No. 845,457. PATENTED FEB. 26, 1907.

C. N. FREY.

PRESS.

APPLICATION FILED JAN. 14, 1907.

6 SHEETS—SHEET 1.

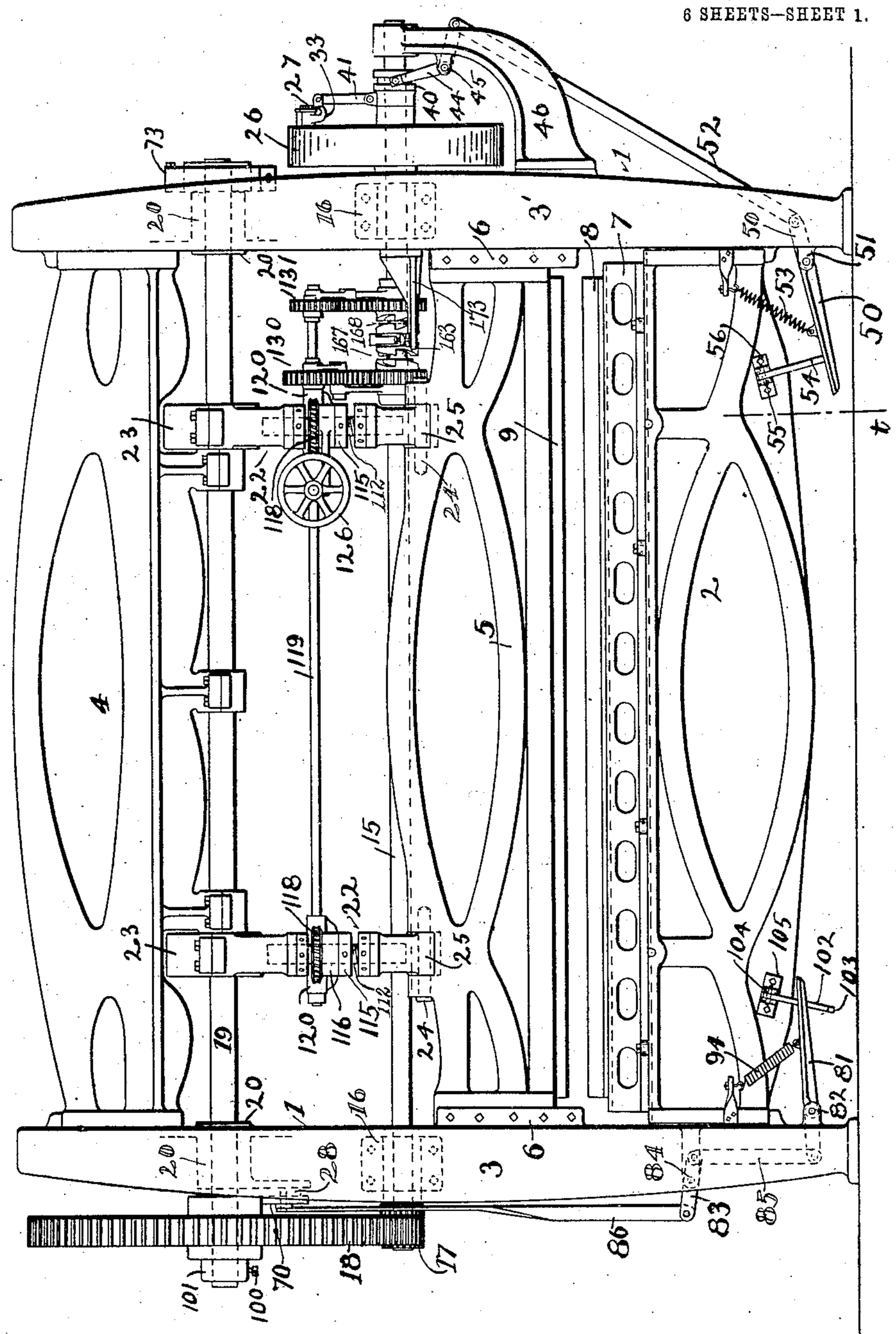

Fig. 1.

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6 SHEETS—SHEET 2.

Fig. 2.

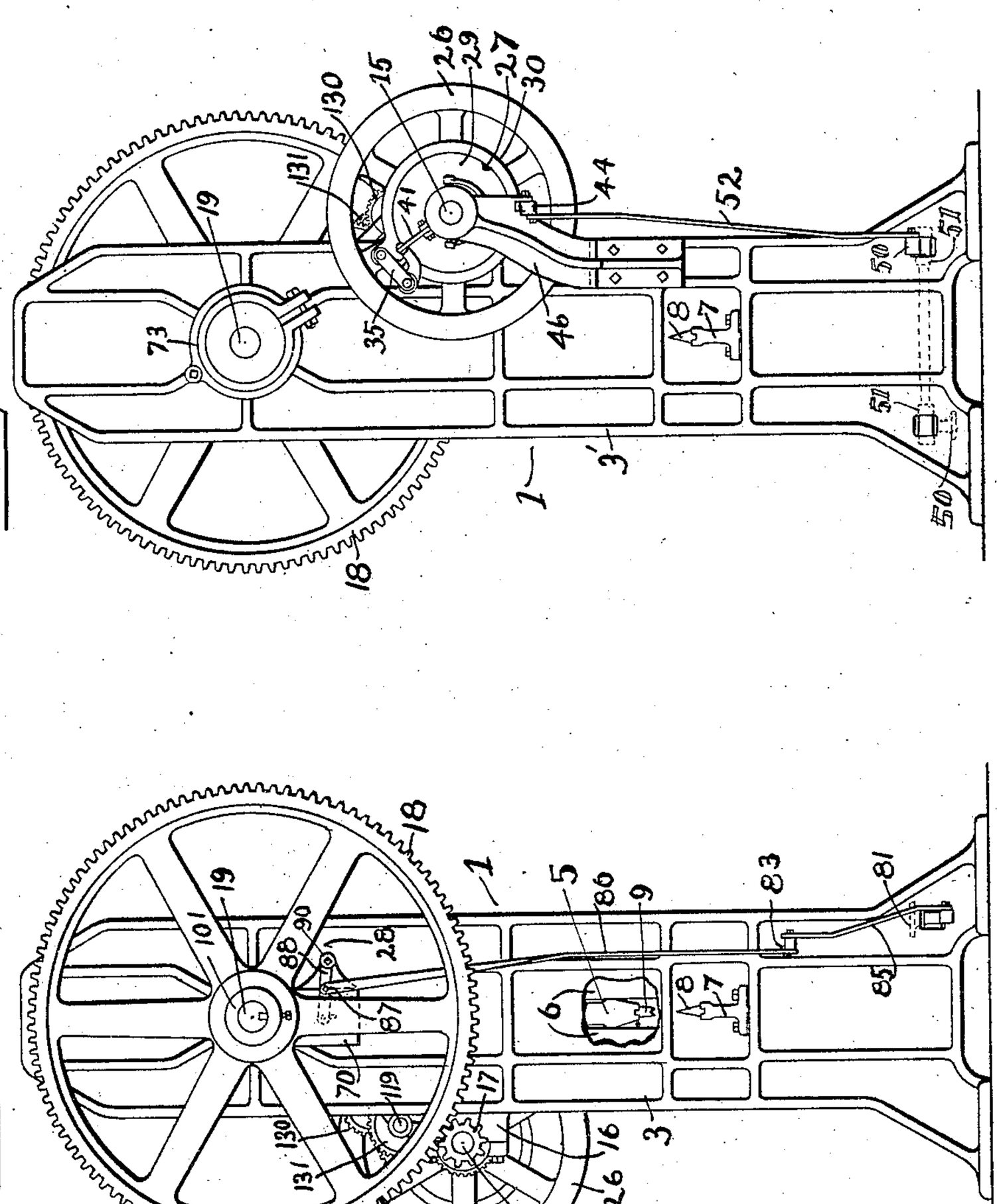

Fig. 3.

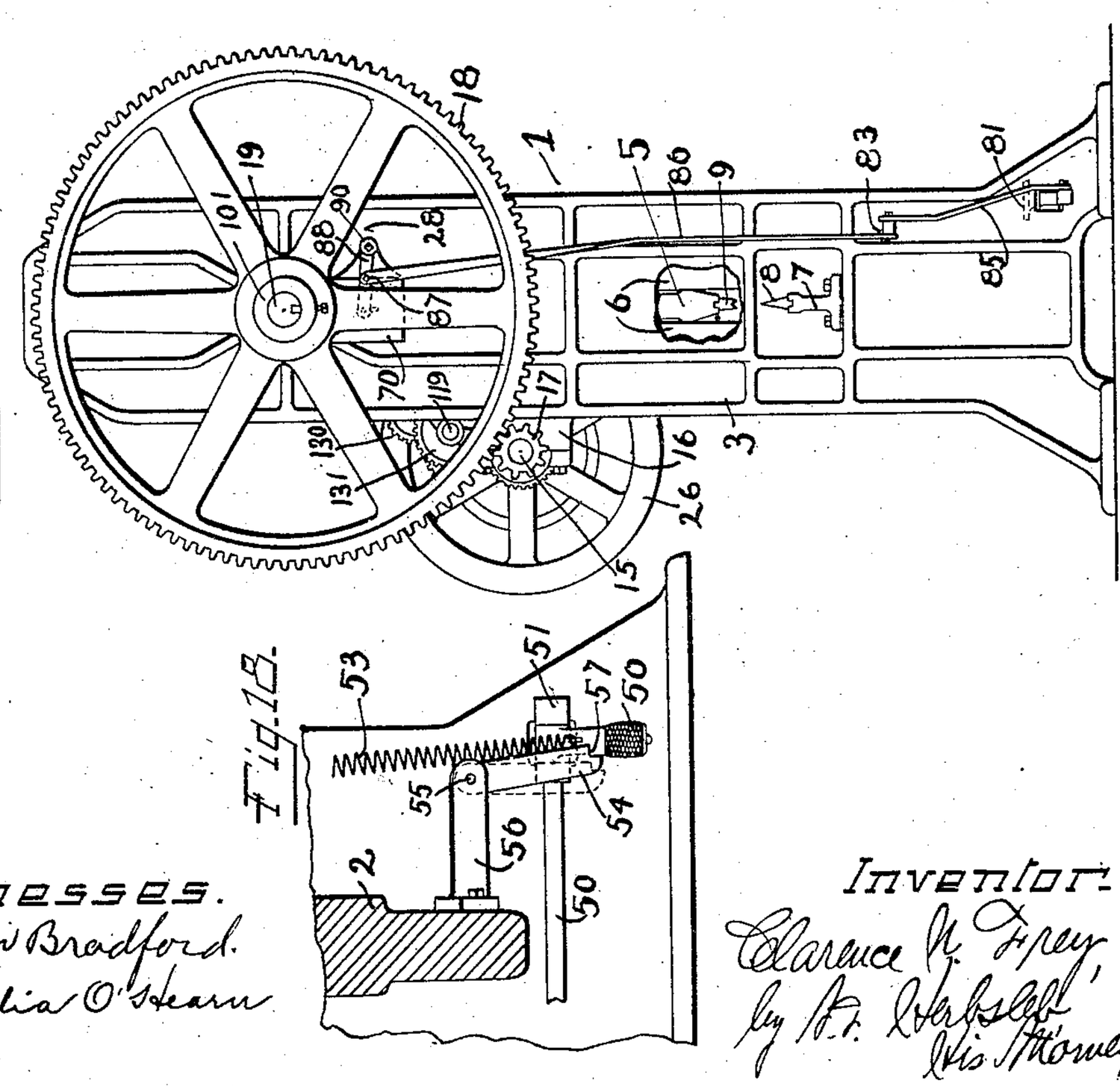

Fig. 18.

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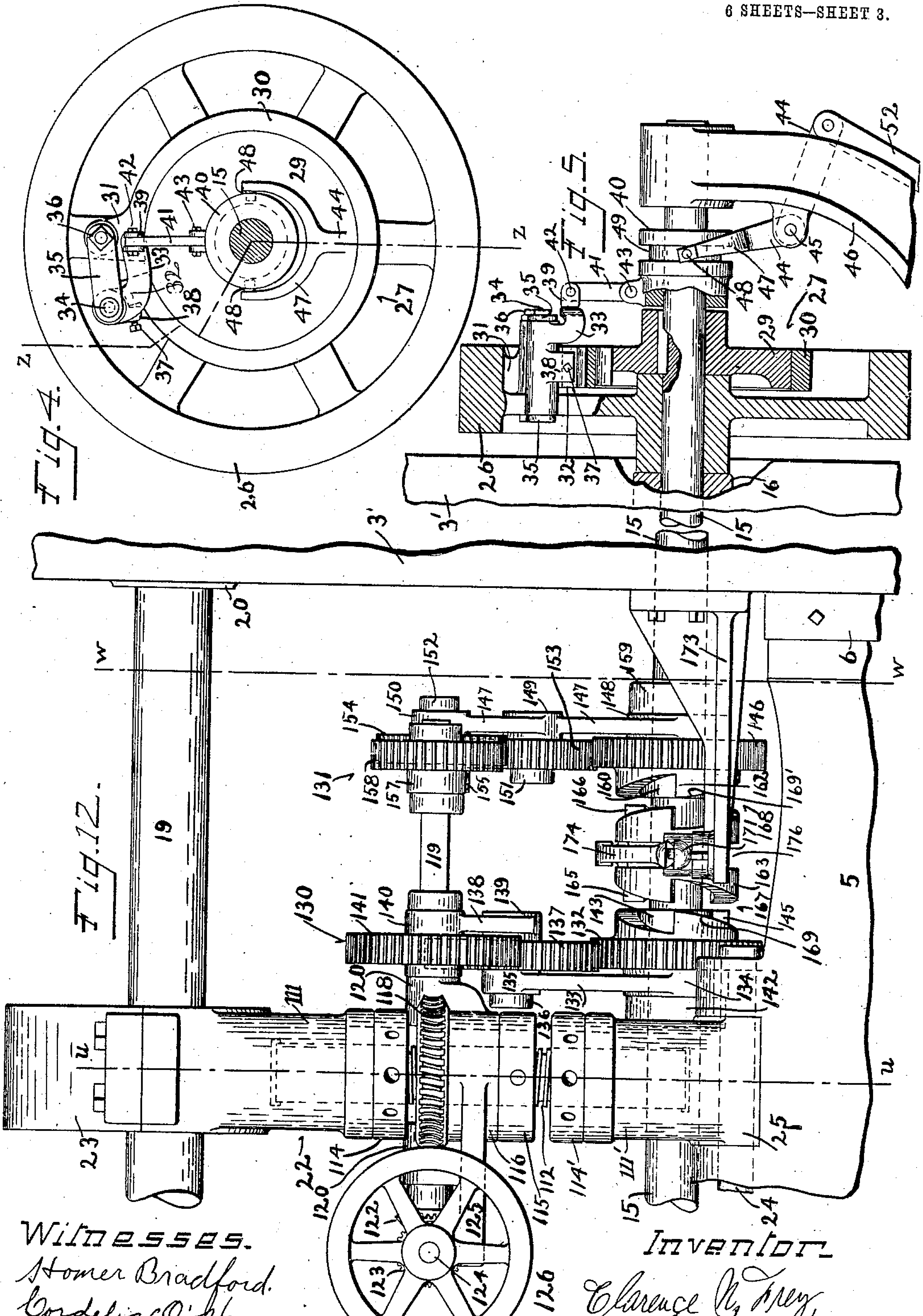
6 SHEETS—SHEET 3.



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6 SHEETS—SHEET 4.

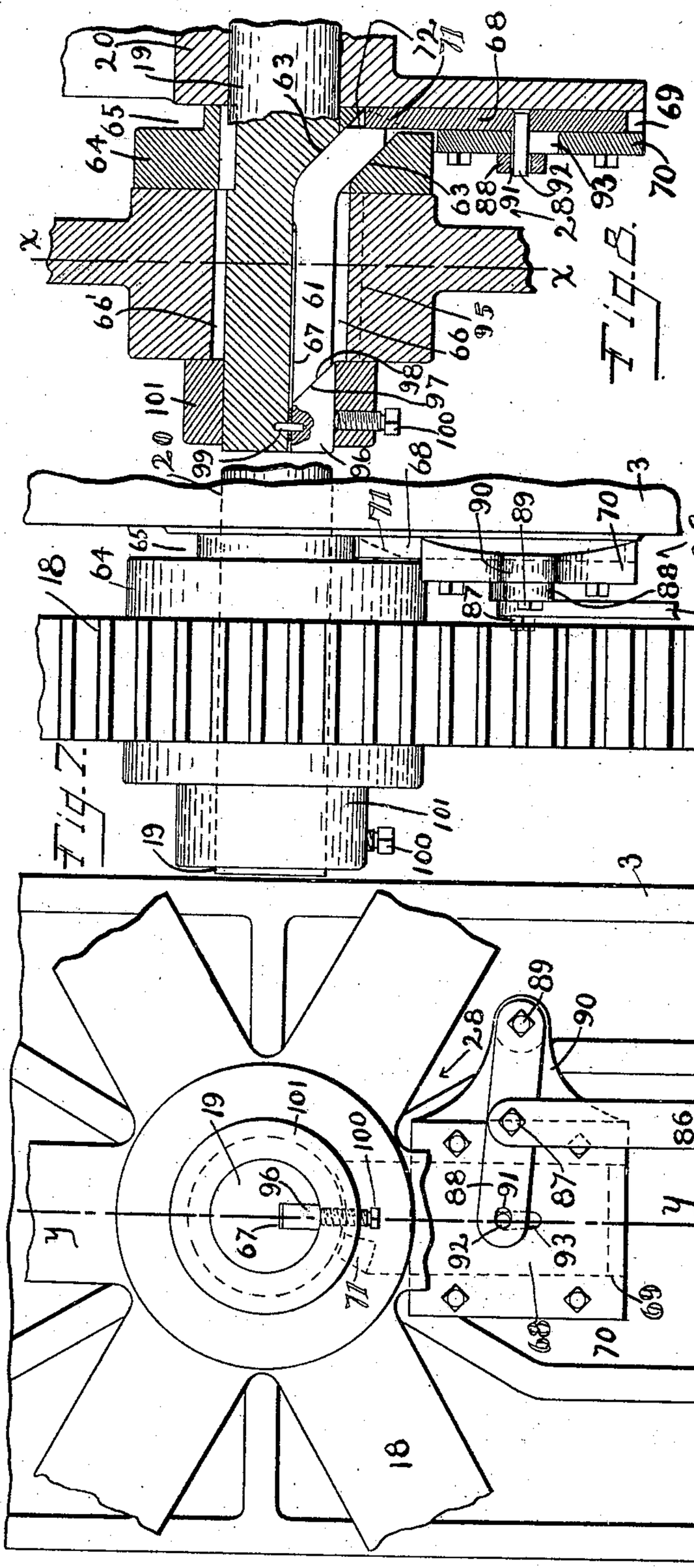

FIG. 8.

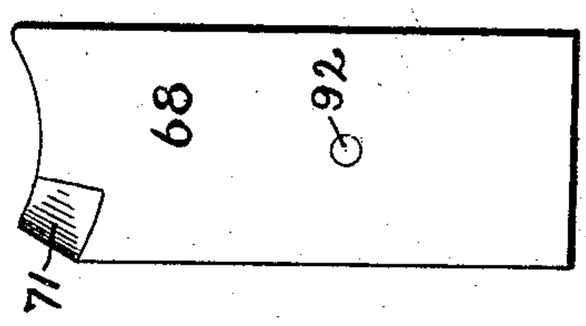

FIG. 11.

FIG. 7.

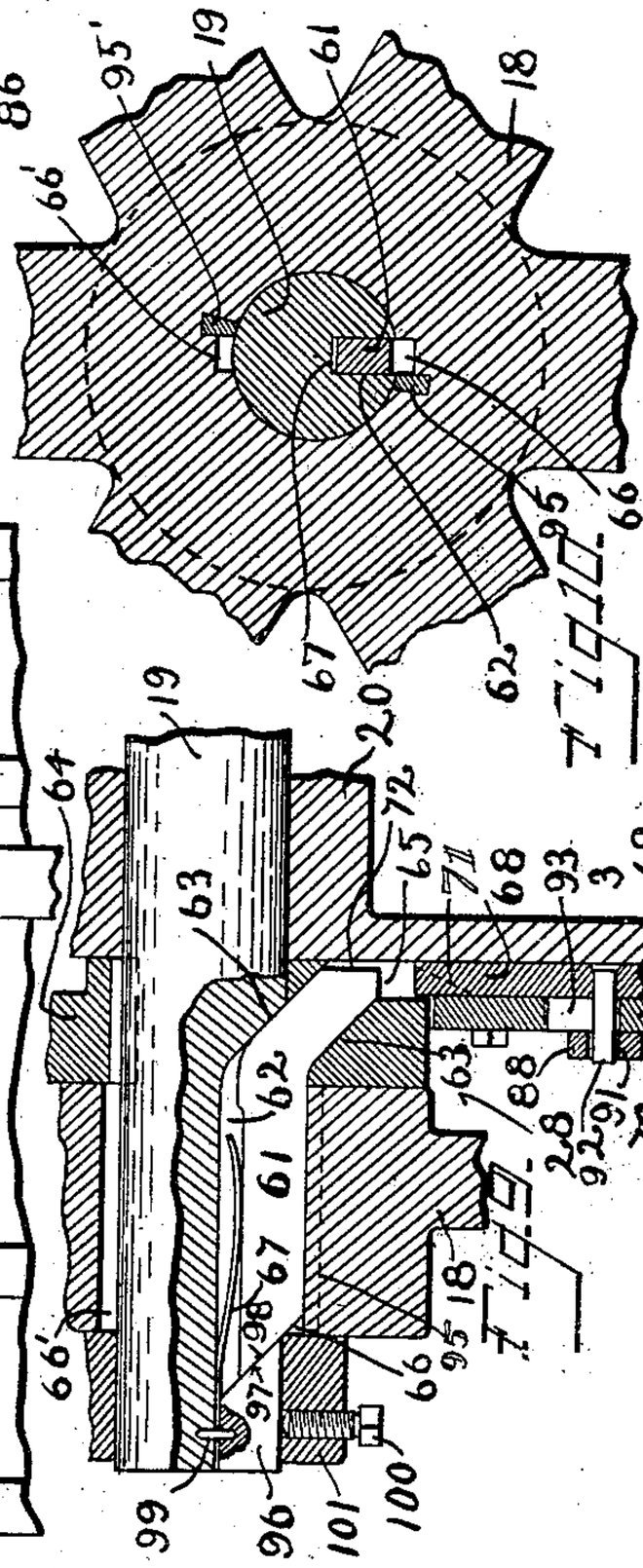

FIG. 10.

FIG. 6.

FIG. 9.

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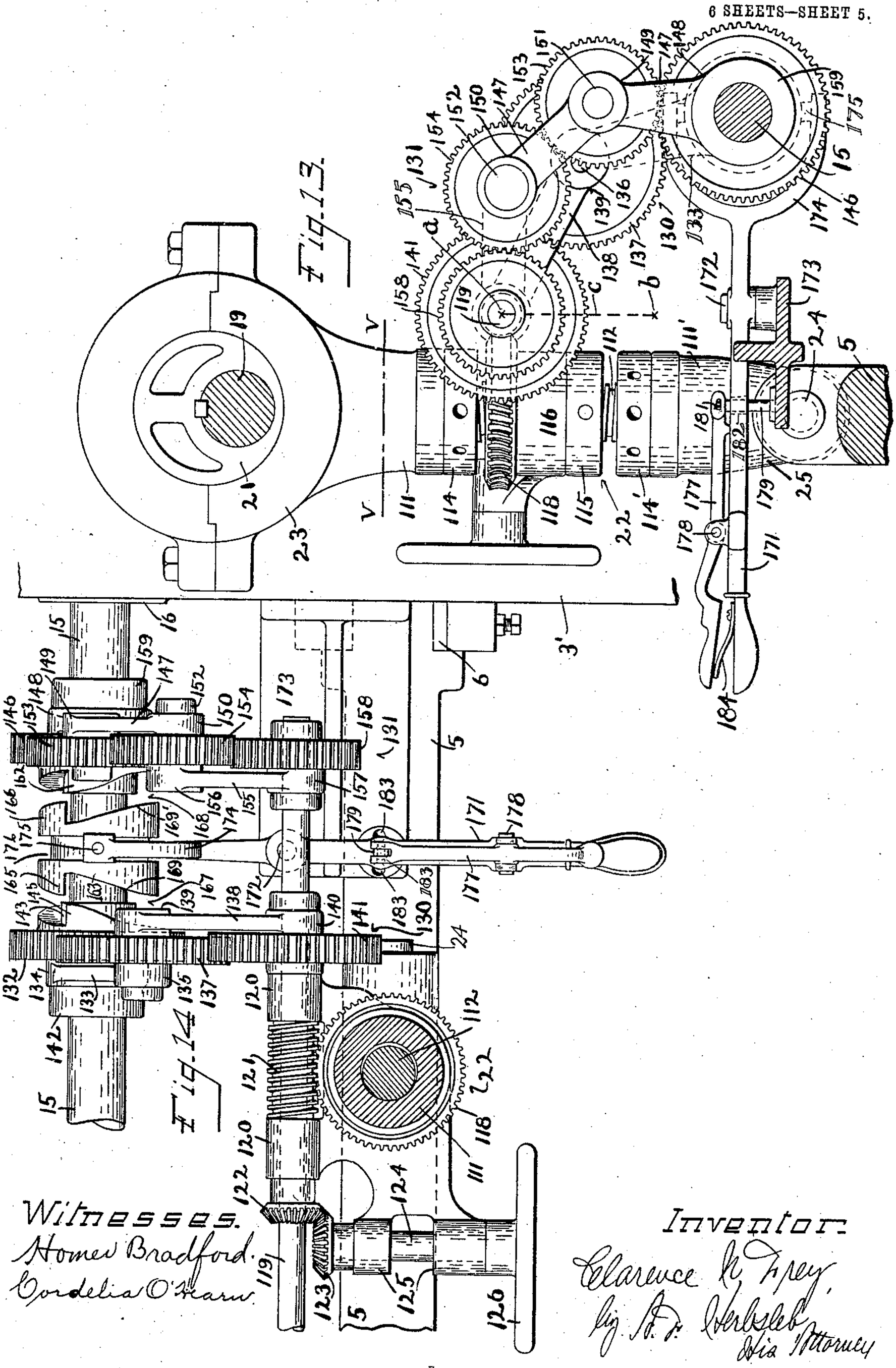
6 SHEETS—SHEET 5.



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PRESS.

APPLICATION FILED JAN. 14, 1907.

6 SHEETS—SHEET 6.

Fig. 16.

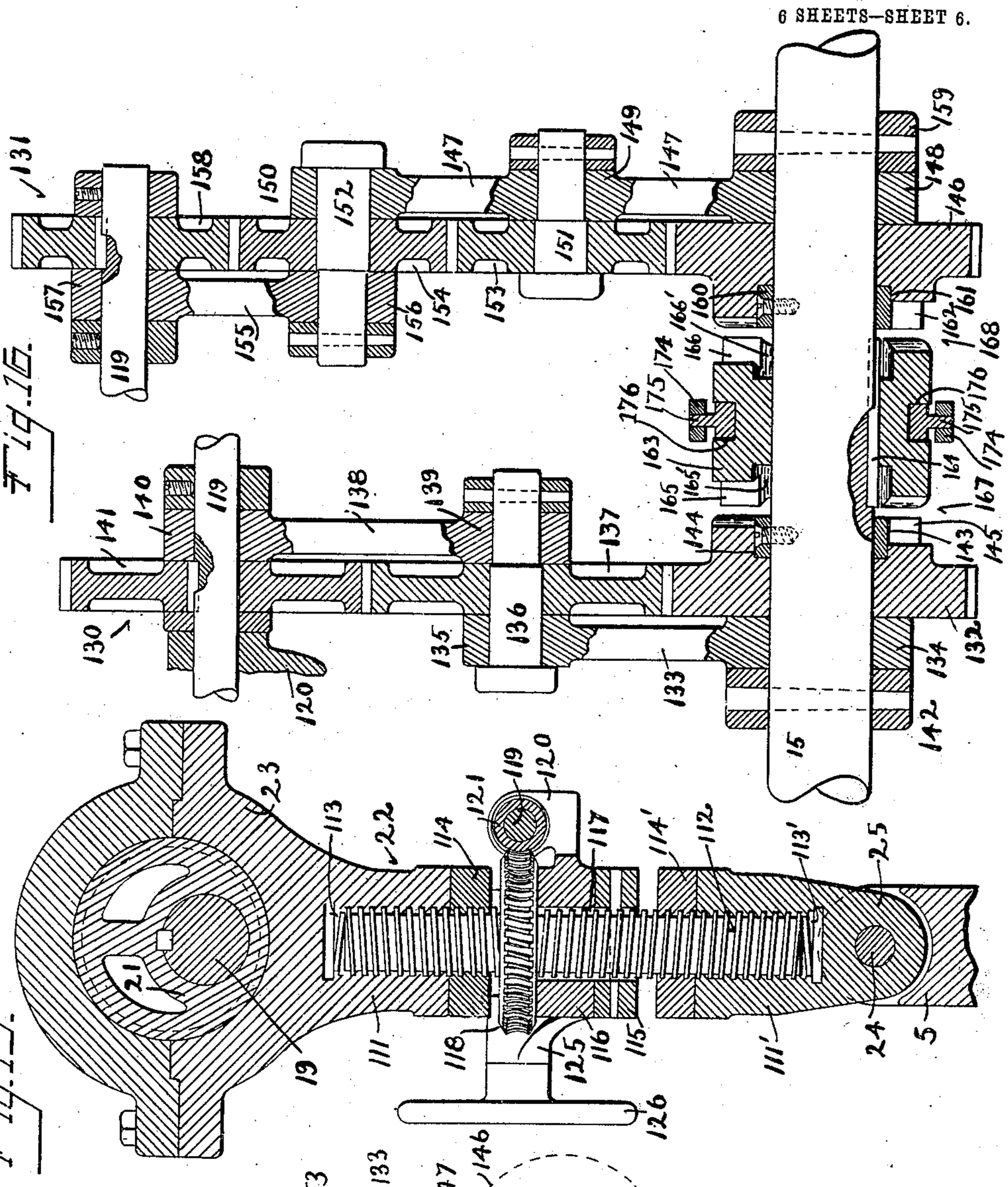
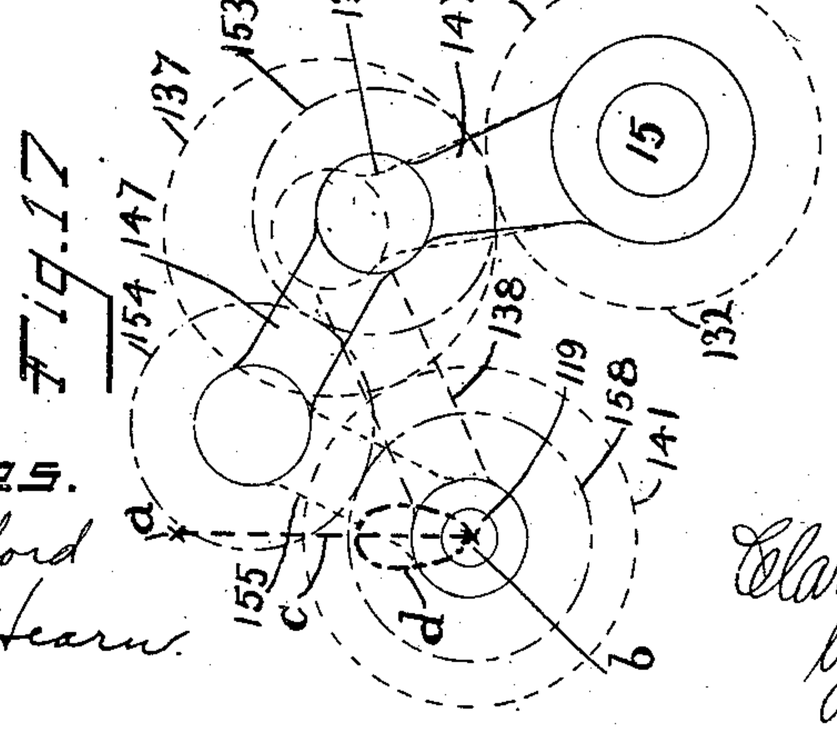


Fig. 15.

Fig. 17.



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UNITED STATES PATENT OFFICE.

CLARENCE N. FREY, OF CINCINNATI, OHIO, ASSIGNOR TO THE J. M. ROBINSON MANUFACTURING COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

PRESS.

No. 815,457. Specification of Letters Patent. Patented Feb. 26, 1907.

Application filed January 14, 1907. Serial No. 352,193.

To all whom it may concern:

Be it known that I, CLARENCE N. FREY, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Presses, of which the following is a specification.

My invention relates to presses of the character employed in pressing sheet metal or the like into shape, and is principally useful in so-called "cornice-presses" employed, for instance, in bending the sheet metal of cornices, metal window-frames and sash, ridge and combing caps, and the like into shape. In machines of this character the sheets are formed up between opposing dies. In work of the character mentioned the sheet during the process of being formed is given a number of different and ofttimes unwieldy shapes, for which it is impracticable and sometimes impossible to provide stationary gages against which to guide the work with relation to the dies. It is the practice, therefore, to manually position or adjust the work with relation to the dies guided by marks or measurements on the work. I have also found it advisable when a number of pieces of work are to be provided with similar bends to first determine the drawing effect of the dies upon an initial sheet, so that the subsequent sheets may be guided accordingly by punch-marks, which form knobs on the lower faces of the sheets arranged to impinge the lower die. I have therefore provided means whereby the dies when the plunger is under the influence of the positive throw-out clutch may be gradually brought close together, so that the points of impact of the dies upon the work may be accurately gaged by the eye before the bending stroke of the dies is completed, and I further provide means whereby the partial or the full stroke of the moving die may be selectively delivered upon the work, so that the moving die may either be brought gradually close to the work and then the final bending stroke delivered or the bending stroke may be delivered from the point of greatest separation of the dies—that is, by a full speedy uninterrupted stroke of the moving die—and I further provide means whereby the latter stroke, effected through the positive throw-out clutch, may be instantly interrupted at any point in the descent of the die, so that if an incorrect positioning or a shifting of the work upon the lower die should take place the descent of the plunger may be stopped, and thus save the piece of work from improper bending. I further provide novel means whereby the distance between the dies may be adjusted, it being understood that in a machine of this character the plunger which supports the moving die is usually very heavy, being sometimes as much as ten feet or more in length. I have provided means whereby this adjustment may be accomplished by hand or by power, and for accomplishing the power adjustment I have provided trains of gearing between the driving-shaft and the adjusting-shaft arranged in such manner that the driving-shaft may be stationarily positioned in the frame of the machine and the adjusting-shaft permitted to follow the movements of the eccentric arms or pitmen throughout their adjustments and when performing their plunger-actuating functions, the movement of this latter shaft being in an up or down direction while being adjusted and in an oval direction during the plunger-actuating movement, resulting in continuous change of distance and direction between the adjusting-shaft and the driving-shaft at each adjustment and stroke of the plunger, my improved construction, however, insuring that the trains of gearing between the driving-shaft and adjusting-shaft shall continuously remain in mesh, so that the adjustments may be accomplished at any point of the stroke of the plunger.

The invention will be readily understood from the foregoing statements and from the following description and claims and from the drawings, in which latter—

Figure 1 represents a front elevation of my improved device. Fig. 2 is a head-end elevation of the same. Fig. 3 is a tail-end elevation of the same. Fig. 4 is a side elevation of the friction-clutch. Fig. 5 is a section of the latter on the line *z z* of Fig. 4. Fig. 6 is an end elevation of the positive throw-out clutch. Fig. 7 is a front elevation of the same. Fig. 8 is an axial vertical section of the positive throw-out clutch, taken on the line *y y* of Fig. 6, showing the clutch in released relation. Fig. 9 is a similar view of the same, showing the clutch in engaged relation. Fig. 10 is a cross-section of the

positive throw-out clutch on the line *x x* of Fig. 8. Fig. 11 is a detail in side elevation of the trip for the positive throw-out clutch. Fig. 12 is a front elevation showing the crank connection for the plunger and the means for adjusting the same. Fig. 13 is a side elevation of the same, partly in section, on the line *w w* of Fig. 12. Fig. 14 is a plan view of the same with the crank connection removed at the section-line *v v* of Fig. 13. Fig. 15 is a vertical axial section of the pitman and its connections, taken on the line *u u* of Fig. 12. Fig. 16 is a sectional view of the adjusting-gears for the pitmen laid out in plane, the section being taken on the axial lines of said gears. Fig. 17 is a diagram view of said adjusting-gears indicating their range of movement and adjustment; and Fig. 18 is a detail on the section-line *t* of Fig. 1, showing the treadle for the friction-clutch.

1 represents the frame of the machine, which comprises a lower die-bed 2 and uprights 3 3′, connected at their upper ends by a bridge 4. A plunger 5 is arranged to reciprocate up and down in guideways 6 of the uprights. The lower die-bed may comprise a pillar 7, which supports the lower die of suitable form, of which I have shown one at 8. An upper die 9 is secured to the plunger in suitable manner and is adapted to coöperate with the lower die 8 for forming up the work. The work is liable to be formed into unwieldy shapes and also usually receives different shapes during the process of being formed, as it will be understood ,for instance, that certain operations upon the work require one form of die, while other operations may require other forms of dies, and then again the same die, acting upon different parts of the work while the latter is held in different relations to the die, will form the work into different shapes. The result is that in practice it is usually found inconvenient to employ a stationary guide against which the work may be placed, and that consequently the work is usually guided manually relatively to the dies by marks or measurements on the work. When the dies are spread apart, it is difficult to tell by sight just at what point the bend upon the work will take place. In order to permit the moving die to be brought toward its mate gradually or with a step-by-step movement and to thereby permit the work to be brought into true relation with the dies and also to interrupt the descent of the plunger when under the influence of the positive throw-out clutch, I have provided the instrumentalities which will now be described.

15 is a driving-shaft journaled in bearings 16 on the frame of the machine. This driving-shaft has a pinion 17 secured thereto, which latter meshes with an operating-gear 18, journaled upon an operating-shaft 19, journaled in bearings 20 in the frame. The operating-shaft has eccentrics 21 secured thereto. 22 are pitmen having bearings 23, taking about the eccentrics and articulated with the plunger 5 by pins 24 on the plunger taking through bearings 25 on the pitmen. 26 is a driving member shown as a pulley, and 27 is a friction-clutch between the driving-shaft and the pulley 26, whereas 28 is a positive throw-out clutch between the operating-gear 18 and the operating-shaft 19.

The form of friction-clutch which I prefer to employ (see Figs. 1, 2, 4, and 5) comprises the pulley 26, which is loosely journaled on the driving-shaft. Adjacent to the pulley there is a drum 29, which is rigidly secured to the driving-shaft. A friction-band 30 is secured to or integral with and rotates with the pulley. The junction of the friction-band with the pulley takes place at one end only of the friction-band, as shown by the web 31. The other end of the friction-band is free and is provided with a heel 32. An arm 33 is pivoted, by means of a pin 34, to links 35, rigidly secured to the pulley by a bolt 36. A set-screw 37 is threaded in a lug 38 on the arm 33 and impinges the heel 32. The friction-band normally loosely surrounds the drum, so that it is necessary to compress the friction-band in order to form driving connection between the pulley and the driving-shaft. To accomplish this, a yoke 39 is secured to the swinging end of the arm 33. 40 is a collar arranged to slide longitudinally on the driving-shaft. A link 41 connects this collar with the yoke 39 through the medium of pins 42 43. A shifting-lever 44 is pivoted at 45 to a bearing-arm 46 and has a fork end 47, provided with pins 48, extending into an annular groove 49 of the shifting-collar for shifting the latter. A foot-treadle 50 is pivoted to the frame at 51, (see Fig. 1,) a link 52 being articulated to the treadle and to the shifting-lever 44. A spring 53, attached at the treadle and to the frame, normally retracts the treadle and the shifting-lever for opening the friction-clutch. A stop-bar 54 is pivoted at 55 to a lug 56 on the frame. (See Fig. 18.) This bar has a notch 57 for receiving the treadle. This stop may be placed upon the treadle for holding the same in depressed position, but is normally held out of range of the treadle by gravity. (See dotted lines in Fig. 18.)

As already stated, the operating-gear 18 normally rotates loosely on the operating-shaft 19. In order to positively connect this gear with its shaft, the positive throw-out clutch 28 is provided. (See Figs. 1, 3, 6–11.) This clutch may comprise a shifting-key 61, normally lying in a groove 62, extending longitudinally of the operating-shaft, and a slot 63, extending diagonally through a collar 64, rigidly secured to the operating-shaft. This collar is also provided with an annular rabbet 65. The hub of the gear 18 is provided

with grooves 66 66′. A spring 67 lies in the groove 62 between the key 61 and the inner wall of the groove for normally urging the shifting-key 61 into the grooves 66 66′, the key being of sufficient height to extend into the groove 62 and either groove 66 or 66′. When it is received by either groove 66 or 66′, the operating-gear and operating-shaft are caused to rotate together. 68 is a trip for the key. It is slidable up and down in a guideway 69 of a guide-piece 70. Its upper end is cut away at one edge for forming a bevel-face 71 against which when the operating-shaft rotates the inner face 72 of the key impinges when the operating-shaft turns and the trip is in raised position, for causing the key to move longitudinally of the diagonal slot 63 and out of the respective grooves 66 66′, thereby throwing out the positive clutch for disconnecting the operating-gear from the operating-shaft, the rotation of the operating-shaft being thereupon arrested, which arrest may be hastened by the friction-brake 73. The trip is normally in raised position. A foot-treadle 81 is provided for depressing the trip. The treadle is pivoted to the frame of the machine at 82. (See Fig. 1.) An intermediate lever 83 is pivoted to the frame of the machine at 84. A link 85 is articulated to one end of this intermediate lever and to the treadle, and a link 86 is pivoted to the other end of the intermediate lever. The upper end of the link 86 is articulated at 87 to a lever 88, pivoted at 89 to the lug 90 of the guide-piece 70.

The free end of the lever 88 is provided with a slot 91, into which a pin 92 extends, this pin being secured to the trip and extending through a slot 93 in the guide-piece 70. A spring 94, attached to the treadle and to the frame, normally raises the outer end of the treadle for also normally raising the trip. If it is desired to cause engagement of the positive throw-out clutch, the treadle 81 is depressed, thereby depressing the trip and causing the key 61 to be forced into one of the grooves 66 66′ when either of said grooves 66 66′ register with the groove 62 in the rotation of the operating-gear, this movement of the key being caused by the spring 67, thereby rotating the operating-shaft with the operating-gear. The treadle being immediately thereupon released, the trip 68 is raised into the path of the inner face 72 of the shifting-key for forcing the shifting-key out of the respective grooves 66 66′ and throwing out the positive clutch. The striking-wall of the respective grooves 66 66′ are formed by contact-pieces 95 95′ of hardened metal.

If desired, a wedge-block 96 may be provided at the outer end of the shifting-key, this wedge-block having a wedge-face 97 and the outer end of the shifting-key 61 having a correspondingly-formed wedge-face 98, conforming to the diagonal slanting of the walls of the slot 63 for guiding both ends of the shifting-key. The spring 67 may be secured between the wedge-piece and the inner wall of the slot 62, a pin 99 positioning the same, the wedge-piece being clamped to the operating-shaft in the groove 62 by means of a set-screw 100, threaded into a collar 101. When now it is desired to gradually depress the plunger, the treadle 81 is depressed for forming operative connection between the operating-gear and the operating-shaft. The work being placed between the dies, the treadle 50 is depressed for slightly depressing the plunger. As the plunger descends if it is found that the work is not in correct position with relation to the dies the treadle 50 may be released, which will permit the plunger to rest in the position it has then attained for permitting the work to be shifted under the upper die. The closer the upper die approaches the work the more accurately can its working position with relation to the work be judged by sight, and the treadle 50 may be depressed and released a sufficient number of times for gradually depressing the plunger and permitting the same to rest at its various steps of descent, so that the correct position of the work may be gradually determined by sight. When the correct position has been attained, the treadle 50 is depressed sufficiently for causing firm operative connection between the engaging faces of the friction-clutch 27 for completing the bending stroke of the plunger. Prior to the complete reciprocation of the plunger the treadle 81 will have been released. If desired, the treadle 50 may be held in depressed position by the stop 54 and the bending operations performed through manipulation of the treadle 81 and the positive clutch if the work is of such character as to permit this to be done, or the treadle 81 may be held in depressed position by the stop-bar 102 and the operations of the plunger performed through the medium of the treadle 50, as desired. The operation of the plunger is, however, dependent on the simultaneous engagement of both clutches. The stop-bar 102 is similar to the stop-bar 54. It has a notch 103, which may be placed over the treadle 81 for keeping the latter in depressed position. The stop-bar 102 normally depends out of range of the treadle 81 from a pivot 104 on a lug 105 on the frame.

The pitmen 22 are preferably made adjustable. I accomplish this adjustment preferably by dividing the pitmen into end sections 111 111′. (See Fig. 15.) A right and left hand screw 112 is threaded to the adjacent ends of the pitman, these respective ends being provided for the purpose with internally-threaded bores 113 113′, jam-nuts 114 114′ locking the screw in position after adjustment. Each of the screws has a collar 115 secured thereto. (See also Figs. 1, 12,

13, and 14.) A journal-piece 116 rests on this collar, the adjusting-screw being journaled in a bore 117 of this journal-piece. A worm-wheel 118 is secured to the adjusting-screw above the journal-piece. An adjusting-shaft 119 extends transversely of the adjusting-screws and is preferably journaled in bearings 120 of each of the journal-pieces. A worm 121 is provided for each of the worm-wheels and is secured to the adjusting-shaft. A bevel-gear 122 is secured to the adjusting-shaft and has a bevel-gear 123 meshing therewith, the latter being secured to a shaft 124, journaled in bearings 125 on one of the journal-pieces and having a hand-wheel 126 for its manipulation.

In order to drive the adjusting-shaft by power, I provide two trains of gearing, (shown at 130 and 131.) (See Figs. 1, 12, 13, 14, 16, and 17.) The train 130 comprises a gear 132, loosely journaled about the driving-shaft. (See particularly Fig. 16.) 133 is a link which has a bearing 134 about the driving-shaft and a bearing 135 for a stud 136 of an intermediate gear 137, meshing with the gear 132. A link 138 has a bearing 139 for said stud and a bearing 140 journaled about the adjusting-shaft. The gear 137 meshes with a gear 141, secured to the adjusting-shaft. The gear 132 is held against endwise movement on the driving-shaft by a collar 142, secured to the shaft to one side of the link 133, and a collar 143, secured to the adjusting-shaft and located in a groove 144 under clutch-teeth 145 on the inner face of the gear 132.

The train of gearing 131 comprises a gear 146, journaled about the driving-shaft. A link 147 has a bearing 148 about the driving-shaft and bearings 149 150, respectively, for studs 151 152. A gear 153 is on a stud 151 and meshes with the gear 146, and a gear 154 is on the stud 152 and meshes with the gear 153. A link 155 has a bearing 156 about the stud 152 and a bearing 157 about the adjusting-shaft. A gear 158 is secured to the adjusting-shaft and meshes with the gear 154. The gear 146 is held against endwise movement by a collar 159, secured to the driving-shaft at one side of the link 147, and a collar 160, secured to the adjusting-shaft in a groove 161 under the clutch-teeth 162 on the inner face of the gear 146.

A clutch-collar 163 is splined to the driving-shaft, as by a spline 164, and has clutch-teeth 165 166, adapted to engage the respective clutch-teeth 145 162. To permit this engagement, the clutch-collar is provided with annular grooves 165′ 166′ under its clutch-teeth. The clutch-teeth 145 165 form a clutch 167 and the clutch-teeth 162 166 form a clutch 168. The clutch-teeth on the collar and on the gears, respectively, preferably have receding rear walls 169 169′, so that when the clutch-collar is shifted sidewardly for engaging either the teeth 145 or 162 engagement across the entire width of the engaging faces of those teeth may be insured.

For shifting the clutch-collar I provide a shifting-lever 171, pivoted at 172 on a shelf 173, secured to one of the uprights. (See Figs. 12, 13, and 14.) The inner end of this shifting-lever is forked, as shown at 174, the tines of the fork being provided with pins 175, received by an annular groove 176 of the clutch-collar. A set-lever 177 is pivoted to the shifting-lever at 178 and has a set-pin articulated therewith in a slot 181 at the inner end of the set-lever. The set-pin extends through an aperture 182 in the shifting-lever and selectively drops into one of three apertures 183 in the shelf 173. A spring 184 normally causes the dropping of this pin. If the pin is dropped into one of the end apertures on the shelf, one or the other adjusting-clutch is brought into contact, and if the said pin is dropped into the intermediate aperture on the shelf the adjusting-clutches are out of operative contact. These adjusting-clutches are normally out of operative contact, and the driving-shaft then performs its normal office of driving the operating-shaft. If, however, adjustment of the length of the pitmen is desired, either during the time that the driving-shaft is performing its normal functions or while the same is out of operative connection with the plunger, either of the adjusting-clutches may be brought into operative engagement for rotating the adjusting-shaft from the driving-shaft and rotating the adjusting-shaft in one or the other direction, depending on which train of gears 130 or 131 is brought into driving connection with the driving-shaft through the adjusting-clutches, one of these trains containing an even number and the other an odd number of gears, so that one of them will drive the adjusting-shaft in one direction and the other will drive the adjusting-shaft in the reverse direction.

In Fig. 13 the adjusting-trains of gearing are shown in the relations they occupy when the plunger is adjusted to its upward limit and the pitmen are in raised position. The relative positions of these trains of gearing continuously change during each stroke of the plunger. To indicate the range of movement of these trains of gearing and to illustrate their movement during each stroke of the plunger, I show a diagram view of the said trains of gearing in Fig. 17. The cross *a* in Figs. 13 and 17 indicates the longitudinal axes of the adjusting-shaft and of the gears of said trains of gearing on the adjusting-shaft when the plunger is at its upper limit. The cross *b* indicates the lowermost position of said longitudinal axes. The dotted line *c* indicates the range of movement of said longitudinal axes. The oval *d* in Fig. 17

indicates the movement of said longitudinal axes during each stroke of the plunger, this movement being enforced by the up-and-down movement of the plunger and the forward and backward reciprocation of the upper ends of the pitmen induced by the eccentrics on the operating-shaft, and it will be understood that this movement *d* takes place in the various positions to which the said longitudinal axes may be adjusted, my improved device permitting all these movements to take place without interference with each other and all connections being ready at all times to effect adjustment at all times irrespective of the point in said movements the adjustment may be desired. My improved construction also permits the plunger when under the influence of the positive throw-out clutch to be arrested at its lowest point of movement by releasing the friction-clutch at the proper time, so that the distance between the dies may be accurately adjusted, while the plunger is released from the influence of the clutches for any desired thickness of stock through the medium of the power adjustments described, it being understood that in a machine of this character the positive throw-out clutch permits arrest of the plunger only at the upper limit of the stroke of said plunger. My improved construction also permits the plunger when under the influence of the positive throw-out clutch to be arrested at any point of approach toward the lower die by releasing the friction-clutch in order to prevent accident, as having work which is not accurately positioned between the dies bent into improper shape or from other cause, it being understood that ordinarily the positive throw-out clutch when once engaged will carry the plunger for its full reciprocation and release it only at its final upward limit of movement.

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

1. In a press of the character described the combination of the plunger and operating-shaft, means between the operating-shaft and plunger for reciprocating the plunger, a driving member, a friction-clutch and a positive throw-out clutch between said driving member and operating-shaft, a connecting member between said clutches, and means for operating said clutches for forming driving connection between said clutches through said connecting member and with said operating-shaft, substantially as described.

2. In a press of the character described, the combination of a plunger, an operating-shaft, means between said operating-shaft and plunger for reciprocating said plunger, a driving member, a friction-clutch and a positive throw-out clutch between the said driving member and operating-shaft, a driving-shaft and gearing between said clutches, and means for operating said clutches for forming driving connection between said driving member and driving-shaft and between said gearing and operating-shaft, substantially as described.

3. In a press of the character described, the combination of a plunger, an operating-shaft, means between said plunger and operating-shaft for reciprocating said plunger, a driving member, a friction-clutch and positive throw-out clutch between said driving member and operating-shaft, means for automatically throwing out said positive clutch when said plunger is in raised position, means for causing engagement of said positive clutch, and means for operating said friction-clutch for permitting said plunger when said positive clutch is in engagement to gradually descend and permitting said descent to be arrested at desirable points of approach between the dies in said press for the purpose specified.

4. In a press of the character described, the combination, with a plunger and pitman for operating said plunger, of means for adjusting said pitman to length, a driving-shaft, an adjusting-shaft for said adjusting means moving with said plunger, a plurality of trains of gearing between said driving-shaft and adjusting-shaft, one of said trains containing an even number and the other of said trains containing an odd number of gears, said trains also comprising links pivoted respectively about said driving-shaft and adjusting-shaft and to each other and said gears for continuously holding said gears of said respective trains in mesh, a clutch between said trains of gearing, and means for selectively connecting said clutch with either of said trains or adjusting said clutch into neutral position, substantially as described.

5. In a press of the character described, the combination with the frame, the plunger, pitmen articulated thereto, the operating-shaft, the eccentrics thereon, and the bearings between said eccentrics and pitmen, of means for adjusting said pitmen to length, a driving-shaft stationarily positioned in the frame of the machine, an adjusting-shaft for said adjusting means journaled to said pitmen, a plurality of trains of gearing between said driving-shaft and adjusting-shaft comprising gears and pivoted links for retaining said gears in mesh, a clutch, and means for connecting said clutch to either of said trains of gearing or adjusting said clutch into neutral position, substantially as described.

6. In a press of the character described, the combination with the frame, plunger, pitmen articulated thereto, an operating-shaft, eccentrics thereon and bearings on the pitmen for said eccentrics, of means for adjusting said pitmen to length, an adjusting-shaft for the latter journaled to and moving

with said pitmen, a driving-shaft, a plurality of trains of gearing and pivoted links therefor between said driving-shaft and adjusting-shaft, one of said trains having an even number and the other of said trains having an odd number of gears, a clutch on said driving-shaft, said clutch having clutch connection with said respective trains of gearing, and means for shifting said clutch for connecting said clutch with either of said trains of gearing or adjusting said clutch into neutral position, substantially as described.

7. In a press of the character described, the combination of the frame, plunger, operating-shaft journaled in the frame, eccentrics thereon, pitmen articulated to the plunger, bearings on said pitmen for said eccentrics, means for adjusting said pitmen to length, an adjusting-shaft for said adjusting means journaled to said pitmen, a driving-shaft journaled in said frame, a pair of trains of gearing respectively having an even number and an odd number of meshing gears and pivoted links for retaining said gears in mesh, one end gear of each of said trains loosely journaled about said driving-shaft, the other end gear of each of said trains secured to said adjusting-shaft, said first-named end gears respectively having clutch-teeth on their inner faces and a groove between said clutch teeth and the driving-shaft, a pair of collars secured to said driving-shaft in said respective grooves for limiting approach of said gears, means for limiting separation of said gears, a clutch-collar splined to said driving-shaft having clutch-teeth and grooves under said clutch-teeth at its respective ends, and means for shifting said clutch-collar sidewardly for engaging its clutch-teeth with the teeth of either of said first-named end gears or permitting said clutch-collar to remain in neutral position, substantially as described.

8. In a press of the character described, the combination of the frame, plunger, operating-shaft, eccentrics thereon, pitmen articulated to said plunger, bearings on said pitmen for said eccentrics, each of said pitmen having a plurality of end members, a right and left hand screw between said end members, a collar secured to said screw, a bracket having a bearing about said screw, a worm-wheel secured to said screw above said bearing, an adjusting-shaft, bearings in each of said brackets for said adjusting-shaft, a driving-shaft and a plurality of trains of gearing and pivoted links therefor between said driving-shaft and adjusting-shaft, one of said trains having an even number the other of said trains having an odd number of gears respectively retained in mesh with each other by said links, a clutch on said driving-shaft, and means for connecting said clutch with either of said trains of gearing, substantially as described.

9. In a press of the character described, the combination with the frame and plunger, of a driving-shaft, an operating-shaft, driving-gears between said driving-shaft and operating-shaft, said driving-shaft and operating-shaft journaled to said frame, eccentrics on said operating-shaft, pitmen articulated to said plunger, bearings on said pitmen for said eccentrics, said pitmen respectively comprising a pair of end members, a right and left hand screw for each of said pitmen connecting said end members, a worm-wheel for each screw, an adjusting-shaft journaled to said pitmen, a worm on said adjusting-shaft for each of said worm-wheels, said adjusting-shaft having reciprocation and forward and backward movement with said pitmen, a pair of trains of gearing between said driving-shaft and adjusting-shaft respectively having an even number and an odd number of gears, pivoted links for each of said trains of gearing for maintaining the gears of said respective trains in mesh, a clutch surrounding said driving-shaft, means for connecting said clutch with either of said trains of gearing, a driving member, a friction-clutch between said driving member and driving-shaft, and a positive clutch between said driving-gears and operating-shaft, substantially as described.

In testimony whereof I have subscribed my name hereto in the presence of two subscribing witnesses.

CLARENCE N. FREY.

Witnesses:

THEODORE C. JUNG,

CORDELIA O'HEARN.