig. 25 on line 26—26; Fig. 27, a section of Fig. 25 on line 27—27; Fig. 28, a section of Fig. 25 on line 28—28; Fig. 29, an enlarged detailed view of the lower part of Fig. 17; Fig. 30, a section of Fig. 29 on line 30—30; Fig. 31, a section of Fig. 1 on line 31—31; Fig. 32, a section of Fig. 31 on line 32—32; Fig. 33, a section of Fig. 31 on line 33—33; Fig. 34, a section of Fig. 31 on line 34—34; Fig. 35, a side elevation of operating lever for clutch; Fig. 36, a front elevation of Fig. 35; Fig. 37, a section of Fig. 1 on line 37—37; Fig. 38, a section of Fig. 37 on line 38—38.

To use the machine a slab is properly forged and punched after which it is inserted in the machine in a horizontal position. This blank has a diameter very much smaller than the finished tire while the cross section of metal is correspondingly greater.

In Fig. 1, which is a plan of my machine, 39 represents a tire in place between the rolls which are as follows: 40, Figs. 1, 17—19—24—25, is a driven vertical main roll carried on a shaft 41 which carries a bevel gear 42 which meshes with and is driven by a

bevel gear 43, Fig. 17, which is carried on one end of a shaft 44, the other end of which is connected to and driven by an engine in any suitable manner. The gears 42—43, as well as their vertical and horizontal bearings, rest on a cast plate or platform, 45, which is again supported by a cast plate 46. This cast plate is suspended from the top frame 1 by the side pieces 47, Fig. 24. In this manner the vertical shaft 41 and the horizontal shaft 44, with their gears and bearings are made part of the machine proper, thus maintaining a proper alinement and doing away with separate foundations. The vertical roll 40 is driven from the shaft 41 through the usual keys and pins but the shaft 41 is hollow from end to end and through this hole is placed a rod 48 the upper end of which is fastened to a bell shaped cup 49. The outer periphery of the tire rests against and is rolled by roll 40, and while the drawing shows a plain roll this roll might be furnished with a groove so as to roll a flanged tire. The purpose of the cup 49 is to be forced down against the upper edge of the tire, thus holding it in place and preventing it from lifting at this point, which action would be disastrous with a flanged tire. The lower end of rod 48 is attached to a swiveled coupling 50 from the inside of which depends the cross piece 51. This cross piece is prevented from turning by guides in the cylinder casting 52 and it is connected by eye bars 53 to the piston 54. By admitting pressure water to cylinder 52 the piston 54 is forced downwards holding, through rod 48, the cup 49 against the tire. When the pressure is exhausted in cylinder 52 the counterweight 55, acting through a fulcrumed and forked lever, 56, a plan of which is shown in Fig. 18, forces the swiveled coupling 50 upwards and releases the tire.

The vertical shaft 41 is at its top held in a bearing which is located in the main top frame 92. This bearing is made up of separate pieces so as to allow for wear of journals, but it is also provided with two keys 57—58, Figs. 17—25—27—28, the purpose of which is to conveniently adjust the shaft 41, in case of wear of the roll, so as to always maintain the point x of the roll 40 in the same position, this being necessary to maintain the true circle.

Bearing against the inside of the tire, and close to roll 40, is the idler roll 59 which is revolving upon a vertical stationary shaft 60, Figs. 19, 20, 21. This shaft is firmly fixed in the sliding frame 61. To the opposite end of this frame are attached two bolts 62—63 which in turn are fastened to the cross head 64, Figs. 1 and 17, which is operated by the cylinder 65 and its piston 66. When pressure of water is admitted to cylinder 65, this pressure is transmitted through the bolts 62—63 and sliding frame 61 to the vertical stationary shaft 60 which again forces the idler 59 against the inside of the tire which in turn is backed up by the roll 40, thus reducing the blank in thickness radially while the roll 40 is being revolved. When the tire is finished and the water is exhausted in cylinder 65 the constant pressure cylinder 67, Figs. 1—17—19, with its piston 68 pushes the roll 59 away from the roll 40 and leaves the tire clear for removal at this point.

The edging rolls 69—70, Figs. 1—2, are attached to a sliding frame which is made of two pieces 71—72, Figs. 1—2—4, which are secured together. Roll 70 is an idler revolving around a shaft 73 which in turn is pushed down by the cylinder 74 through its piston 75. The shaft 73 is surrounded by a vertically sliding bearing 76 which is operated by piston 75 through a sliding joint. The rear end of shaft 73 is pivoted on trunnions 77, permitting it to swing around same.

A pull back cylinder 78 acting through its piston 79 and tie rods 80, Figs. 2—4—5, pulls the conical roll 70 upwards and away from the tire the moment the water is exhausted from cylinder 74.

The lower edging roll 69 is keyed to the shaft 81, the lower end of which is driven from the horizontal main driving shaft 44 through conical gears 82—83. The bearings 84 and 85 are provided with adjustable keys and screws 86 so as to take up wear of roll 69 for the purpose of maintaining the alinement of the mill, the same purpose being accomplished with the top roll 70 by operating the screws 87, Fig. 3.

To the lower half frame 72, Fig. 2, is attached a bearing 88 which surrounds the projecting hub of the gear 82 to which is fastened an inside key 89, which again is driven by the main shaft 44. This shaft is provided with a key slot running through a considerable part of its length in order to enable the carriage frames 71—72, with their rolls and shafts, to move backwards and away from the rolls 40 and 59, while the tire is being rolled so as to suit its increasing diameter. This movement of the frame takes place in guides 90, Figs. 2—4—19—24, the forward continuation of which furnish the guide slots for the sliding carriage 60 which carries the vertical idler pressure roll 59.

91, Fig. 1, is an electric motor attached to the frame 92. Its pinion 93 meshes with the gear 94 on the long shaft 95. The two gears 96 on the ends of this shaft mesh with the gears 97 on the screw shafts 98, Figs. 1 and 6. To the upper sliding frame casting 71 are attached the two side arms 99, Figs. 1—4—6—8—9 and 10, which are securely bolted together. Sliding on the forward side of the side arms 99 are the two frames 100 containing the guide or centering rolls 101 which engage the outer periphery of the blank or tire. These rolls revolve on stationary pins 102 which are carried at the top and bottom in bearing blocks 103, 104, said blocks being adjustable through screws and wedge blocks 105 or other suitable means.

To the ends of arms 99 are attached the pieces 106 which contain bearings for the screws 107, Figs. 1, 7, 8, 9. The turning of these screws affords a reciprocating movement to the frames 100 through the nuts 108, these nuts being inserted in said frame in such a manner that they abut against and are immovable inside of them. On the extreme outer ends of these screws are attached the gears 109 meshing with each other, thus insuring a motion to both if either one is driven. The bearings for these screws contain collars 110, Fig. 7, so as to take up end thrust. To one of the screws is attached a spiral gear 111, which meshes with a spiral pinion 112, Figs. 6 and 7, which is attached to the side screws 98 by a sliding key 113. On each side of the sliding pinion 112 are the bearings 114, one or both of which contain nuts 115 that mesh with screw 98. These nuts are held in such a manner as to prevent their turning with the screw. It will be seen that if the side screws 98 are made one left and one right and if the screws 107 are also made one right and one left, the rotation of the shaft 95 will cause the carriage 71—72

to move inwards or outwards while at the same time the frames 100 are simultaneously sliding inward or outward on the side arms 99. If when rolling the carriage 71—72 is intended to slide backward and the frames 100 are simultaneously to slide outward, this can be accomplished with the mechanism shown and described with a proper selection of screws to be right or left and vice versa.

On the shaft 95 the gear 96 is not keyed but its hub runs through the bearing 116, see Fig. 37, and is bolted to a flange casting 118, which is rigidly keyed to shaft 95. This bolt connection is made so light that in case any undue strain should come to the screws above described these bolts will shear, thus forming a breaking point to act as a safety device in case of excess strain. I do not desire to confine myself to any particular safety device for this purpose; any suitable device can be used.

On the shaft 95 is the pinion 119 meshing into gear 120; on the shaft of this latter gear is the pinion 121 meshing into gear 122, Figs. 1—17. The shaft 123 for this latter gear continues out each side of it, one end being threaded right, the other left. Two cross heads 124, form nuts for the two screws above mentioned. The tops and bottom parts of the cross heads are trunnion shaped and are surrounded by square blocks 125, which are located in the bifurcated short ends of levers 126, Figs. 1, 11, 12, 14. These levers are fulcrumed on stationary pins 127 which are carried by the main frame 92. It will be seen that a turning of pinion 119 will cause a turning of levers 126 around their fulcrums, the blocks 125 sliding out and in in the bifurcated outer end of the levers while at the same time following the trunnion shaped nut 124 out and in on the screw 123. The trunnion shaped nut is prevented from following the screw in its revolution by being guided on its one side by and against the guide block 128, Figs. 1, 11 and 12, this guide block being bolted down solidly to the frame 92. This guide furnishes also a means for taking up the great side thrust which is caused by the small angle between the screw and the bifurcated lever arm. If this angle was 90°, that is, if the center line of lever and center line of screw were at right angles, there would be no side thrust. The opposite, or long or inner end of the lever 126 carries a guiding roll 129. This roll is carried by the sliding frame 130 with blocks, keys and screws, as are the guide rolls 101. The frame 130 slides in and out on the guide piece 131, said guide piece being at its two ends fastened to and held by the main frame 92. It is now seen that the turning of pinion 119 will swing lever 126 on its fulcrum and push or pull the frame pieces 130 in or out on the guide 131 depending upon the direction of its rotation.

In adjusting the blocks, keys and screws to take up wear on roll 129, it will be necessary to have a side adjustment in the top and bottom parts of the long end of lever 126. This adjustment is taken up by keys 132, Figs. 11 and 13, or other convenient means for accomplishing the same end. Gear wheel 94 on shaft 95 is not directly connected to said shaft but is keyed to a sleeve 133, Fig. 31, which passing through the bearings 134—135, is shaped so as to form part of a positive clutch, the other part 136 of which is keyed to shaft 95. The clutch as shown, or similarly constructed, is for the purpose of enabling the driving of the side screws 98 to be discontinued, permitting the working of the guide rolls 129 only, but leaving the guide rolls 101 as well as the carriage 71 and 72 to remain at rest. This proceeding is at times necessary when running on special small rings when otherwise the conical rolls 69—70, if permitted to continue their inward movement, would interfere with the sliding frame 61.

The gear 94 connects to pinion 119 by having the sleeve of this pinion pass through bearing 134, and by then being bolted to the flanged end of this sleeve through bolts 137 of such light dimensions that any unusual strain would break them. It is thus seen that any undue resistance in connection with the screws, levers, &c., for operating the rolls 129 would merely shear the bolts 137. I do not confine myself to this safety device; any equivalent may be used.

In Fig. 33, a front view of the coupling 133—136 is shown. Figs. 34—35—36 show a lever 141 for operating this coupling, but any other form of apparatus may be used.

In machinery of this sort it is very important to be able to change the rolls rapidly. The guide rolls 129—101 are shown in the drawings as correct for a flat tire. If a flanged tire is to be manufactured the rolls as shown will have to be removed and grooved rolls inserted. The pins 102 and 138, Figs. 8—10—13—15, are prevented from lifting and turning by a cap piece 139 which is fastened to the sliding frame 101—130 by two bolts 140. The middle part of this cap is slotted as shown in Fig. 10 and the upper ends of pins 102—138 are milled or planed to match this hole. It is thus seen that the pins 102—138 can neither rise nor turn when once set in a certain position. It will be furthermore seen that by removing the nut on the bolt 140 the cap 139 can be lifted out of connection with the pins 102—138 after which these pins can be pulled up bodily and the rolls 101—129 taken out sidewise.

In solving the problem of the automatic action of the four guide rolls so that they will all act to maintain a perfect circle with relation to point x, Fig. 19, of the driven roll 40, not only a proper relation between the speeds of the necessary gears, screws, levers, rolls and motor must be observed but also there must be established and determined the proper angles A and B, Fig. 11, and the angle D, Fig. 6.

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

1. The combination in a tire rolling mill, of a main frame, a driven roll carried by said frame and adapted to engage one side of the tire, means for driving said roll, a movable pressure roll adapted to engage the other side of the tire, means for carrying and means for moving said roll towards or away from said driven roll, longitudinal slideways upon said frame, a carriage carried by said slideways, a motor, threaded shafts upon opposite sides of said frame adapted to drive said carriage, driving connections between said motor and threaded shafts, slideways upon opposite sides of said carriage, slides mounted on said slideways, means actuated from said threaded shafts for driving said slides, and guide rolls carried by said slides.

2. The combination in a tire rolling mill, of a frame, a roll carrying carriage movable lengthwise on said frame, a motor, threaded shafts upon opposite sides of said frame driven from said motor and driving said carriage, slideways upon opposite sides of the carriage, slides car-

ried in said slideways, screws for driving each of said slides, gear wheels carried by said screws, a gear wheel slidably mounted on and turning with each of the motor driven threaded shafts gearing into and driving said gear wheels on said screws and through said screws said slides, and guide rolls carried by said slides.

3. The combination in a tire rolling mill, of a frame, slides carried transversely of said frame, two levers one pivoted to one side and the other to the other side on said frame, guide rolls pivoted in sliding bearings mounted in the inner ends of the said levers, a second set of slides carried transversely of said frame on which said sliding bearings travel, blocks slidably mounted in the outer ends of said levers and engaging the first mentioned transverse slides, and means for moving said blocks towards or away from one another.

4. The combination in a tire rolling mill, of a frame, slides carried transversely of said frame, two levers, one pivoted to one side and the other to the other side on said frame, guide rolls pivoted in sliding bearings mounted in the inner ends of the said levers, said sliding bearings carried transversely on the said frame on one of the slideways on which slideways said bearings travel, blocks slidably mounted in the outer ends of said levers and engaging the first mentioned transverse slides, and means for moving said blocks towards or away from one another.

5. The described means for operating the pivoted guide roll carrying levers of a tire rolling mill, and in combination with said levers and a main frame to which said levers are pivoted, a sliding block carried in a slot in the outer end of said levers, a trunnioned nut carried in said block, a screw passing through and driving said nut, a stationary guide mounted on said frame and placed to the outer side of the fulcrum of said levers and parallel to said screw and adapted to slidably support the trunnioned nut, a motor, and a driving connection between said motor and said screw.

6. In a tire rolling mill, in combination, a pivoted lever the inner arm of which is bifurcated and slotted to receive a block and the outer arm of which is adapted to be actuated to rock it upon its fulcrum, means for rocking said lever, sliding blocks adapted to be carried in the slots in the inner end of said lever, a pin carried by said block, a guide roll carried by said pin, a sliding frame carried by said pin, and a stationary guide upon which said frame slides, said stationary guide being placed to the inner side of the fulcrum of said lever.

7. The combination with the guide rolls, of a pin upon which said rolls revolve, bearings for carrying said pin, a cap rigidly enveloping the free end of said pin, a slidable member for carrying said bearings, and means for removably connecting said cap to said slidable member.

8. In a tire rolling mill, in combination, a roll, a cup enveloping and longitudinally movable on said roll, and means for longitudinally moving said cup in relation to said roll.

9. In a tire rolling mill, in combination, a roll, a hollow shaft carrying said roll, a rod passing through said shaft, a cup carried by said rod and enveloping said roll, and means for moving said rod longitudinally of said shaft.

10. In a tire rolling machine, in combination, a roll, a hollow shaft carrying said roll, a rod passing through said shaft, a cup carried by said rod, and means for moving said rod longitudinally of said shaft.

11. In a tire rolling mill, in combination, a frame, a driven roll, a hollow shaft carrying said roll, a rod passing through said shaft, a cup carried by said rod, a swiveled coupling on said rod, a piston connected to said rod, means for actuating said piston, and a counterweighted lever pivoted to said frame for normally holding said rod and connected parts in an elevated position.

12. The combination with the main frame and the vertical driven roll of a tire rolling mill, of a platform, a step bearing for the lower end of the shaft of said driven roll carried by said platform, and frames depending from said main frame for carrying said platform.

13. In a tire rolling mill, in combination, a main frame, a vertical driven shaft, bearings carried by said frame for the upper end of said shaft, a bevel gear carried by said shaft, a main driving shaft, a bevel gear on said shaft driving said first bevel gear, a platform carrying a step bearing for the lower end of said vertical shaft, and a circumferential bearing for the inner end of said driving shaft, said bearings, and frames carried by and depending from said main frame for carrying said platform.

HENRIK V. LOSS.

Witnesses:
H. HAYES AIKENS,
WM. L. ACHILLES.