No. 613,704. Patented Nov. 8, 1898.

J. MONTO.

TINNING MACHINE.

(Application filed Dec. 20, 1897.)

(No Model.) 10 Sheets—Sheet 1.

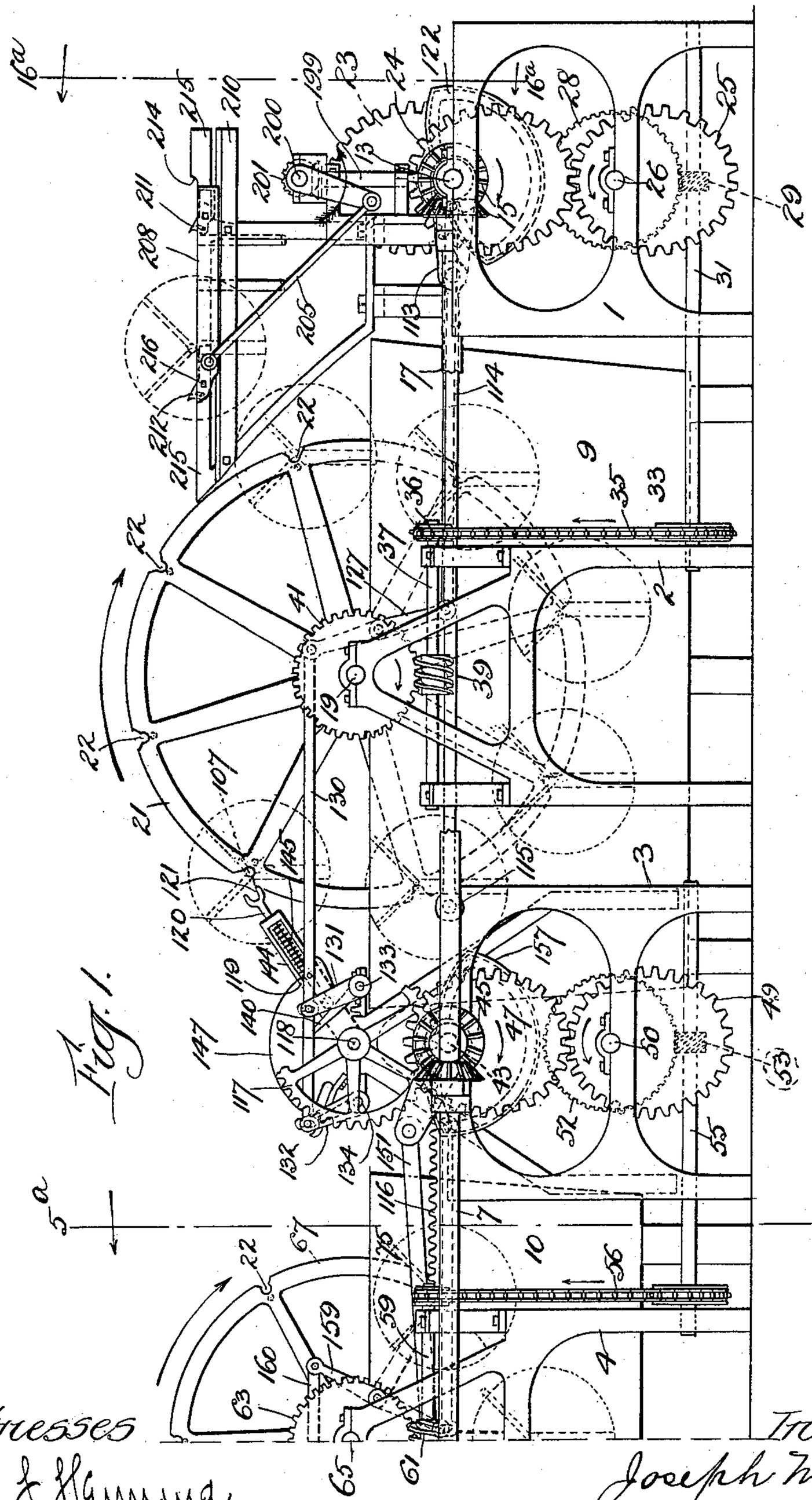

Fig. 1.

Witnesses
Wm. F. Fleming
Wm. H. Rheem.

Inventor
Joseph Monto.
by Dixon & Fletcher
Attys.

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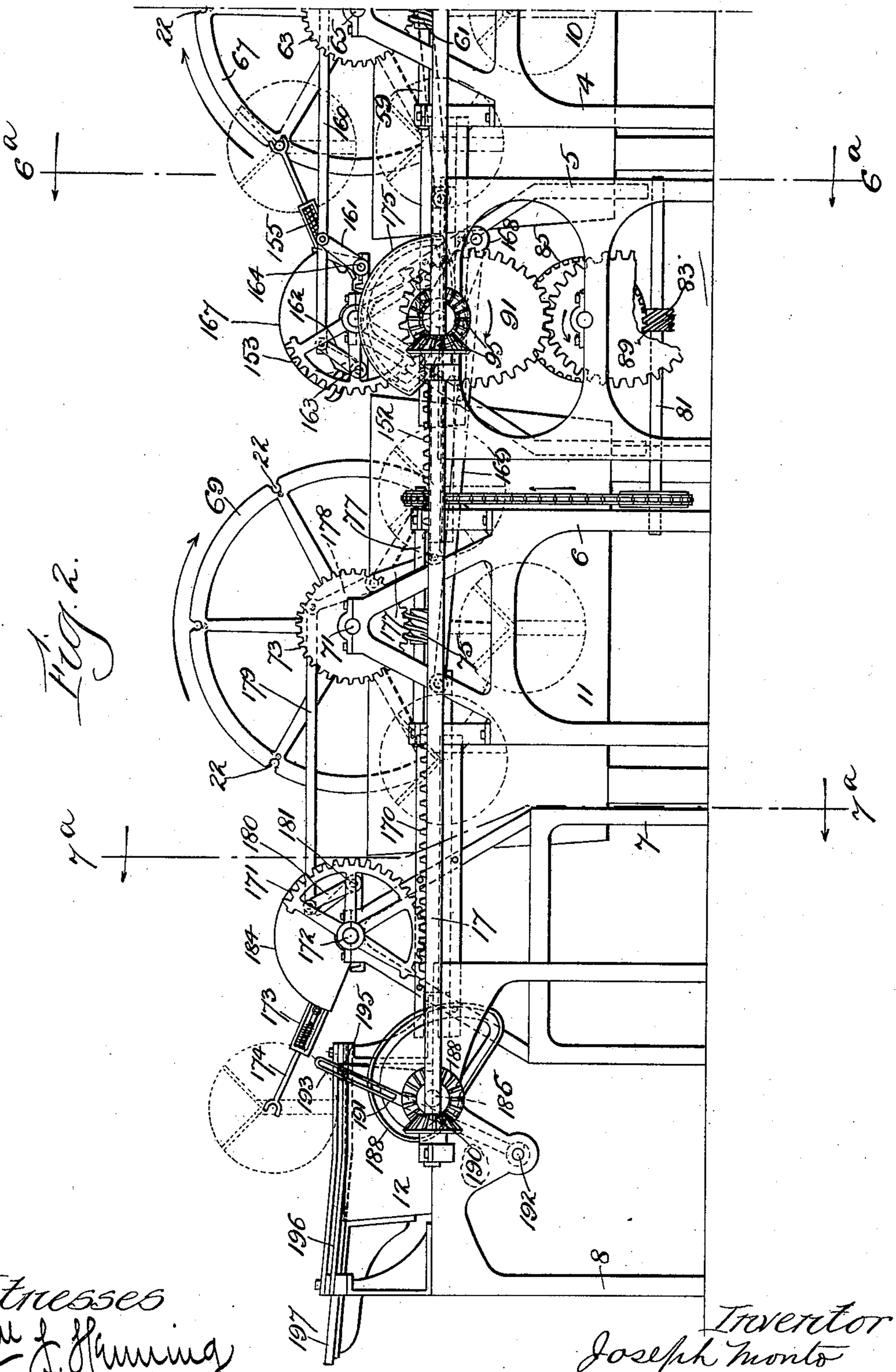

Fig. 2.

Witnesses
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Wm. N. Rheem.

Inventor
Joseph Monto
by Dixon & Fletcher,
Attys

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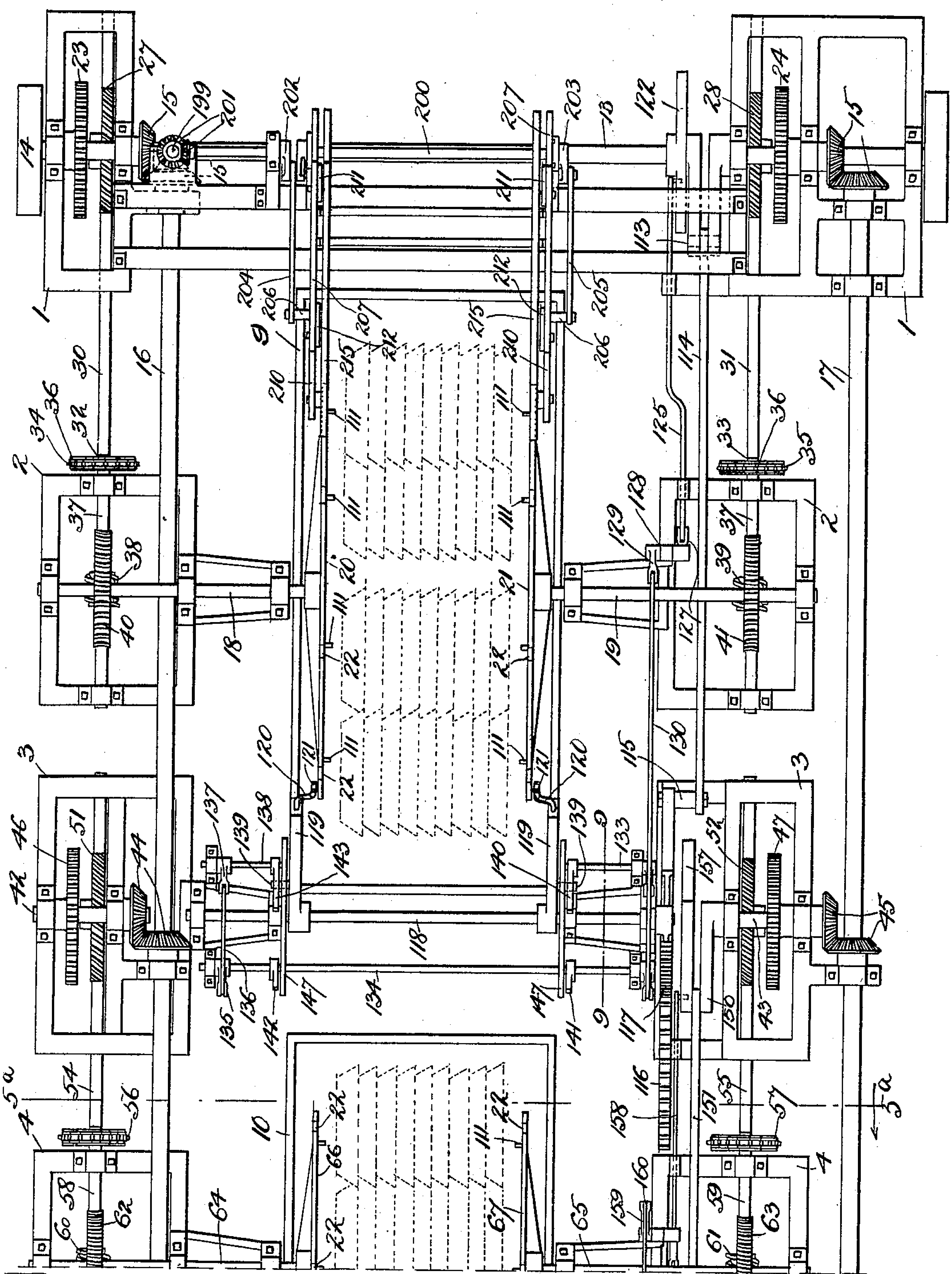

Fig. 3.

Witnesses
Wm. F. Henning
Wm. M. Rheem

Inventor
Joseph Monto
By Dixon & Fletcher,
Attys.

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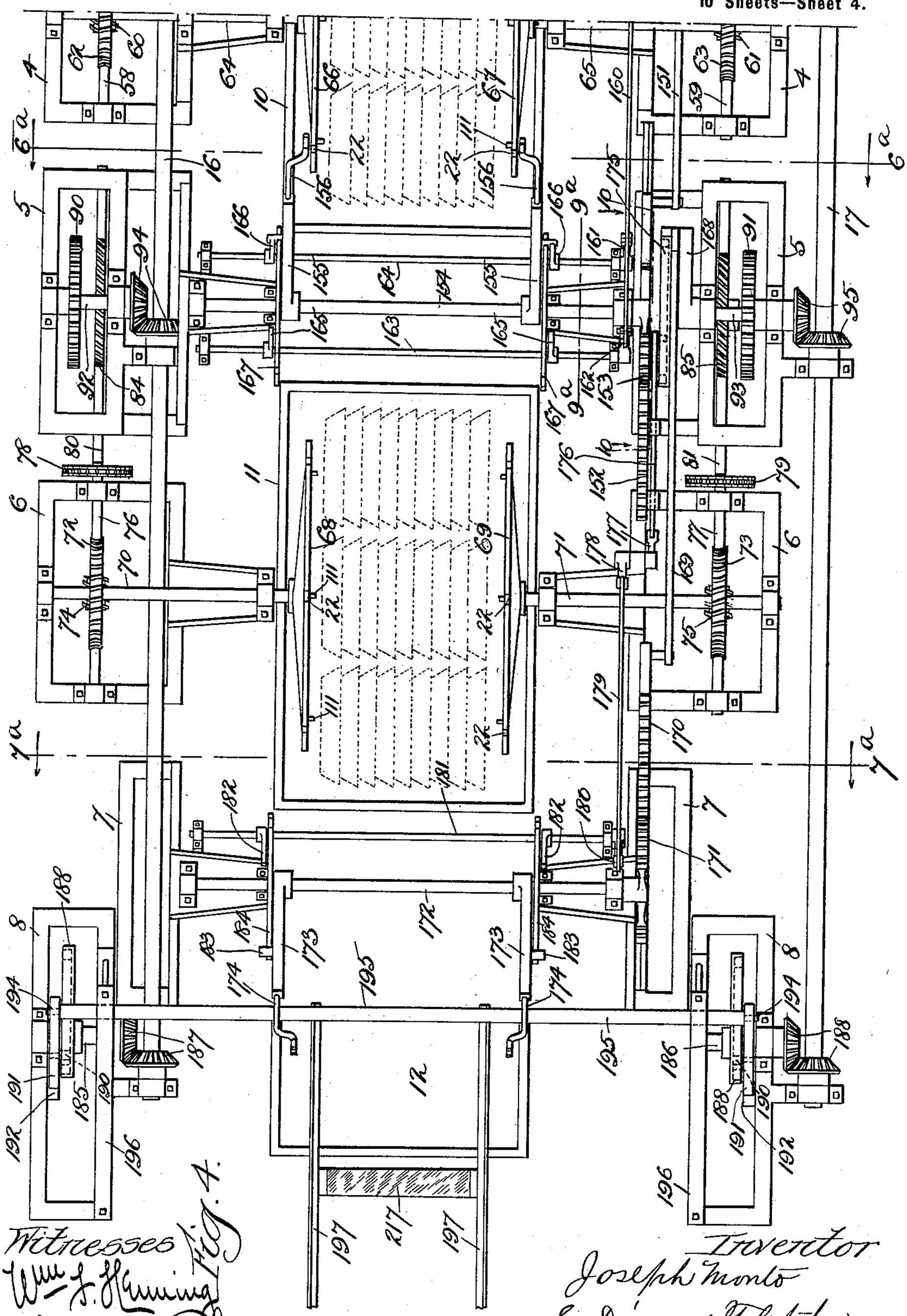

Fig. 4.

Witnesses
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Wm. N. Rheems.

Inventor
Joseph Monto
by Dixon & Fletcher,
Atty's.

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(No Model.) 10 Sheets—Sheet 5.

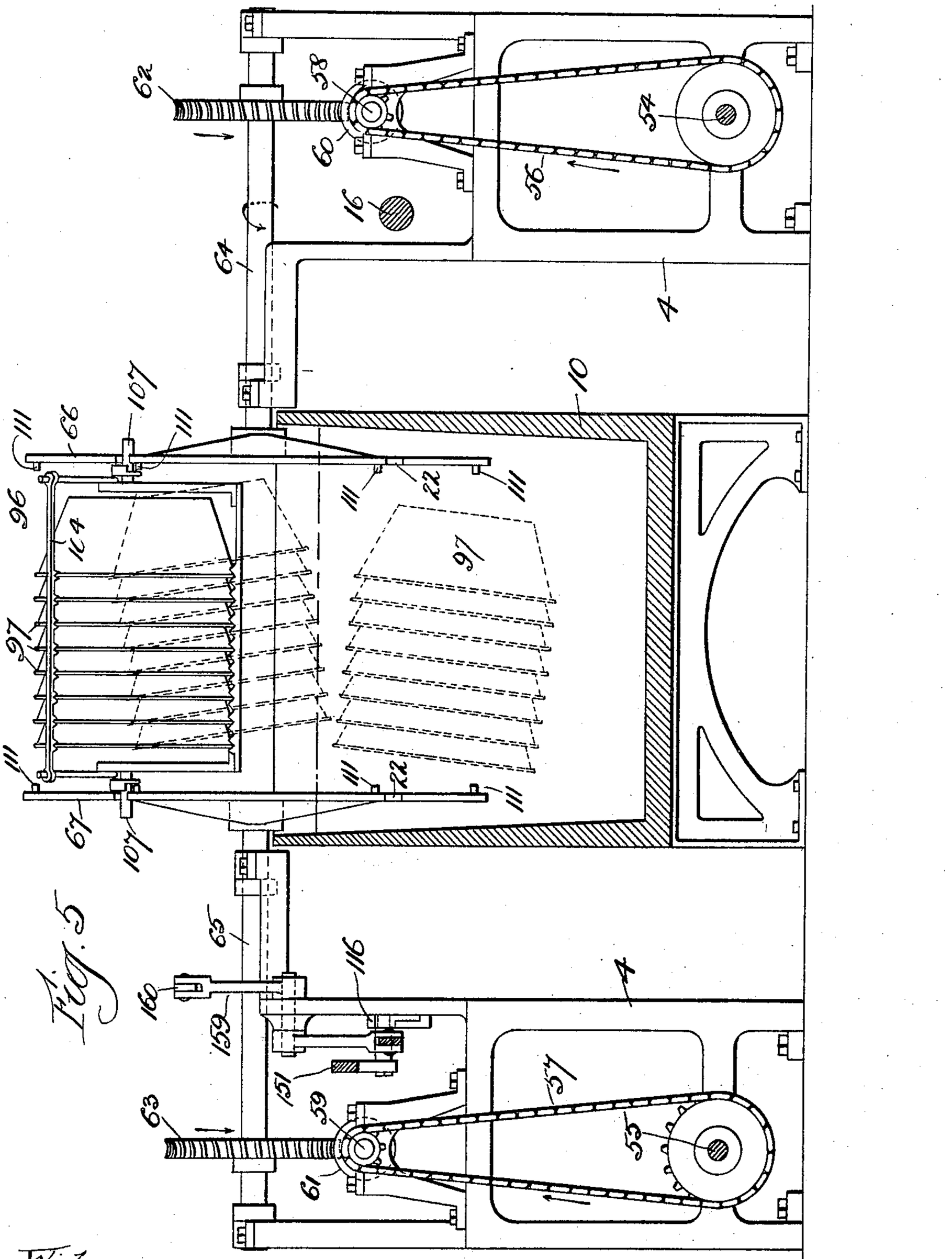

Fig. 5.

Witnesses
Wm. F. Fleming
Wm. N. Rheems

Inventor.
Joseph Monto
by Dixon & Fletcher.
Attys

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(No Model.) 10 Sheets—Sheet 6.

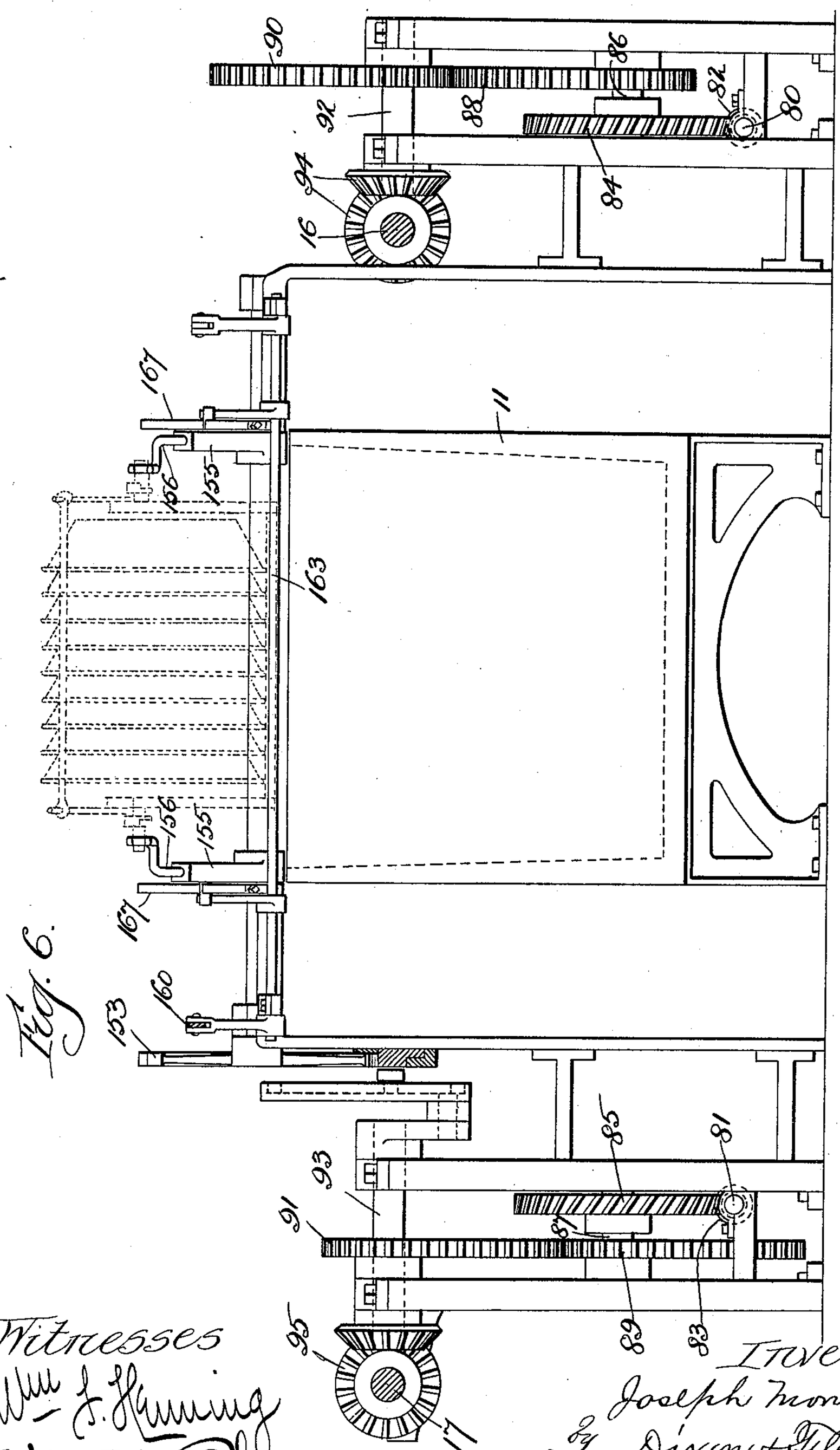

Fig. 6.

Witnesses
Wm. F. Fleming
Wm. H. Phelps.

Inventor
Joseph Monto
by Dixon & Fletcher,
Attys

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J. MONTO.

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(No Model.) 10 Sheets—Sheet 7.

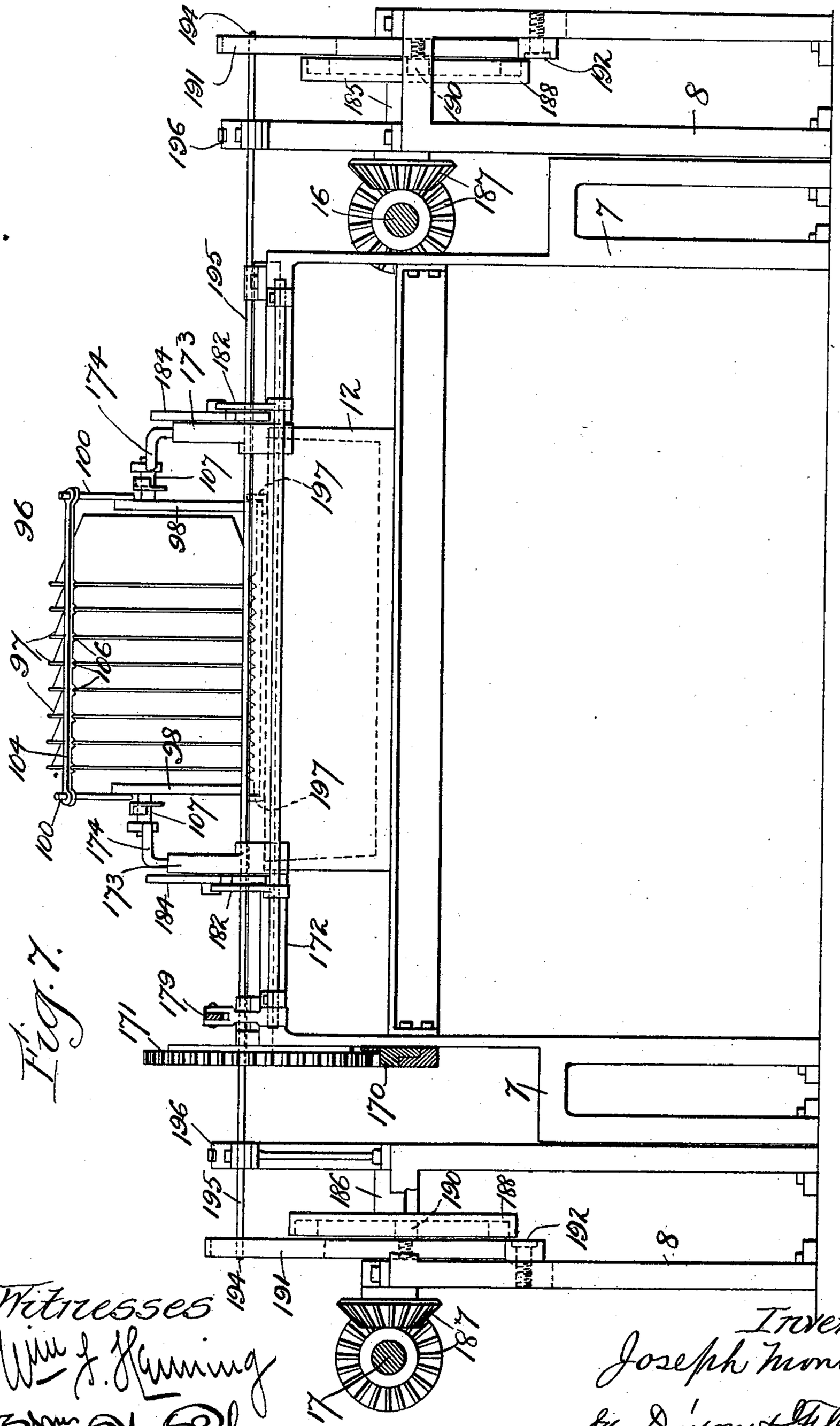

Fig. 7.

Witnesses
Wm. F. Fleming
Wm. M. Rheem.

Inventor
Joseph Monto.
by Dixon & Fletcher.
Atty's

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J. MONTO.

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(Application filed Dec. 20, 1897.)

(No Model.)

10 Sheets—Sheet 8.

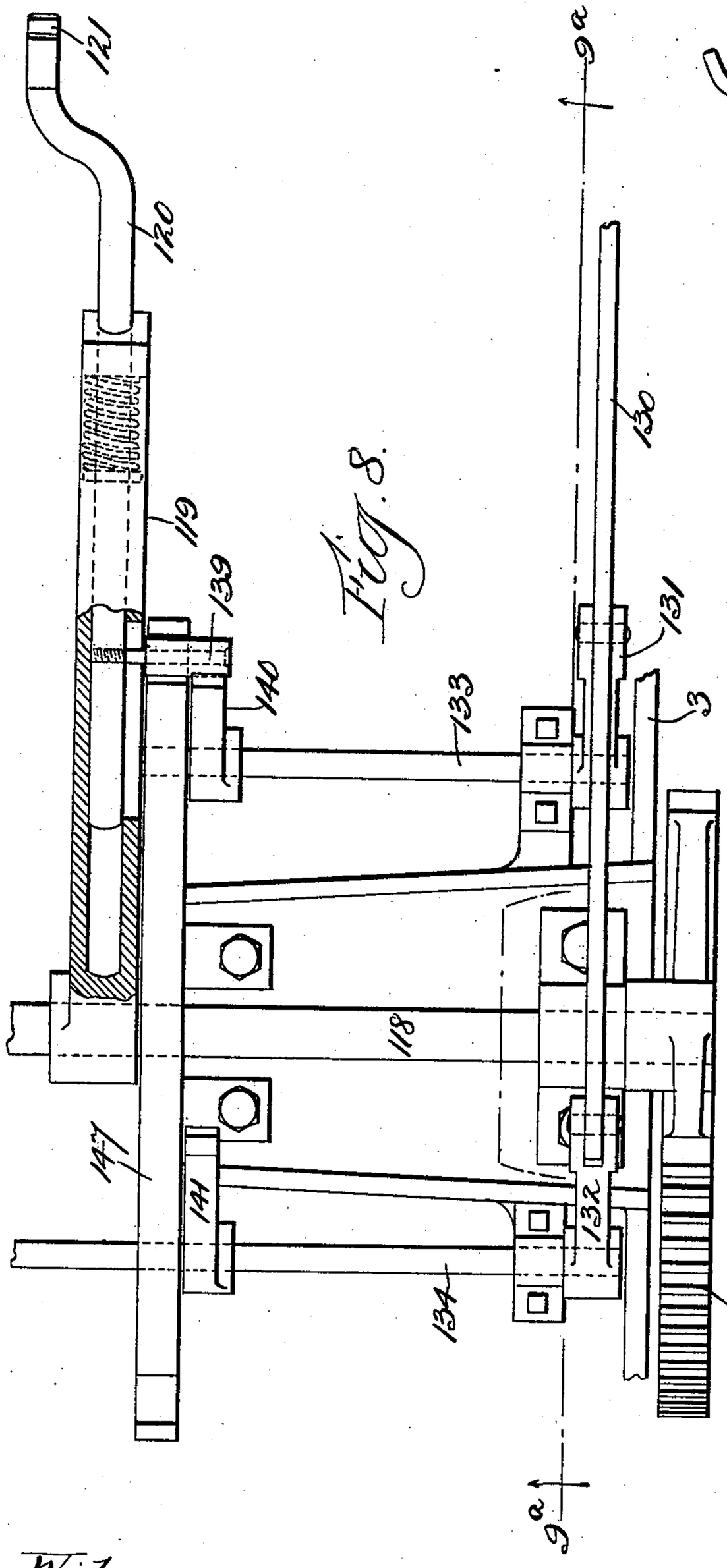

Fig. 8.

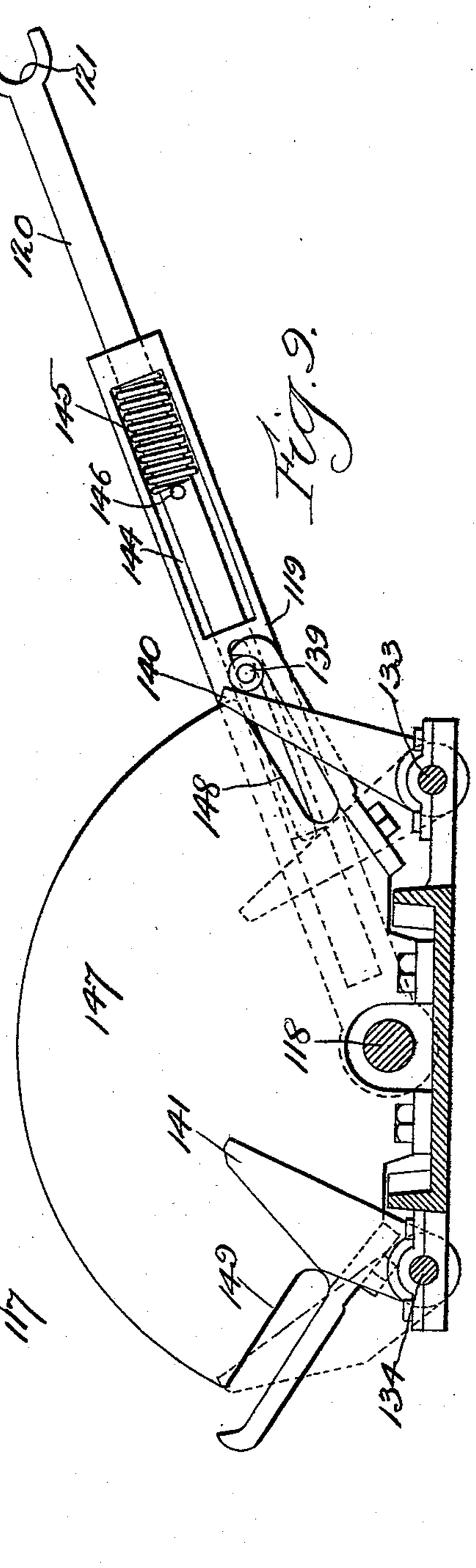

Fig. 9.

Witnesses
Wm. F. Hanning
Wm. M. Rheem.

Inventor
Joseph Monto
by Dixon & Fletcher
Attys.

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J. MONTO.

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(Application filed Dec. 20, 1897.)

(No Model.) 10 Sheets—Sheet 9.

Fig. 10.

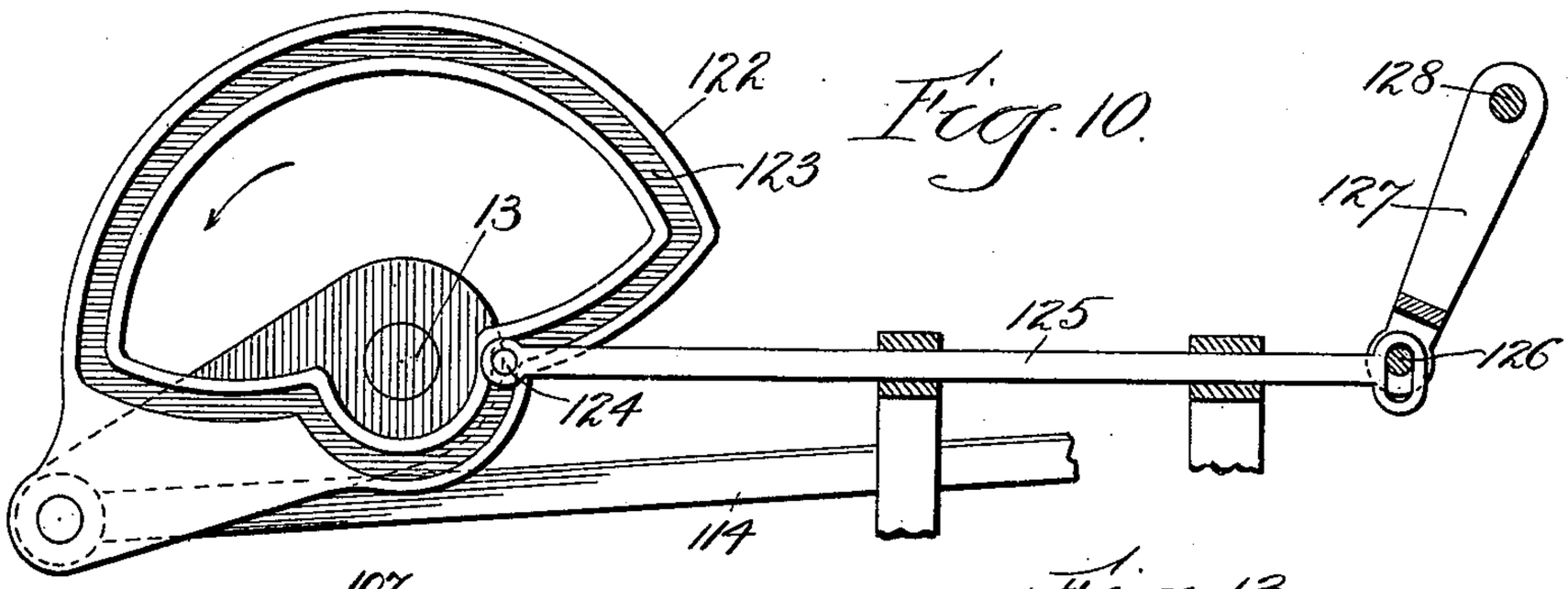


Fig. 11.

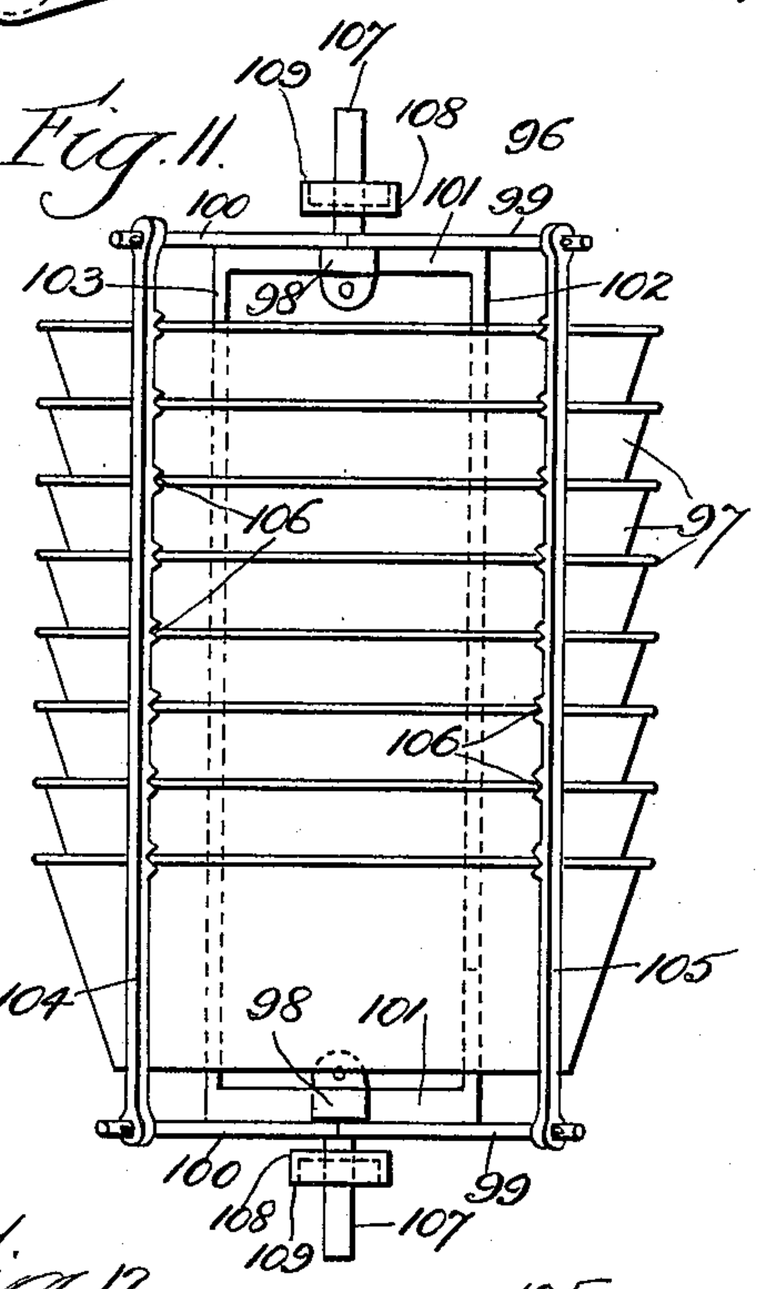


Fig. 13.

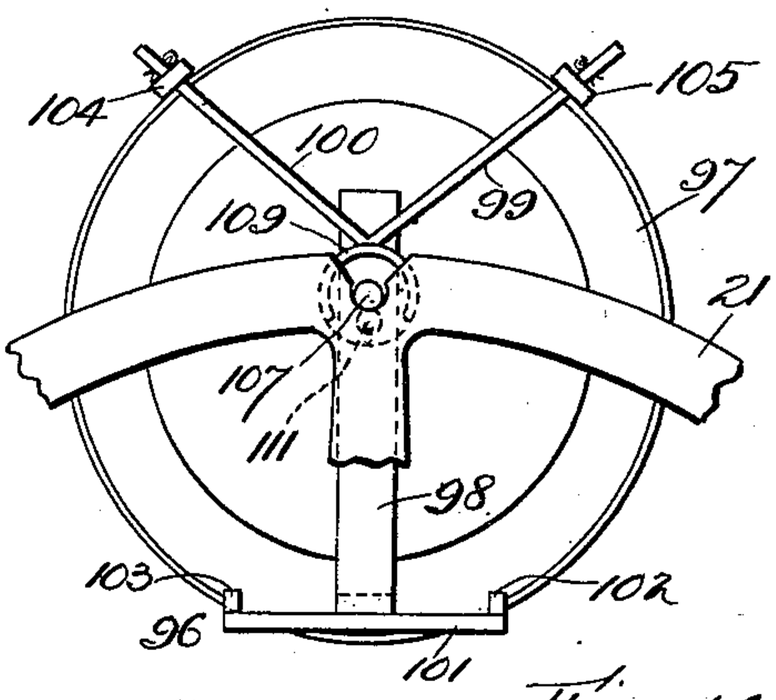


Fig. 14.

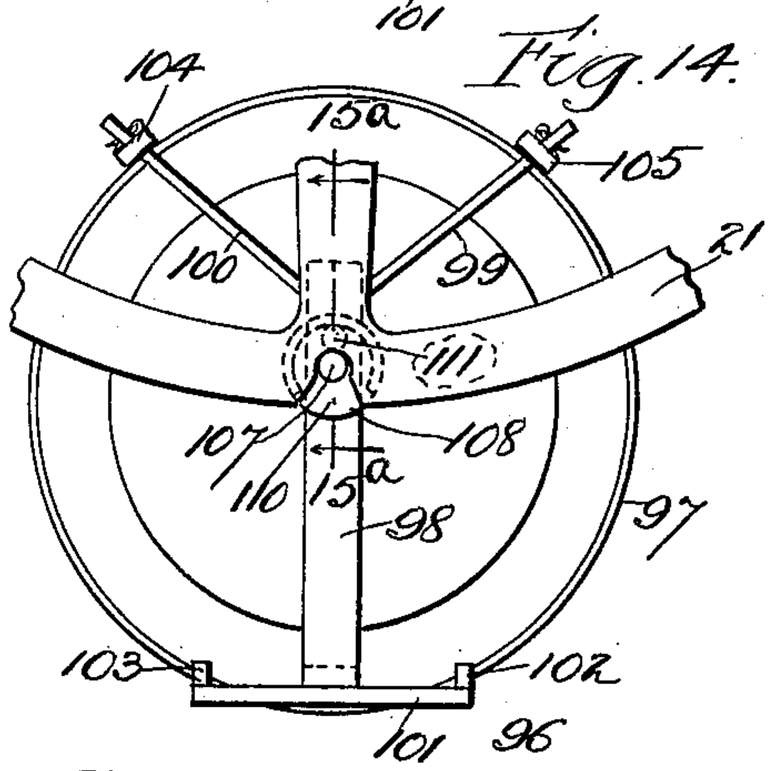


Fig. 12.

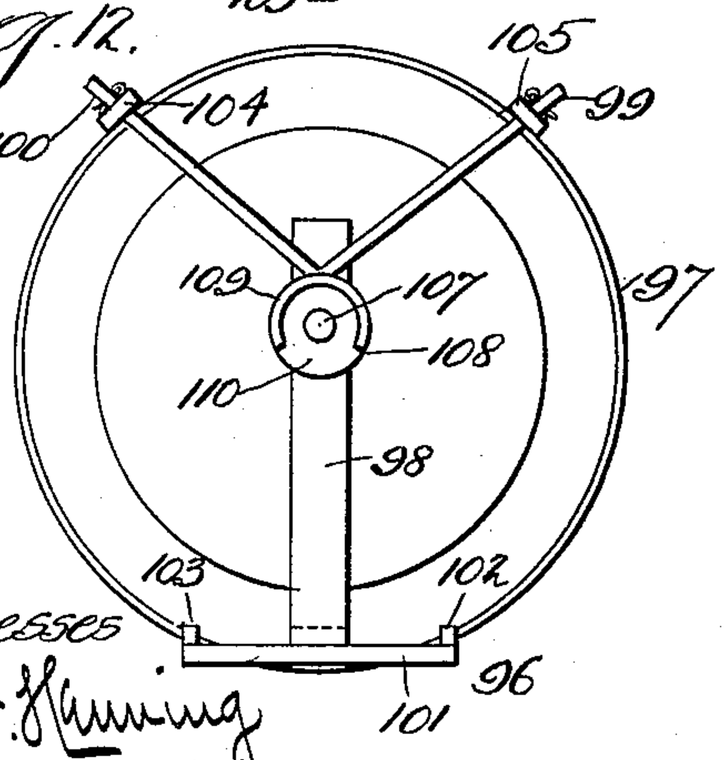
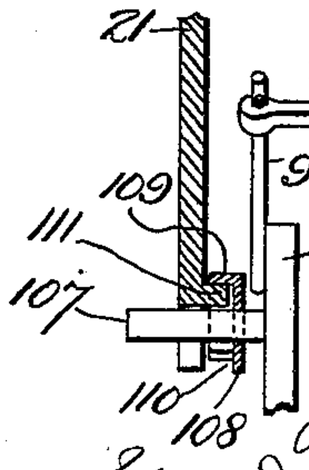


Fig. 15.



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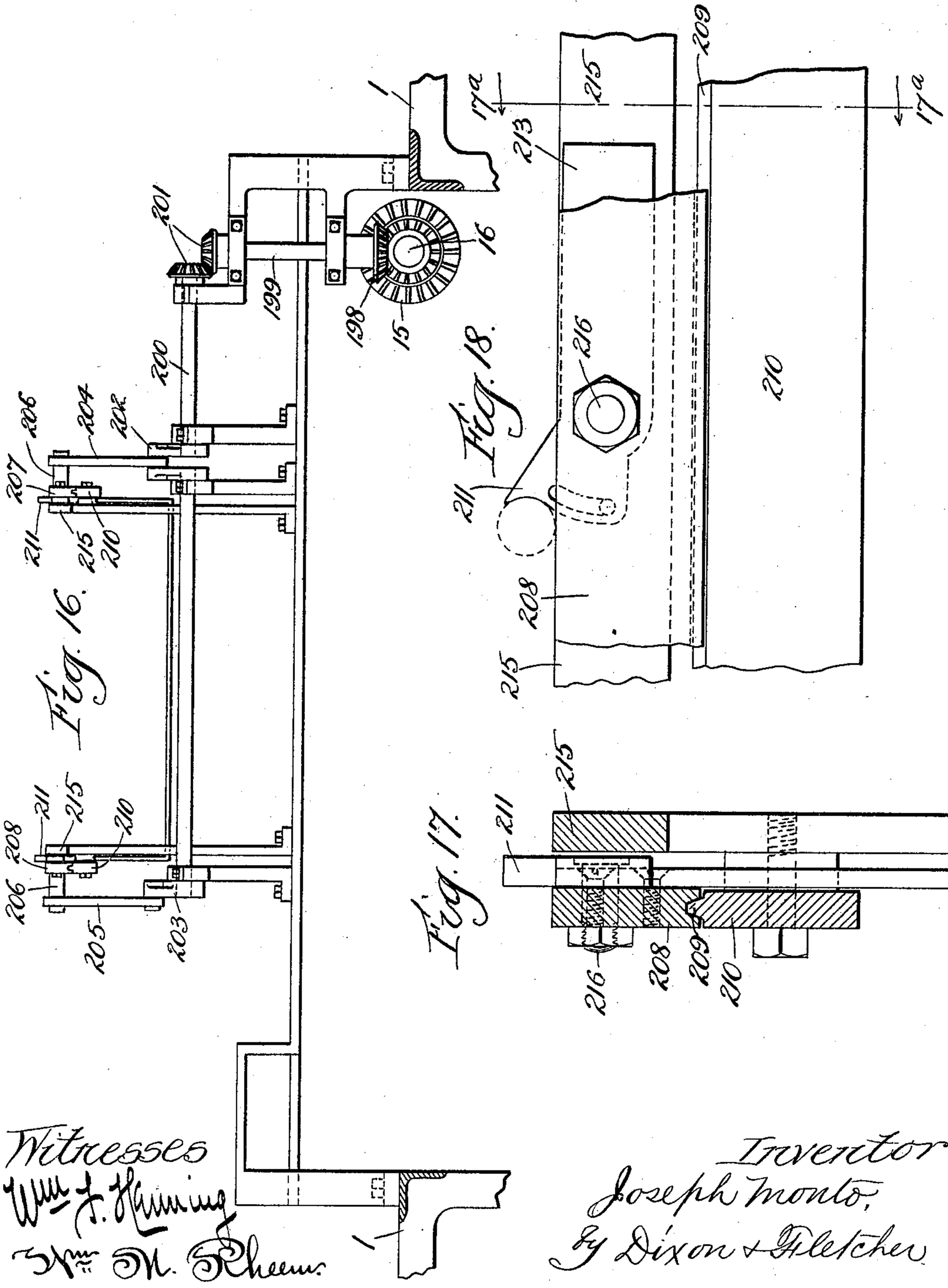

Witnesses
Wm. T. Fleming
Wm. M. Rheem.

Inventor
Joseph Monto,
by Dixon & Fletcher
Attys

UNITED STATES PATENT OFFICE.

JOSEPH MONTO, OF CHICAGO, ILLINOIS.

TINNING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 613,704, dated November 8, 1898.

Application filed December 20, 1897. Serial No. 662,607. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH MONTO, of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Tinning-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in which corresponding reference-numerals in the different figures indicate like parts.

My invention relates to the tinning, retinning, and listing of sheet-metal ware, and particularly to vessels such as dish-pans, washbowls, dairy ware, and analogous vessels, either stamped or otherwise formed directly from the black metal or those which have been tinned previous to stamping and require to be retinned; and the object of my invention is to so construct an automatic machine that the goods may in any desired quantity be automatically passed thereby into and out of and transferred from one to the other of the successive grease and tin pots to which they are ordinarily subjected (to a large extent by hand) for the purpose of imparting thereto the desired coating and uniform luster and finish, all of which is hereinafter more particularly described and definitely claimed.

In the drawings, Figures 1 and 2 when combined so that the left-hand end of Fig. 1 joins the right-hand end of Fig. 2 constitute a side elevation of my improved machine. Figs. 3 and 4 when combined in like manner represent a plan view thereof. Fig. 5 is a transverse vertical sectional view taken upon the line 5^a 5^a, Fig. 1. Fig. 6 is a like sectional view taken upon the line 6^a 6^a, Fig. 1. Fig. 7 is a like sectional view taken upon the line 7^a 7^a, Fig. 1. Fig. 8 is an enlarged plan view in detail of a portion of the transferring mechanism. Fig. 9 is a side view thereof, taken upon the line 9^a 9^a, Fig. 8. Fig. 10 is an enlarged side view in detail of a cam mechanism adapted to aid in controlling the action of the transferring-arms. Fig. 11 is a plan view of one of the vessel-holding crates as the same would appear when the axis is in a horizontal position. Fig. 12 is an end view thereof. Fig. 13 is an end view thereof as it would appear when supported at the top and in the notches of the carriers or dipping-wheels. Fig. 14 is a like view showing said crate in a reversed position at the bottom of said carrier or when the latter has completed half of a revolution, including the means for retaining the trunnions thereof in said notches. Fig. 15 is a sectional view in detail, taken upon the line 15^a 15^a, Fig. 14, to further illustrate my improved means for holding the trunnions of said crates in position in the notches of the dipping-wheels. Fig. 16 is a transverse sectional view taken upon the line 16^a 16^a, Fig. 1, viewed in the direction of the arrow there shown to illustrate the automatic feed mechanism only. Fig. 17 is an enlarged transverse sectional view in detail, taken upon the line 17^a 17^a, Fig. 18, showing a portion of the feed mechanism; and Fig. 18 is a side view in detail, showing the feed-slide and pawl thereon.

My machine, while constituting a complete coacting whole, is made up of a series of similar machines which are substantial counterparts of each other so connected as to be driven from a primary source of power, while at the same time they are arranged to act independently of each other in accomplishing special results, but to so coact that when the work in one part or section is completed the goods acted upon therein are automatically transferred to the next section, and so on consecutively until the finished product is delivered from the last section of the machine.

Referring to the drawings, 1 1, 2 2, 3 3, 4 4, 5 5, 6 6, 7 7, and 8 8 represent the framework of the machine, which consists, preferably, of a series of separate frames arranged in two rows and placed opposite each other, respectively, as clearly shown in Figs. 1 to 4, inclusive, so as to leave a space between for the placing in rotation of a series of vats or pots, which constitute, respectively, what are known as the "first grease-pot" 9, the "tin-pot" 10, the "second grease-pot" 11, and the "list-pot" 12. It is obvious that in lieu of a series of separate frames, as shown, a single long framework may be employed, leaving a space in the middle for the reception of the pots, but I prefer the construction shown.

Mounted in suitable bearings upon the framework 1 1 is a main driving-shaft 13, Figs. 1 and 3, having a driving-pulley 14,

which shaft is connected by means of miter-gears 15 15 to parallel counter-shafts 16 17, which are supported in suitable bearings upon the series of frames respectively arranged upon each side of the pots and extend throughout the length of the machine. The shafts 16 and 17 are intended through intermediate mechanism to impart a rotary motion at a variable speed to a series of dipping-wheels, each of which is adapted to carry a series of crates so arranged as to sustain the vessels to be immersed in the tin-pot 10, second grease-pot 11, and introduced to the listing-pot 12. A similar pair of dipping-wheels are employed in connection with the first grease-pot 9, which wheels are driven by the main shaft 13 and intermediate mechanism, but are not in any way connected with the shafts 16 and 17.

I will first describe the construction and operation of the dipping-wheels connected with the first grease-pot.

Mounted in bearings in the frames 2 2 are shafts 18 and 19, the inner ends of which extend over the edge of the pot 9, as shown in Fig. 3, and the axes of which coincide. Upon the inner end of the shaft 18 is keyed a dipping-wheel 20, and upon the inner end of the shaft 19 is also rigidly secured a like wheel 21. The two dipping-wheels 20 and 21 are preferably of a larger diameter than that of the two pairs hereinafter described, all of which are provided with a series of notches or sockets 22 for the reception of the trunnions of the removable racks, hereinafter described, for receiving and carrying the goods to be tinned.

I will first describe the means for actuating the dipping-wheels 20 and 21 as well as that of the other dipping-wheels in the series, after which I will describe said pan-holding racks, the peculiar manner in which they are supported upon and actuated by the dipping-wheels, and, finally, my improved means for automatically transferring said racks from one pair of wheels to the next succeeding pair.

Keyed or otherwise rigidly mounted upon the shaft 13 are elliptical gears 23 24, Figs. 1 and 3, which mesh into like elliptical gears 25, one of which is shown in Fig. 1. Said gears, respectively, are mounted upon short shafts 26 (see Fig. 1) in the frames 1 1 opposite each other and below the shaft 13. Keyed upon the shafts 26 26 are gear-wheels 27 28, the teeth of which are set at an angle of forty-five degrees to the plane of said wheels, as shown in Fig. 3. Said gears engage with pinions 29, one of which is indicated in dotted lines in Fig. 1, keyed upon the shafts 30 31, Figs. 1 and 3, which shafts are arranged parallel to each other and have their opposite ends supported by the frames 1 and 2. Mounted upon said shafts adjacent to the frames 2 2 are sprocket-wheels 32 33, which are connected by means of sprocket-chains 34 35 to like sprocket-wheels 36 36, attached to parallel shafts 37 37, which are in turn mounted in bearings at the top of the frames 2 2. Worms 38 39 are keyed to said shafts, respectively, and are adapted to engage with worm-gears 40 41, mounted upon the shafts 18 and 19, respectively.

It will be seen that when the main shaft 13 is rotated at a uniform rate of speed a variable motion will be imparted through the elliptical gears thereon, the shafts 30 and 31, the sprocket-chains, and worm-gears to the shafts 18 and 19, thus rotating the dipping-wheels 20 and 21, and it is further manifest that while the dipping-wheels are both driven from the same main shaft through intermediate gears it does not follow that they will be caused to rotate in unison, but inasmuch as the movement of each depends upon the relative setting of the intermediate elliptical gears by which it is driven it follows that the movement of said dipping-wheels may be made to vary with respect to each other to any desired extent within certain fixed limits—that is to say, one may be made to move very slowly or at a minimum speed during a part of its revolution, while the other may be moving at its maximum speed. It is obvious, however, that the number of revolutions completed by the two wheels within a given time must be the same. This peculiar variable motion will be again referred to and its purpose explicitly set forth in describing the dipping process of the crates or racks.

Having described the movement of the first pair of dipping-wheels and the machinery by which they are driven, I will now briefly describe the other two sets of dipping-wheels, each of which is driven independently of the others and in the same variable manner through gears connecting with the shafts 16 and 17. Mounted upon the frames 3 3 are shafts 42 43, which are connected by means of miter-gears 44 45 with the shafts 16 and 17, respectively. Elliptical gears 46 47 are keyed to said shafts and engage in turn with elliptical gears 48 49, the latter of which is shown in Fig. 1 mounted upon shafts 50 50, Fig. 1, which shafts are arranged below and in the same plane with the shafts 42 and 43. Gears 51 and 52, Figs. 1 and 3, having obliquely-arranged teeth, like the gears 27 and 28, are adapted to engage corresponding pinions, one of which, 53, is shown in dotted lines in Fig. 1, upon horizontal parallel shafts 54 and 55, which connect through suitable sprocket-wheels, as shown, and sprocket-chains 56 57, shafts 58 59, worms 60 61, and worm-gears 62 63 with transverse shafts 64 and 65, upon which are mounted dipping-wheels 66 and 67, like the wheels 20 and 21 above described, with the exception that they have a smaller diameter and a less number of notches. The wheels 66 and 67 are partially immersed in the tin-pot 10, as shown, for the purpose of introducing the crates thereto, as hereinafter set forth.

Located above and so as to be partially immersed within the grease-pot 11 I provide

another pair of dipping-wheels 68 and 69, like the wheels 66 and 67, the former being mounted, respectively, upon shafts 70 and 71, which are driven precisely like the shafts 64 and 65 through worm-gears 72 and 73, worms 74 75, shafts 76 77, sprocket-chains 78 79, connecting with sprocket-wheels upon the shafts 76 77 and 80 81, gears 82 83 upon said shafts, (better shown in Fig. 6,) gears 84 85, shafts 86 87, elliptical gears 88 89 90 91, shafts 92 93, and miter-gears 94 95, connecting with the shafts 16 and 17.

Having described the specific means by which the several dipping-wheels are actuated, I will now describe the pan-holding crates and the manner in which they are introduced into the pots and withdrawn therefrom as a result of the peculiar variable motion of the carrier-wheels.

Referring more especially to Figs. 11 to 15, inclusive, 96 represents a pan-holding crate filled with dish-pans 97. Each crate consists, preferably, of end pieces or spiders having arms 98 99 100, to the former of which are attached cross-bars 101, which are in turn connected by means of bars 102 103, which serve to unite the two spiders rigidly to each other. Connecting the arms 99 and 100 at the opposite ends are removable bars 104 105, which are bored at opposite ends to enable the bars 99 and 100 to be inserted therein. Notches 106, Fig. 11, are formed in the bars 102, 103, 104, and 105 for the reception of the edges of the pans 97, which are thereby secured within the crate and separated from each other, as shown. Upon the end pieces or spiders of the crates are formed trunnions 107, which are adapted to engage with the peripheral notches 22 of the dipping-wheels, and thus sustain the crates in a horizontal position. It is obvious, however, that the trunnions would fall out of the notches upon the rotation of the dipping-wheels unless prevented by suitable means. In order to maintain the trunnions in the notches of the dipping-wheels at all times except when it is desirable to transfer the crates from one pair of wheels to another, I provide the following-described mechanism: It should be borne in mind that the weight of metal in the crates is so distributed that they will always maintain the position shown in Figs. 12 to 14, inclusive—that is to say, that the bar 101 will always be at the bottom while the dipping-wheel is being revolved. Taking advantage of this fact, I attach a disk 108 to each of said trunnions, said disk being provided with an outwardly-extended flange 109, which extends around about three-quarters of its circumference, as shown, leaving an opening 110 at the bottom. Upon the inside of each of the dipping-wheels, opposite the notches 22 therein, I place studs or projections 111, (indicated in dotted lines in Figs. 13 and 14 and shown in section in Fig. 15,) which studs are adapted to engage with the flanges 109 whenever the dipping-wheel is rotated sufficiently so that the trunnions would tend to fall out of the notches. It will be seen by reference to Fig. 13 that the trunnions may be placed in or removed from the notches of the dipping-wheels without obstruction, inasmuch as the studs 111 are opposite the opening 110; but when the dipping-wheel is sufficiently rotated from the position shown in said figure the flange 109 engages with the stud 111 and the crate is supported by the latter elements independently of the trunnions, as shown in Figs. 14 and 15. Thus it is obvious that the trunnions will remain in the notches during a complete revolution of the dipping-wheels, but are free to be removed therefrom when the notches are at the top or but a short distance above the plane of the axis.

It is well known that in order to prevent the discoloration of the pans and to insure a uniform coating of tin thereon it is essential that they should be dipped into and removed from the grease or tin bath, as the case may be, in such a way that the edge of the pan will be the first to enter and the last to leave the surface of the bath. In order to accomplish this result, it is essential that the axis of the crate should be tilted so as to be oblique to the plane of the horizon, as indicated in dotted lines in Fig. 5. I have already stated that the several dipping-wheels are given a variable motion, alternately accelerated and retarded during a given revolution through the action of the elliptical gears by which they are driven. It is obvious that if said gears upon the opposite sides of the machine are set with reference to each other, as the elliptical gears 89 and 91 are set with reference to the gears 90 and 88 upon the opposite side, Fig. 6, the dipping-wheels driven thereby will not move synchronously, but that one will be given an accelerating motion, while the other is retarded, and that the racks suspended therein will be given a hitching movement, first at one end and then the other, so that their axes will during most of the time be oblique to the axis of the dipping-wheels. This movement is clearly indicated in dotted lines in Fig. 6, but occurs with reference to each pair of dipping-wheels. In the last-named figure the dotted lines indicate a rack with the axis so tilted as to introduce the edges of the pans to the surface of the tin-bath, and the gear should be so timed as to cause the same relative action when the pans are withdrawn therefrom.

In order to suspend the crates upon the dipping-wheels, they may be placed upon a frame 215, Figs. 1 and 3, in substantial alinement with the wheels 20 21, and the trunnions may be pushed by hand into the notches 22, formed in the latter; but I prefer to employ the following-described automatic feeding mechanism for accomplishing this result: The beveled gear 15 upon the shaft 16 is a double-faced gear, as clearly shown in Fig. 16, into the inner face of which meshes a beveled gear 198, mounted upon a vertical shaft 199. A

horizontal shaft 200 (also shown in Figs. 1 and 3) is supported in suitable bearings and is in operative connection with the shaft 199 through the beveled gear 201, Fig. 16. Mounted upon the shafts 200 are cranks 202 203, the former of which is arranged to actuate a pitman 204 and the latter a like pitman 205, which are connected, respectively, by means of wrist-pins 206 206 with slides 207 208, (see also Figs. 17 and 18,) the bottoms of which are grooved, as shown, so as to engage and slide upon guides 209, formed upon the top of two parallel bars 210 210, constituting a part of the framework for supporting the automatic feed mechanism. Gravity-pawls 211 and 212 are mounted upon each of the slides 207 208, said pawls being pivotally attached to the slides by means of bolts 216, Figs. 17 and 18, and held normally in the position indicated in said figures by means of counterweights 213. The pawls are so placed upon the slides that the pawls 211 will be when in their initial position back of depressions 214, Fig. 1, formed in horizontal guide bars or supports 215, forming a part of the framework, which bars are intended to receive the trunnions 107 of the crates.

In operating the machine the trunnions of the crates are placed upon the bars 215, and the crate is then pushed forward until the depression 214 is reached, when the further work is accomplished automatically. The slides are drawn back by means of the cranks and pitman until the pawls 211 211 are brought against the trunnions 107. This contact depresses the pawls and permits them to slide beneath the trunnions. As soon as they have passed back of the latter they rise to the position shown in Fig. 18, in which they are ready to engage the trunnions with the forward movement of the slides. The first revolution of the cranks causes the crate to be pushed to the position indicated in dotted lines in Fig. 1. With the next revolution the pawls 212 are brought into engagement with it in the same manner, while the pawls 211 engage the trunnions of a second crate. The forward stroke pushes both crates forward, the first being pushed into the notches 22 of dipping-wheels and the second to the halfway position shown in Fig. 1.

The movement of the shaft 200 is timed to act in harmony with that of the dipping-wheels—that is to say, with each revolution of said shaft the notches 22 are brought into position to receive the trunnions of one of the crates. All of the dipping-wheels revolve in the direction indicated by the arrows. Each of the wheels 20 and 21 is provided with eight notches in its periphery, while the others have but six. This arrangement enables the pans to be immersed somewhat longer in the first pot than in the others. When the crates are lifted by the dipping-wheels from the first grease-pot, they are automatically transferred to the list-pot.

I will now describe the automatic transfer mechanism. Upon the shaft 13 is formed a crank 113, Figs. 1 and 3, which is connected by means of a pitman 114 to a stud 115 upon a sliding rack 116, fitted in suitable sliding bearings in the frame 3. The rack 116 is in engagement with a segmental gear 117, mounted upon a rock-shaft 118, (see also Figs. 8 and 9,) mounted in bearings in the frames 3 3, to which shaft is rigidly attached arms 119 119 in substantial alinement with the side walls of the pot 9. Enlarged views of these arms are shown in Figs. 8 and 9. The arms 119 119 are bored out for the reception of sliding arms 120 120, which are provided with sockets 121 in the ends to enable them to engage with the trunnions 107 of the crates in the manner and for the purpose hereinafter described. As a result of the rotation of the crank 113 the segmental gear 117 is actuated, thus causing the arms 119 to oscillate back and forth from the position shown in Figs. 1 and 3, in which the arms 120 are brought into alinement with the trunnions of the crates resting in the notches of the dipping-wheels 20 and 21, to a similar position with relation to the dipping-wheels 66 and 67. This oscillatory movement is timed to conform to that of the respective sets of dipping-wheels between which the arms oscillate, so that the sockets 121 of the arms may engage in the manner hereinafter described with the trunnions of the crates in one pair of wheels as they are brought to a given position and by the movement of the arms transfer said crates to the next pair of wheels, in the notches in the rims of which said trunnions are deposited.

It is obvious that in order to cause the arms to engage with and release the trunnions it is not only necessary to produce the oscillatory movement described, but that the arms 120 should be thrust out and withdrawn at the proper times. These movements are accomplished by means of a cam and intermediate mechanism properly timed and arranged to coact with the transferring-arms.

Rigidly attached to the shaft 13 (see Figs. 1, 3, and 10) is a cam 122, with the groove 123 of which is connected a wrist-pin 124 upon the end of a bar 125, having a slot in the opposite end which connects with a pin 126, Fig. 10, in the end of one arm, 127, of a lever pivoted at 128. To the other arm, 129, of said lever is attached a bar 130, which is pivotally connected with the free ends of arms 131 132, (better shown in Figs. 8 and 9,) which are rigidly attached to rock-shafts 133 134, mounted in bearings in the frame, as shown. The shaft 133 is short, while the shaft 134 extends across the machine and is provided with a rigid arm 135, Fig. 3, upon its opposite end, which is connected, by means of a link 136, to a like arm 137, attached to a rock-shaft 138, which is actuated thereby.

Extending laterally from the inner ends of the arms 120 120 are studs 139, having roll-

ers thereon, as shown, which studs are in the path of movement of arms 140, 141, 142, and 143, respectively, which are rigidly attached to the rock-shafts 133, 134, and 138.

Each of the arms 119 is slotted, as shown at 144, Figs. 1 and 9, for the reception of a coiled spring 145, which is interposed between the outer end of the slot and a pin 146, which spring serves normally to draw the arm into its socket. When the shafts 133, 134, and 138 are rocked, the arms 140 and 143 or the arms 141 and 142, as the case may be, are brought into engagement with the studs 139, thus compressing the springs 145 and pushing out the arms 120, as shown in Fig. 9, until the sockets 121 at the ends are brought into engagement with the trunnions 107 of the crates in the dipping-wheels. Rigid sectors 147 147 are arranged to engage with the studs 139, and thus keep the arms 120 extended to their full limit after they become disengaged from the arms 140 143 and until the time they reach the dipping-wheels 66 67 and deposit the trunnions of the transferred crate in the notches therein. Oblique notches 148 149, Fig. 9, are formed in the sectors 147, into which the studs 139 are received at the end of each oscillatory movement of the transferring-arms, the springs 145 acting to force the arms 120 back to their respective normal positions as soon as the notches are reached. At the proper time the arms 141 142 act in a reverse direction and force the studs out of the notches 149, when the arms 120 are returned and are again withdrawn into the sockets ready to be pushed out to transfer the next crate brought to position by the dipping-wheels 20 and 21. Fig. 1 shows the arm 120 withdrawn, and Fig. 9 shows it extended to engage the trunnion.

For the purpose of transferring the crates from the dipping-wheels 66 67 to the wheels 68 69 I duplicate the mechanism above described, as shown in Figs. 1, 3, 5, and 6. In that case 150 indicates the crank; 151, the pitman; 152, the rack; 153, the segmental gear; 154, the rock-shaft; 155 155 156 156, the transfer-arms; 157, the cam corresponding to the cam 122; 158, the bar connecting therewith; 159, the intermediate pivoted lever; 160, the secondary connecting-bar; 161 162, the arms with which the opposite end of said bar is connected; 163 164, the rock-shafts; 165 165 166 166, the actuating-arms thereon, and 167 167 the sectors for holding the transfer-arms in an extended position during the time required to make the transfer. The transfer mechanism just described is again repeated for the purpose of transferring the crates from the carrier-wheels 68 69 to the list-pot, which mechanism is shown in Figs. 2, 4, and 7, in which 168 indicates the driving-crank; 169, the pitman; 170, the rack; 171, the segmental gear engaging therewith; 172, the rock-shaft; 173 173, the carrier-arms attached thereto; 174 174, the transfer-arms adapted to engage and lift the rack-trunnions; 175, the cam arranged to act in unison with the crank; 176 176, the pitman connecting with said cam; 177 178, the intervening lever-arms; 179, the secondary pitman; 180, the driven arm connected therewith; 181, the rock-shaft actuated by said arm; 182 182, arms attached to said rock-shaft for pushing out the transfer-arms; 183 183, the studs through which said act is accomplished, and 184 184 the sectors which hold said arms out during the transfer. These sectors differ from those heretofore described in that they do not permit the transfer-arms to be withdrawn except when in one extreme position, and that for the purpose of engaging with the trunnions of a rack upon the dipping-wheels 68 69. When in the extreme opposite position, as shown in Figs. 2 and 4, they are still extended, withdrawal in that position being unnecessary, inasmuch as the crates when deposited by them over the list-pot are removed by means of special automatic mechanism arranged to coact therewith, which will now be described.

Keyed upon the shafts 185 186, Figs. 2, 4, and 7, which are in alinement with each other and are connected through miter-gears 187 187 with the supplemental driving-shafts 16 and 17, respectively, are cams 188 188, having corresponding grooves 189 therein, one of which is shown in full lines in Fig. 2, which grooves are engaged by studs 190 upon lever-arms 191 191, the lower ends of which are pivoted to the frame at 192. The upper portions of the levers 191 are provided with slots 193, (shown in Fig. 2 and indicated in dotted lines in Figs. 4 and 7,) which engage the ends 194 194 of a horizontal sliding cross-bar 195, arranged loosely between parallel bars 196 196. (Better shown in Fig. 2.)

Extending over the list-pot 12 are parallel bars 197 197, preferably formed of angle-iron, which form ways upon which the crates are deposited by the transfer mechanism. When the arms 174 are in the position indicated in Fig. 2, the frame of the crate rests upon the ways, as shown in Fig. 7, and the lever-arms 193 are in the position shown in Fig. 2, with the cross-bar 195 behind and in position to engage the crate, which it immediately does through the action of the cams and levers described. The ways 197 are inclined, as shown in Fig. 2, but the ends upon which the crates are deposited are of such a height above the surface of the molten metal as to permit the edges of the pans to be brought into contact with the latter, and as the crates are gradually raised while being pushed forward the drops of metal which would otherwise adhere thereto are entirely removed, and the pans after having been brought into contact with a wiping-pad 217, Fig. 4, consisting of a suitable greased fabric, are delivered from the machine in a thoroughly-finished condition.

It is obvious from the construction of my

improved machine that the work may be made continuous—that is to say, the crates may be delivered thereto as fast as the notches of the dipping-wheels are presented in position to engage the trunnions, thus forming a continuous procession of crates into and out of the pots and from one to the other of the dipping-wheels in successive order until the finished goods are delivered as stated.

The variable motion described with respect to the dipping-wheels, while especially desirable and important in connection with the treatment of goods of the class described, need not be employed in connection with those of a different shape—such, for example, as tin-plate or any goods adapted to drain readily—regardless of the exact manner in which they are withdrawn from the bath. I regard the transferring mechanism, however, as of special importance, inasmuch as it enables a series of similar machines to be joined together and to coact as one continuous whole, thereby dispensing with handwork and greatly increasing the output of a given plant, while improving the work and lessening the cost.

Having thus described my invention, I claim—

1. A mechanism of the class described in which are combined two or more tanks or receptacles adapted to contain liquefied material, a plurality of crates for holding the articles to be immersed therein, dipping-wheels arranged over said tanks respectively, the lower portions of said wheels being within the tanks, means for detachably connecting said crates to the periphery of said wheels, and automatic mechanism for transferring said crates from the dipping-wheels in one tank to those in another, substantially as described.

2. The combination with a grease or tin tank of dipping-wheels arranged to rotate therein side by side, crates for receiving and holding the articles to be immersed in said tank, means for suspending said crates at each end, from and between the periphery of adjacent wheels and means for moving said adjacent wheels at different peripheral speeds with respect to each other whereby the axis of the crate may be obliquely tilted during a portion of the revolution of the dipping-wheels, substantially as described.

3. In a machine of the class described, the combination with a tank and a pair of dipping-wheels having means upon which trunnioned crates may be suspended from one to the other, the axis of said dipping-wheels being coincident, of trunnioned crates and variable-speed gears for actuating said dipping-wheels independently of each other, substantially as described.

4. The combination with two or more tanks of two or more pairs of dipping-wheels arranged to rotate with their lower parts in said tanks goods-receiving crates provided with trunnions adapted to be suspended transversely from peripheral notches in said pairs of wheels and oscillatory arms having means for engaging the trunnions of said crates and transferring them from one to the other pair of dipping-wheels, substantially as described.

5. In a machine of the class described the combination with a tank, of a pair of dipping-wheels arranged to rotate with their lower parts in said tank, said wheels having peripheral notches for the reception of the trunnions of goods-holding crates, goods-holding crates provided with trunnions, and means for automatically delivering the crates to said dipping-wheels, substantially as described.

6. A machine of the class described provided with a plurality of tanks with dipping-wheels having their lower portions therein, upon which wheels crates for holding the articles to be coated may be detachably suspended, a series of crates, means for detachably suspending them from the dipping-wheels, means for driving said wheels in unison and intermediate mechanism arranged to coact therewith for automatically transferring the crates from one set of wheels to another in successive order, substantially as described.

7. In a machine of the class described, the combination of a succession of tanks, successive sets of dipping-wheels arranged in alinement, the lower portions being within the tanks respectively, means upon said wheels for detachably suspending crates for holding articles to be immersed in the tanks, means for driving said wheels, a series of crates and intermediate oscillatory transfer-arms, said arms being provided with means for causing them to elongate in the act of removing a crate from one set of wheels, and of withdrawing from engagement with the crate after having deposited the same in position upon the next set of wheels, substantially as described.

8. In a machine of the class described, the combination with a tank adapted to contain a heated bath of grease or tin, of dipping-wheels arranged upon opposite sides and having their lower portions arranged to rotate within said tank, said wheels having their axes coincident with each other and provided with peripheral notches adapted to receive the trunnions of goods-receiving crates, trunnioned crates, and means for actuating said wheels independently of each other and at different peripheral speeds, but so that the revolution of the two may be completed within the same space of time, substantially as described.

9. In a machine of the class described, the combination with a tank adapted to contain a liquefied material of dipping-wheels arranged upon opposite sides of, and having their lower portions arranged to rotate within said tank, said wheels having their axes coincident with each other and provided with

means upon the periphery of each adapted to engage one of the trunnions of goods-receiving crates, detachable trunnioned goods-receiving crates, and means for securing said trunnions in suspension upon said wheels while the latter are completing the lower half of a revolution, substantially as described.

10. In a machine of the class described, the combination with two or more tanks each adapted to contain a liquefied material, of dipping-wheels arranged upon opposite sides of, and having their lower portions arranged to rotate within said tanks respectively, the wheels in a given tank having their axes coincident with each other, and provided with means upon the periphery of each adapted to engage one of the trunnions of goods-receiving crates, detachable, trunnioned goods-receiving crates, means for securing said trunnions in peripheral engagement with the wheels in a given tank while the latter are completing the lower half of a revolution, means for actuating the wheels in one tank in harmony with those in the next, and means for automatically engaging the trunnions of one crate as it rises from the bath and transferring it to the wheels of the next succeeding bath, substantially as described.

11. The combination with a tank of the class described, of dipping-wheels arranged upon opposite sides of and having their lower portions arranged to rotate therein, the axes of said wheels being coincident with each other, and provided with means upon the periphery of each wheel adapted to engage and suspend one of the trunnions of goods-holding crates while the wheels and crates are being rotated within the bath, detachable trunnioned goods-receiving crates, automatic reciprocating feed-slides for engaging and pushing the trunnions of said crates into engagement with the dipping-wheels, and means for actuating said wheels and feed-slides in harmony with each other, substantially as described.

12. The combination with a grease-tank, a tin-tank and a second grease-tank arranged in succession, of dipping-wheels arranged upon opposite sides of and having their lower portions within said tanks respectively, the wheels of a given tank having their axes coincident with each other and provided with means upon the periphery of each adapted to engage one of the trunnions of goods-receiving crates, detachable trunnioned goods-receiving crates, means for securing said trunnions in peripheral engagement with the wheels in each of said tanks while the latter are completing a partial revolution, means for synchronously actuating all the wheels, an automatic feeding mechanism actuated in harmony with the movement of the dipping-wheels, a list-pot, and intermediate transfer mechanism between said tanks respectively arranged to operate in harmony with the movement of the dipping-wheels for automatically engaging the trunnions of the crates in successive order as they emerge from the bath and transferring them to the next succeeding pair of wheels and finally to the list-pot, substantially as described.

13. The combination with a grease-tank, a tin-tank and a second grease-tank arranged in succession, of dipping-wheels arranged upon opposite sides of and having their lower portions within said tanks respectively, the wheels in a given tank having their axes coincident with each other and provided with means upon the periphery of each adapted to engage one of the trunnions of goods-receiving crates, detachable, trunnioned goods-receiving crates, means for securing said trunnions in peripheral engagement with the wheels in each of said tanks while the latter are completing a partial revolution, means for synchronously actuating all the wheels, an automatic feeding mechanism actuated in harmony with the movement of the dipping-wheels, a list-pot, intermediate transfer mechanism between said tanks respectively arranged to operate in harmony with the movement of the dipping-wheels for automatically engaging the trunnions of the crates in successive order as they emerge from the bath, and transferring them to the next succeeding pair of wheels and finally to the list-pot, and automatic mechanism for moving said crates across said list-pot so that the goods may be in contact with the molten metal therein, substantially as described.

14. The combination with a grease-tank, a tin-tank and a second grease-tank arranged in succession, of dipping-wheels having their lower portions arranged to rotate within said tanks respectively, the wheels in a given tank having their axes coincident with each other and provided with means upon the periphery of each adapted to engage one of the trunnions of goods-receiving crates, detachable, trunnioned goods-receiving crates, means for securing said trunnions in peripheral engagement with the wheels in each of said tanks while the latter are completing a partial revolution, means for synchronously actuating all the wheels, an automatic feeding mechanism actuated in harmony with the movement of the dipping-wheels, a list-pot, intermediate transfer mechanism between said tanks respectively arranged to operate in harmony with the movement of the dipping-wheels for automatically engaging the trunnions of the crates in successive order as they emerge from the bath and transferring them to the next succeeding pair of wheels and finally to the list-pot, automatic mechanism for moving said crates across said list-pot to bring the goods in contact with the molten metal therein, and a wiping-pad arranged in the path of movement of the goods held by said crates, substantially as described.

15. In a machine of the class described, the combination with a list-pot and goods-hold-

ing crates, of automatic mechanism for moving said crates over said list-pot so that the goods may be momentarily brought into contact with the molten metal in said pot, and a wiping-pad arranged in the path of movement of said goods after delivery from the list-pot, substantially as described.

In testimony whereof I have signed this specification, in the presence of two subscribing witnesses, this 7th day of December, 1897.

JOSEPH MONTO.

Witnesses:
D. H. FLETCHER,
JOSEPHINE S. MCGREGOR.