

No. 753,032.

PATENTED FEB. 23, 1904.

C. BANKEY.
THRESHING MACHINE.

APPLICATION FILED JAN. 18, 1901.

NO MODEL.

6 SHEETS—SHEET 1.

Fig. 2.

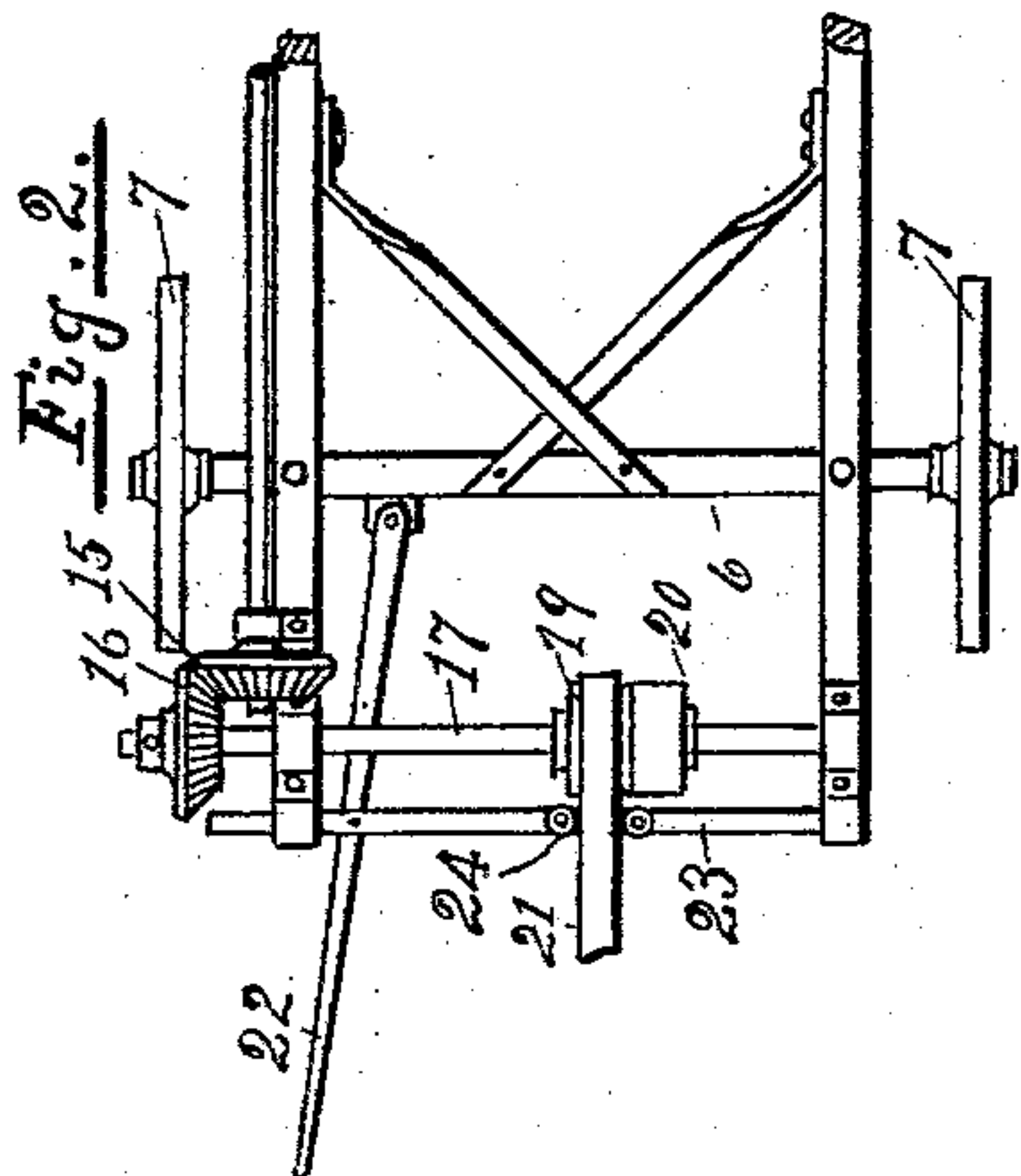
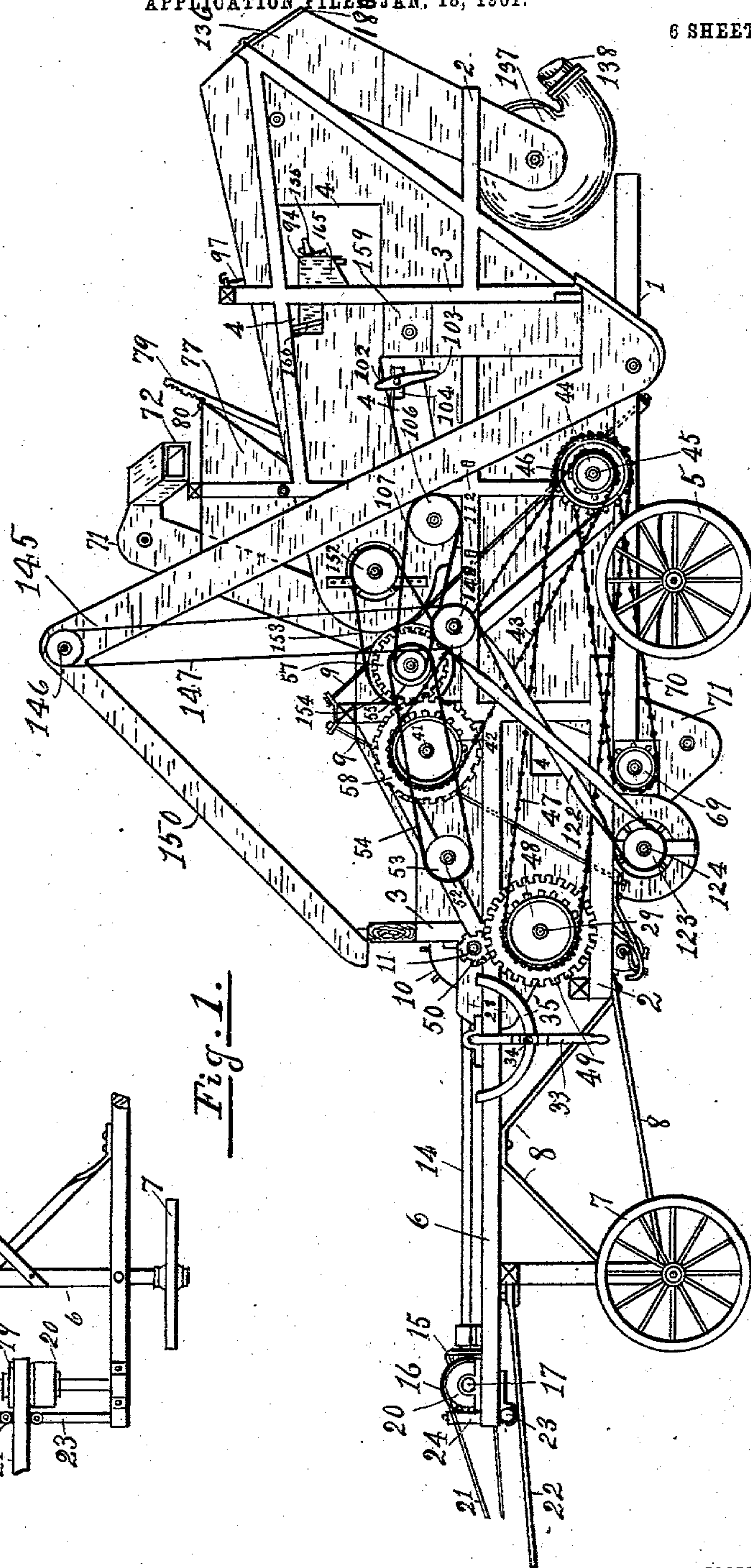


Fig. 1.



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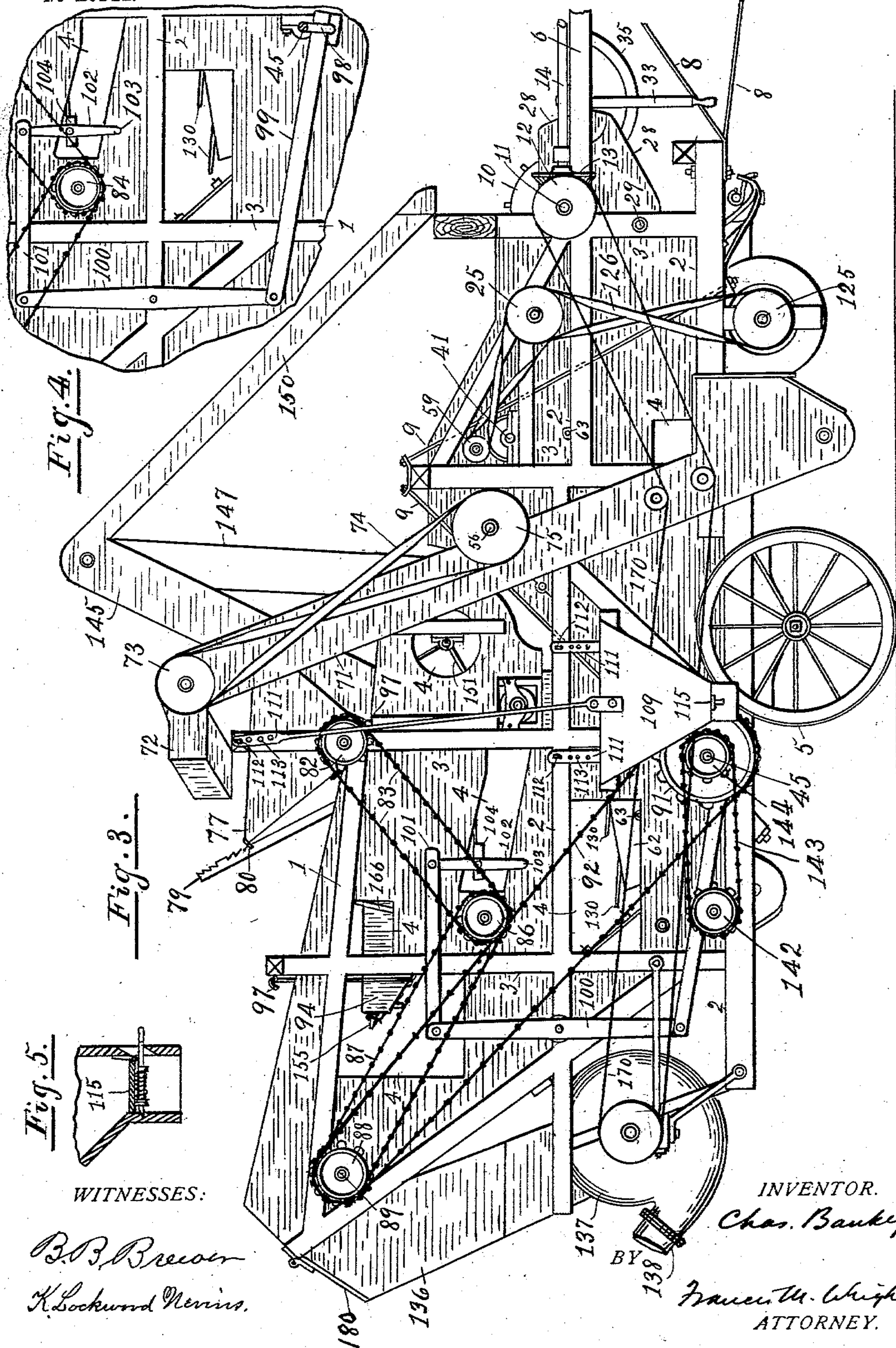
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6 SHEETS—SHEET 2.



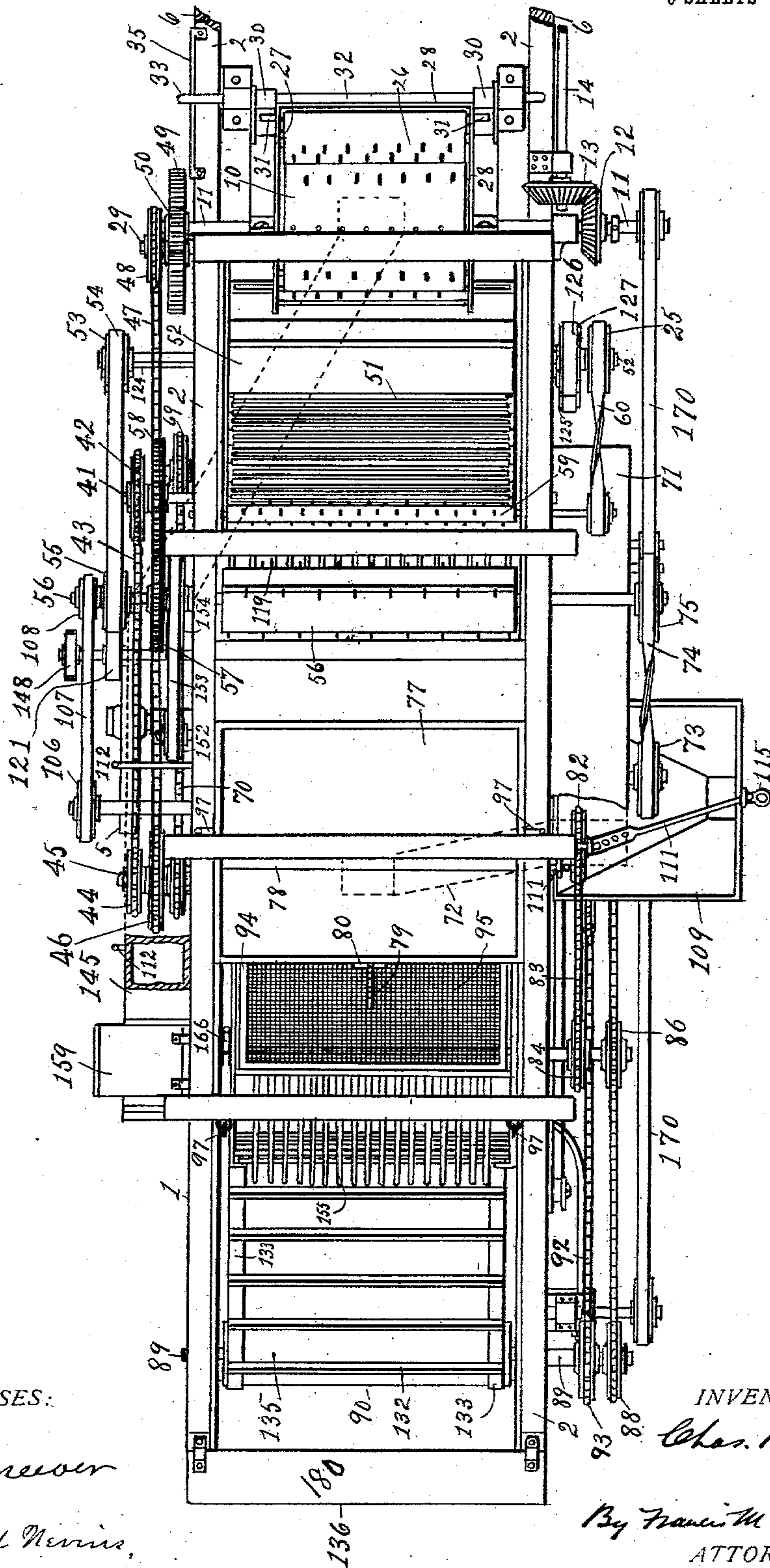
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6 SHEETS—SHEET 3.

Fig. 6.



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6 SHEETS—SHEET 4.

Fig. 8.

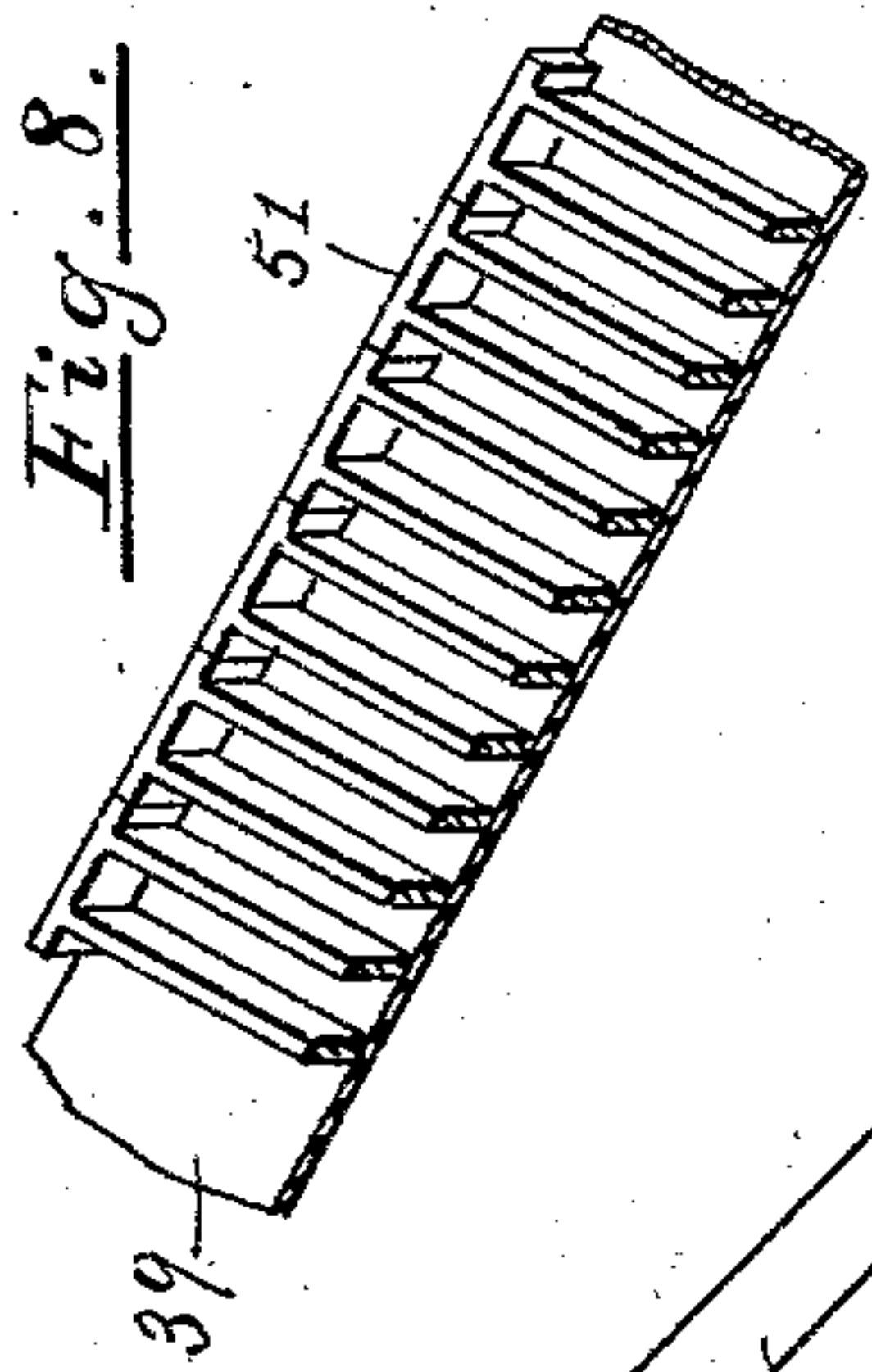
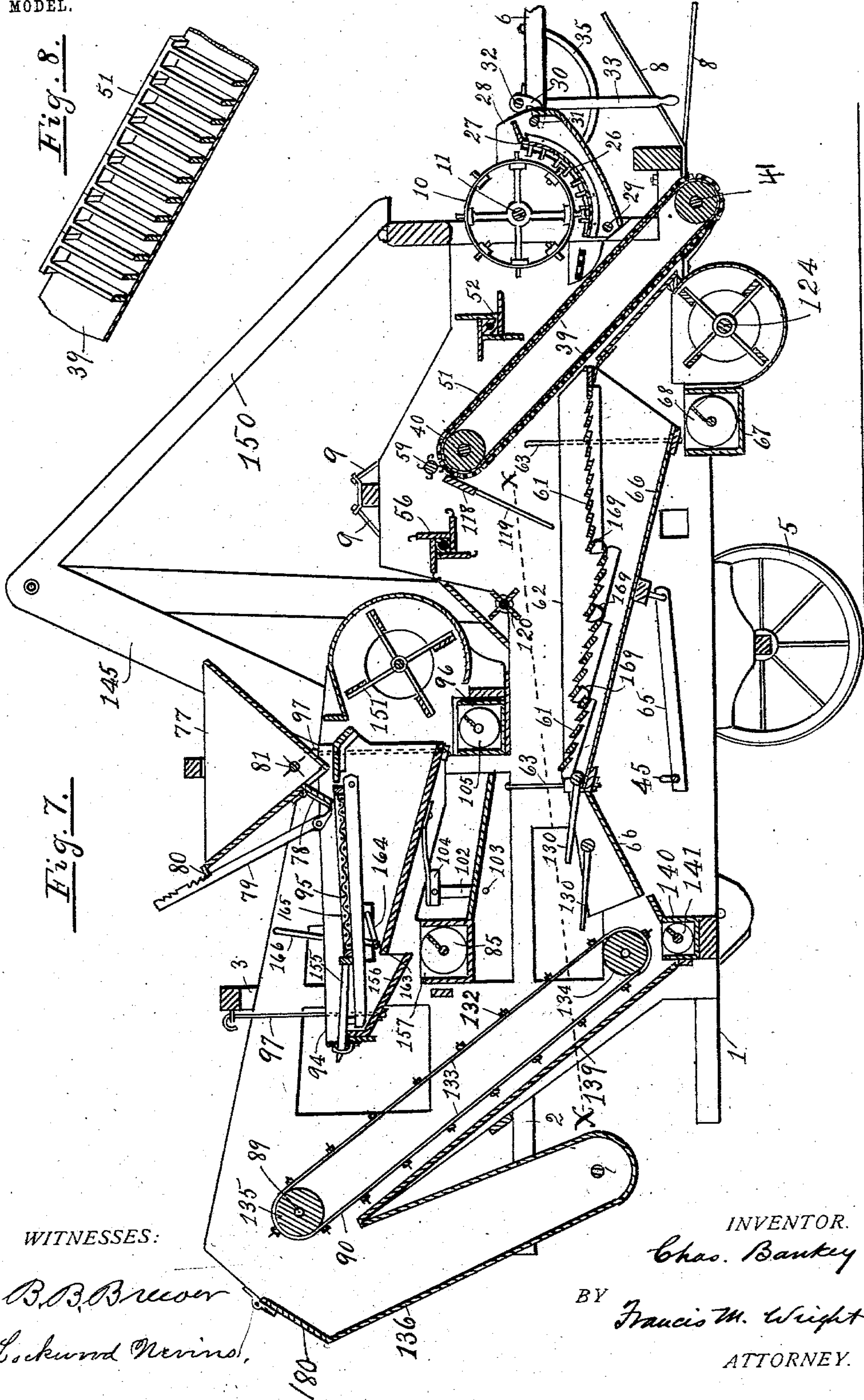


Fig. 7.



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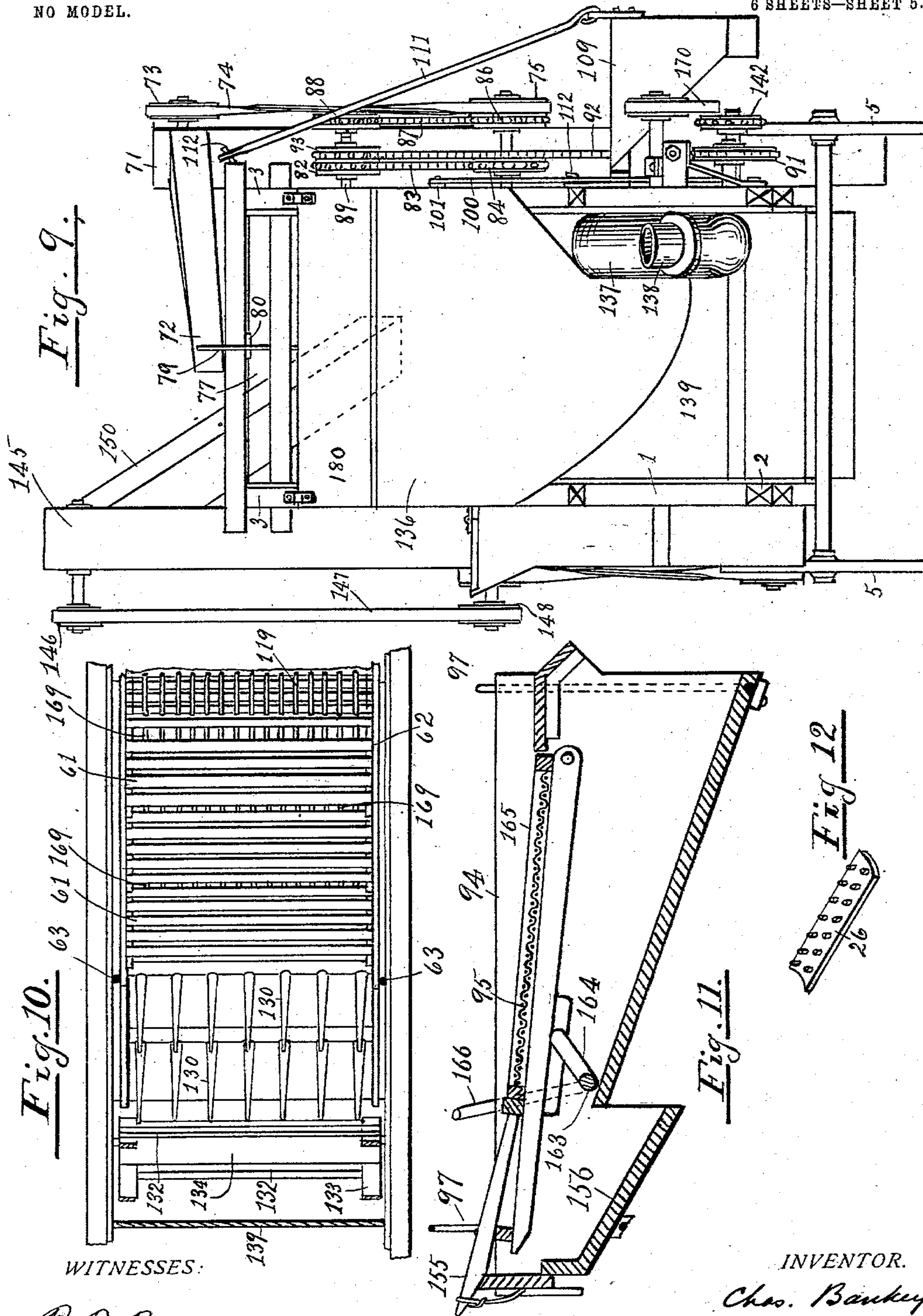
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6 SHEETS—SHEET 5.



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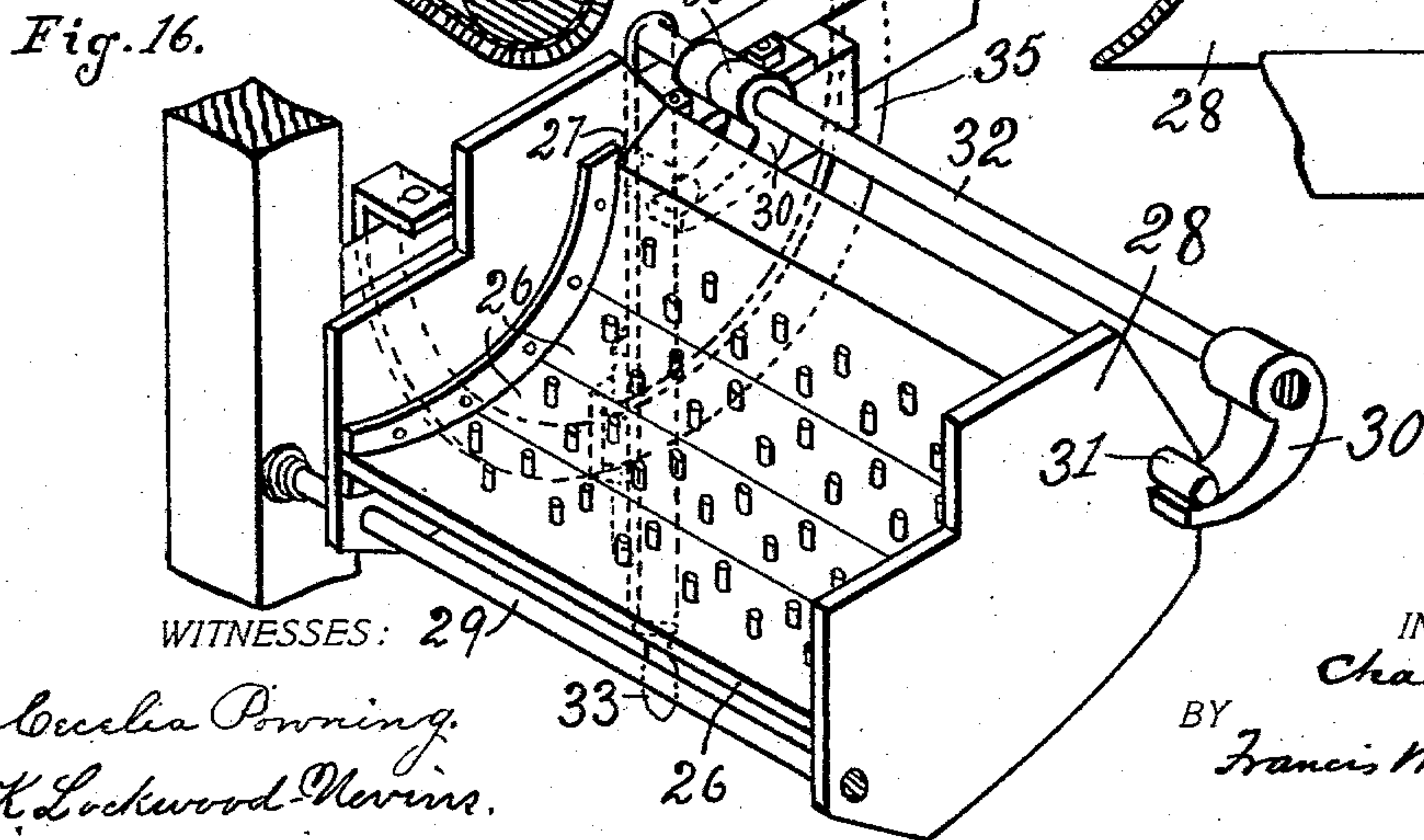
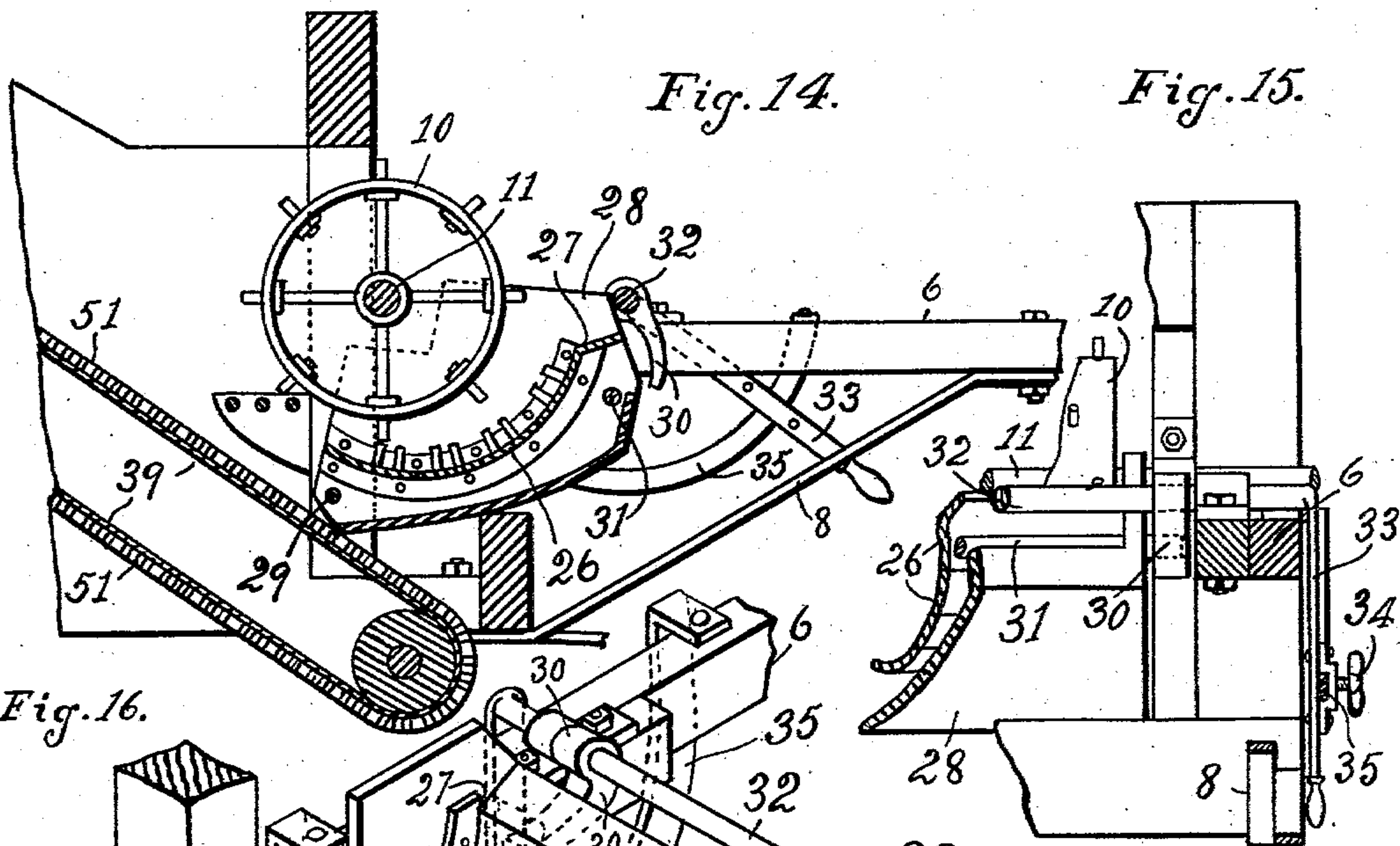
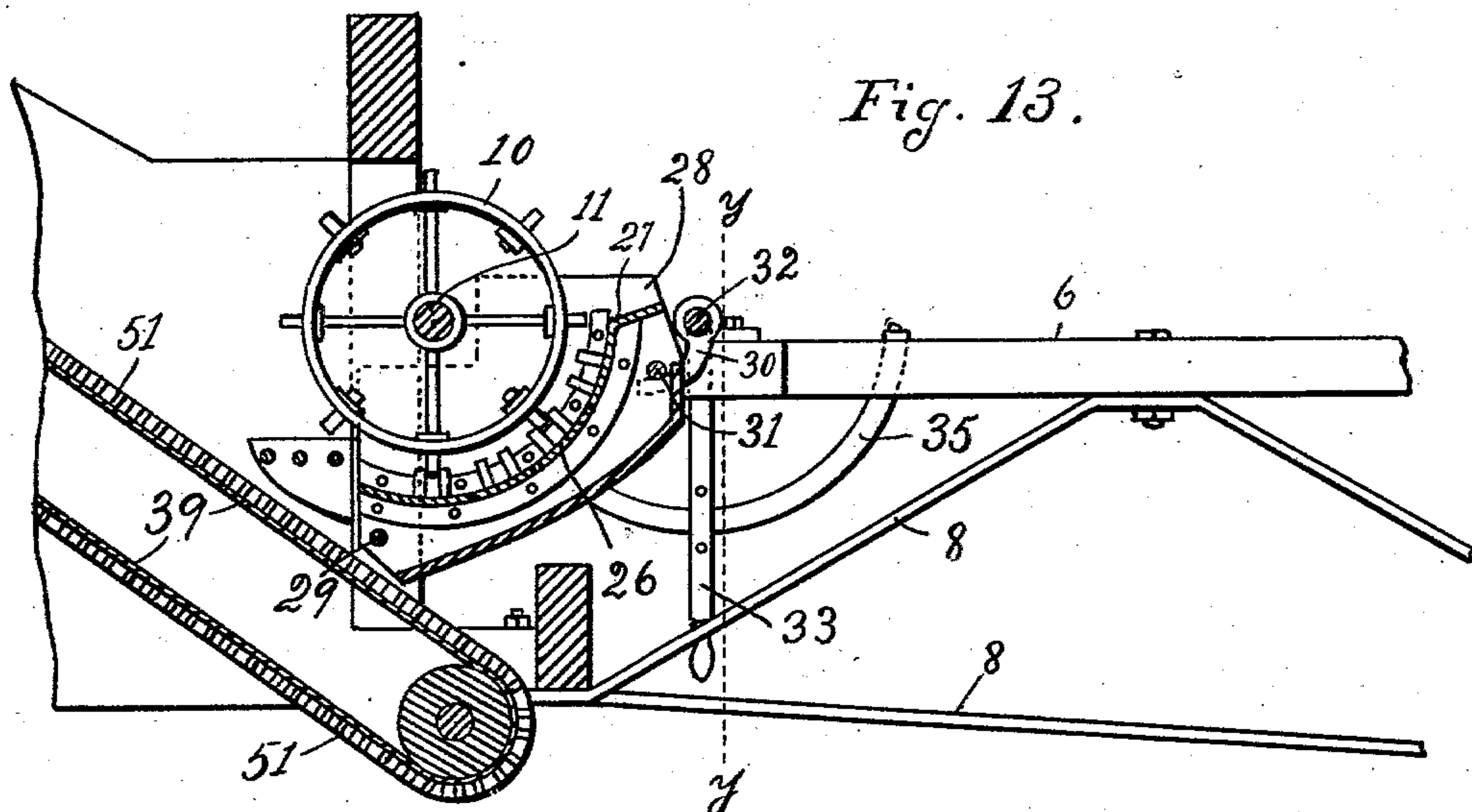
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APPLICATION FILED JAN. 18, 1901.

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6 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

CHARLES BANKEY, OF SAN FRANCISCO, CALIFORNIA.

THRESHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 753,032, dated February 23, 1904.

Application filed January 18, 1901. Serial No. 43,823. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BANKEY, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Threshing-Machines, of which the following is a specification.

My invention relates to improvements in threshing-machines, the objects of my invention being to provide a machine of this character which will save time, labor, and grain.

My invention therefore resides in the novel construction, combination, and arrangement of parts for the above ends, hereinafter fully specified, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the threshing-machine. Fig. 2 is a plan view of the forward extension thereof. Fig. 3 is a side elevation of the opposite side of the machine to that shown in Fig. 1, the extension being omitted. Figs. 4 and 5 are details of construction. Fig. 6 is a plan view, the extension being omitted. Fig. 7 is a longitudinal view, the extension being omitted. Fig. 8 is a broken perspective view of the draper. Fig. 9 is a rear view. Fig. 10 is a section on the line X X, Fig. 7. Fig. 11 is an enlarged section of the cleaner. Fig. 12 is a perspective view of one of the concaves. Fig. 13 is an enlarged longitudinal section through the threshing-cylinder, showing the concaves in their raised position. Fig. 14 is a similar view showing the concaves in their lower position. Fig. 15 is a partial cross-sectional view on the line y y of Fig. 13. Fig. 16 is a perspective view showing the interior of the swinging basket.

Referring to the drawings, 1 represents the frame or body of my improved threshing-machine, comprising horizontal beams 2 and vertical posts 3. In said body are apertures or doors 4, permitting access to the interior of the machine at different points for inspection and repairs. Said frame is supported on rear wheels 5, and it has an extension 6, supported on the front wheels 7, said extension being strengthened by braces 8 and the main frame

1 being strengthened by ties 9, extending from the lower horizontal beams to the tops of the main vertical posts.

In the front end of the main body of the threshing-machine is carried the threshing-cylinder 10, its shaft 11 being driven by means of miter-gears 12 13 from a longitudinal shaft 14, supported on the extension 6 and driven by miter-gears 15 16 from a transverse shaft 17 on the front end of said extension. Said transverse shaft carries fast and loose pulleys 19 20, the fast pulley 19 being driven by a belt 21 from the engine or other source of power at a distance, and for the purpose of stopping the operation of threshing the belt 21 is shifted onto the loose pulley 20 by means of a shifting-lever 22, operating a sliding rod 23, carrying rollers 24, between which said belt travels. The advantages of this extension are as follows: In the present construction of machines the shaft of the threshing-cylinder carries the pulley, which is driven direct from the engine. The result is that there is no satisfactory way of stopping the threshing-machine except by stopping the engine. Thus it often happens that the operator of the threshing-machine knows that along with the wheat there is being fed to the threshing-cylinder a foreign object which will damage the machine—as, for instance, a fork may be dropped into the straw being fed—but he is not able to stop the machine in time, as the engineer is not always at his post. It is understood that the nature of the ground and other reasons often require that the engine be placed a considerable distance from the threshing-machine. By reason of the extension fast and loose pulleys may be provided and means for instantly throwing the belt from the engine from the fast to the loose pulley, so that the feed may be stopped without running to the engine or finding the engineer. This construction, therefore, saves a man in caring for the operation of the machine, for with the old construction it was necessary to have a stoker as well as an engineer to attend to the engine, for it was necessary to have a man at the engine always ready to stop at a signal.

With the present construction this is not necessary, as the engineer can also stoke the engine.

A further advantage of the extension is that it facilitates the setting up of the machine, particularly in hilly countries. In hilly places it is sometimes almost impossible to connect the engine with the threshing-machine by a belt on account of the difference of elevation of the engine and machine. It is particularly hard to set up the machine so that the belt shall run straight on a pulley of the shaft of the threshing-cylinder. If it is set obliquely on one side, it runs off the pulley; if obliquely on the other side, it runs up against the feeder and damages both the feeder and itself. The edge of the belt next the feeder wears rough and becomes long on that side and gets out of shape to such an extent that it is impossible to set it right.

A further disadvantage in the old style is that the pulley being close to the threshing-cylinder becomes covered with dust and dirt and the belt slips, thereby causing great loss of power. In the above-described construction the dust from the threshing-cylinder does not come near the pulley, and thus the pulley does not become dirty, and said pulley is connected with the shaft of the threshing-cylinder by bevel-gearing, which is not affected by the dust,

A further advantage is that the threshing-machine can be turned in a sharp curve when being moved about. Also the present construction is of great advantage in setting up the machine in hilly places where it is necessary to dig under one of the front wheels of the machine to lower the same. In the old style, in which the front wheels were close up to the threshing-cylinder, it was very inconvenient to dig under said front wheels, whereas with the present construction this is easily done from both sides of the wheel.

A further advantage is that the weight of one end of the long feeder to the threshing-cylinder is now carried between the front and rear wheels of the threshing-machine instead of being carried on an extension of the machine beyond the front wheels, as formerly.

A further advantage is that the present construction permits of the belt being more conveniently rolled up and carried out of the way of the feeder and men removing the same when changing ground.

The unthreshed straw is fed to the threshing-cylinder by the usual feeders and passes between the surface of said cylinder 10 and concaves 26, said concaves being supported at their ends in grooves 27, formed on the sides of a swinging basket 28. Said basket is pivoted near its rear side, as shown at 29, and to support said basket in position, so that the concaves 26 are in proper relation to the thresh-

ing-cylinder 10, there are provided arms 30, engaging the ends of a rod 31, passing through said basket 28, said arms 30 rocking on a shaft 32, vibrated by means of a lever-arm 33. Said lever-arm 33 may be adjusted in any desired position by means of a set-screw 34 engaging any desired portion of an arc 35, secured to one of the horizontal beams forming the extension 6.

The concaves 26 have each two rows of teeth projecting inwardly from the concave side thereof, the teeth of the cylinder alternating in longitudinal position with the teeth of the concaves, so that the straw which is carried down by said cylinder between said cylinder and concaves is thoroughly threshed. When threshing out different stacks of wheat, these stacks will differ in condition as regards toughness. The stacks will be more or less brittle, according to the length of time they have been sweated. Also dampness caused by rain makes the straw tough.

To adjust the threshing-cylinder for different degrees of toughness in the straw in passing from one stack to another, it is necessary to put in more or fewer concaves. In the old construction the concaves are held in stationary casings and have to be pried out one after the other. This is done with great difficulty and inconvenience. This operation is likewise necessary when it is required to take out concaves if damage is done to the teeth of the concaves or of the cylinder or to the concaves themselves. An hour and a half or two hours are sometimes occupied in making this change. With my improvement of supporting the basket on a pivotal axis this operation of adjusting the concaves for different degrees of toughness or examining or changing the concaves may be done in a few minutes. All that is necessary is to loosen the set-screw 34 and rock the shaft 32 by means of the lever-arm 33, so that the arms 30 on said shaft shall be wholly removed from engagement with the ends of the rod 31. When this is done, as shown in Fig. 13, the basket 28 will swing down on its rear pivot 29 and the concaves will be easily accessible.

My improved construction also prevents damage to the threshing-cylinder, which would happen in the old constructions. For instance, if a horseshoe is fed into the threshing-cylinder, which not uncommonly happens, then in the old style the horseshoe would break the teeth out of the cylinder and break the concaves, causing very great pecuniary damage and much loss of time. With my construction the casing is arranged to give way under such pressure as would otherwise break the concaves. This is permitted by the support given by the set-screw 34, the tightness of which may be so adjusted as to yield to any desired amount of pressure. The grain is

now carried upward by means of a draper 39, operated by a roller 40 on a shaft 41, having a sprocket-wheel 42, driven by means of a sprocket-chain 43 from a sprocket-wheel 44 on the agitator-shaft 45, said shaft having also a sprocket-wheel 46, driven by a chain 47 from a sprocket-wheel 48, mounted loosely on the shaft 29, said wheel being secured to and rotating with a gear-wheel 49, driven by a pinion 50 on the shaft 11 of the threshing-cylinder. The grain being carried upward by said draper falls into pockets formed thereon by means of slats 51, placed close together, the straw, however, being carried up by said draper above the level of said pockets. In its ascent the straw is further beaten by means of a beater 52, driven by means of a pulley 53 and belt 54 from a pulley 55 on the shaft of the beater 56, the latter shaft having thereon a gear-wheel 57, meshing with a gear-wheel 58 on the shaft 41 of the roller 40, which operates the draper. It is then carried to the separator 59, which is driven by a crossed belt 60 from a pulley 61 on the shaft of the beater 52, by means of which the straw is separated from the grain, the latter falling onto and between the bars 62 of an agitator 62. Said agitator 62 is suspended by rods 63 to permit of a reciprocating movement and is reciprocated by means of the shaft 45, driven in the manner already described, said shaft 45 having cranks formed therein connected by links 65 to said agitator 62. The agitator 62 has an inclined bottom 66, down which the grain, separated as above described, falls into a trough 67, along which it is conveyed to the side of the machine by means of an auger 68, on a shaft having a sprocket-wheel 69, driven by means of a sprocket-chain 70 from the agitator-shaft 45. The grain thus conveyed to the side of the machine is deposited in the bottom of an elevator 71, up which it is carried to be deposited in a chute 72. The elevator 71 is operated by means of a pulley 73, crossed belt 74, and pulley 75 on the shaft of the beater 56, driven as already described. The chute 72 discharges into a hopper 77, having a door 78 closing the opening in its bottom, said door being adjustably secured by means of the ratchet-bar 79 and catch 80. A feed-roller 81 in the bottom of the hopper feeds the grain therefrom, said roller being driven by a sprocket-wheel 82, chain 83, and sprocket-wheel 84 on the shaft of an auger 85, said latter shaft being driven by another sprocket-wheel 86, a chain 87, and a sprocket-wheel 88 on the shaft 89, which operates the straw-carrier 90, said latter shaft 89 being driven by a sprocket-wheel 91, chain 92, and sprocket-wheel 93 from the agitator-shaft 45. The grain thus discharged from the hopper 77 falls on a cleaner 94, comprising a wire sieve 95, through

which the grain, if perfectly clean, falls onto the inclined bottom of the cleaner and then along said bottom into the trough 96. Said cleaner is suspended by rods 97 and is reciprocated from a crank-arm 98 of the agitator-shaft 45 (see Fig. 4) by means of a link 99, lever 100, link 101, lever 102, pivoted at 103, and link 104, connected to the inclined bottom of the cleaner 94. The clean grain discharged into the trough 96 is fed therealong by means of an auger 105, operated by means of a pulley 106, belt 107, and pulley 108 on the shaft of the beater 56. Said grain so fed is discharged into a hopper 109, removably supported by means of rods 111 from pins 112 on the sides of the machine. Said rods 111 have a number of eyes 113 therein to engage the pins, thereby permitting the hopper to be adjusted in height, so that a grain-sack can be stood upon the ground beneath the hopper whatever may be the level of the ground. By changing the belt 107 to a crossed belt the auger 105 may be made to feed in the opposite direction to the other side of the machine. This is of advantage, as it saves time in setting up the machine to be able to sack the grain at either side. Also sometimes it may be desirable to change the side of the machine at which the grain is being sacked on account of the direction of the wind. The adjustability in height of the hopper obviates the necessity of digging into the ground to obtain a proper resting-place for the sack, as is now sometimes necessary. The mouth of the hopper is normally closed by a gate 115, and as the hopper is constructed to contain a sackful of grain this construction saves a man in the operation of sacking. With former machines it has been necessary to have one man to hold the sack to the mouth of the discharge-trough while it is being filled, while other sacks are being sewed up. With the present construction this man is not required, as the hopper will be gradually filled while the full sacks are being sewed up, and before it is quite full there will be time for a man who has been sewing a full sack to bring another empty sack to the hopper and fill it in an instant therefrom and then remove the full sack, leaving the hopper to be filled automatically while the sack is being sewed up.

Returning now to the straw which was separated from the grain by the separator 59, said straw passes over a partition 118, having downwardly-extending teeth 119, and so descends to the griddled surface of the agitator 62, being beaten in its descent by two beaters 56 120, the beater 56 being driven in the manner already described, and the second beater 120 being driven by means of a pulley 121, cross-belt 122, and pulley 123 from the shaft of a blower 124, said blower-shaft 124 being driven by means of a pulley 125 at

the opposite side of the machine, cross-belt 126, and pulley 127 on the shaft of the beater 52. The effect of the fan or blower 124 is to blow the straw rearwardly along the griddled surface of the agitator, and this, combined with the reciprocating motion of the agitator working against the teeth 119, feeds the straw rearwardly over the bars 61. Said straw will by means of the beaters 56 120 give up a further quantity of grain, which falling between the bars 61 onto the inclined bottom 66 of the agitator will descend into the trough 67 and be carried by the elevator 71 to the hopper 77 and cleaner 94 and thence discharged by the trough 96 to the hopper 109 and so sacked. The straw will pass on over the agitator 62 and over rakes 130 to the straw-carrier 90, comprising bars 132, carried by bands 133 over rollers 134 135, the upper rollers being mounted on a shaft 89 and driven in the manner already described. By this means the straw will be elevated and deposited in a chute 136, leading to the fan 137 of the pneumatic straw-stacker 138; but while the straw is being carried upward by the carrier loose unthreshed heads of wheat and white caps or grains having particles of chaff adhering thereto will fall through said straw and carrier onto the wall 139 and into the trough 140, along which they will be conveyed by the auger 141, driven by means of a sprocket-wheel 142, chain 143, and sprocket-wheel 144 on the agitator-shaft 45. So conveyed they will be deposited in an elevator 145, operated by a pulley 146 at the top of said elevator, driven by a band 147 from a pulley 148 on the shaft of the beater 120, driven in the manner already described. From the top of said elevator they descend by a chute 150 to the threshing-cylinder 10 and are threshed over again, the clean grain thus obtained being conveyed to the sack in the manner already described, while if there be any white caps or unthreshed heads remaining after the second operation they will be a second time conveyed to the threshing-cylinder to be threshed a third time. The result is that substantially all the grain is eventually saved, and there is comparatively no loss by unthreshed heads and white caps going off with the straw. By this improvement, therefore, I effect a very great saving in the amount of grain obtained. The white caps and unthreshed grain which are separated from the grain by means of the sieve 95 of the cleaner 94 are blown rearwardly along said sieve by means of a fan 151, driven by a pulley 152, band 153, and pulley 154 from the shaft of the beater 56 and are thus carried on the rake 155, through which they fall upon the inclined board 156, delivering them to the trough 157, along which they are conveyed by an auger 85 to a vertical chute 159, delivering them to the elevator 145, whereby in the

manner already described they are conveyed to the threshing-cylinder to be threshed over again.

It is necessary that the sieve of the cleaner be evenly covered all the time with grain. If it is too scantily covered, the wind will blow the grain off. If there is too much grain, it will go over without being cleaned. The amount of grain on the sieve can be regulated by adjusting the angle of inclination of the cleaner.

The uniform depth of grain upon the sieve is obtained by means of the hopper, which acts as a reservoir, holding two or more sacks of grain, so that however irregular is the threshing and the feed to the hopper the discharge from the hopper upon the sieve will be uniform.

It is very necessary that the sieve should be at all times level in order that the grain should be fed uniformly therealong. Sometimes in hilly countries the threshing-machine is so placed that with the old construction, in which there is used a stationary sieve, it is not possible to provide for the sieve being level except by resetting the entire machine. I obviate this objection by making the sieve adjustable in inclination, so that however uneven the machine itself may be the sieve may always be placed level, if desired. A further advantage of this construction is that the inclination of the sieve may be varied to suit different kinds of grain. The sieve may be placed level with the horizon, or it may be inclined to any degree to suit different kinds of grain by means of a rock-shaft 163, secured upon the inclined bottom of the cleaner, said shaft being formed with cranks 164, engaging the side pieces 165 of the sieve to raise the same, said shaft being bent at one end to form an arm 166 to rock said shaft. By shifting the arm 166 the shaft 163 is rocked and the side pieces 165 and the sieve are raised or lowered, as may be desired. As thus adjustment is made only occasionally, it will be sufficient to secure the arm 166 in the desired position by any simple contrivance, such as driving a nail into the side of the harvester under the edge of the arm 166 or by tying the arm 166 in position by a cord.

A further object of my invention is to provide means for arresting loose teeth of the threshing-cylinder and other small hard objects and preventing them going through the threshing-cylinder a second time with the white caps and unthreshed heads of grain. This is accomplished by dividing the bars 61 of the agitator 62 into groups and interposing between the groups short vertical or nearly vertical bars 169 of metal sufficiently near to each other to prevent the loose teeth or other pieces of iron from dropping through.

An important improvement resides in so

locating the pneumatic straw-stacker 138 that its fan 137 does not suck any grain from the sieve. In prior constructions there has been no obstacle preventing the indraft of the pneumatic straw-stacker creating an undue suction at the sieve tending to draw the grain therefrom. In my construction this is prevented by the interposition of the wall 139 between the pneumatic fan and the sieve. In furtherance of the same object there is provided at the top of the chute a door 180, which will when necessary be opened, the effect of which will be to break the current of air from the interior of the machine to the straw-stacker when said current becomes too strong. Without this door it may happen that the current of air may be so strong as to suck up the grain as well as the straw. Whenever this happens, it is only necessary to open the door 180, and this will break the current, drawing in air direct from the atmosphere and not through the body of the machine.

The fan 137 is driven by a belt 170 from the shaft of the threshing-cylinder.

I claim—

1. A threshing-machine having a threshing-cylinder, an extension forward of said cylinder, supported directly above the front wheels of the machine, a shaft in the forward end of said extension, fast and loose pulleys on said shaft, a longitudinal shaft extending from a point in front of said wheels to the rear of the same, and bevel-gearing connecting said longitudinal shaft with the shaft on the extension and the shaft of the cylinder, substantially as described.

2. A threshing-machine having a threshing-cylinder, a basket swinging from its rear side, concaves supported by said basket, said cylinder and concaves having teeth for threshing the straw, removable supports for the front side of said basket, and means for wholly removing said supports from engagement with said basket to permit the front side thereof to fall freely, substantially as described.

3. A threshing-machine having a threshing-cylinder, a basket swinging from its rear side, concaves supported by said basket, said cylinder and concaves having teeth for threshing the straw, removable supports for the front side of said basket, means for wholly removing said supports from engagement with said basket to permit the front side thereof to fall freely, and a set-screw for adjustably and yieldingly maintaining said means in the position of support, whereby said basket yields to undue pressure, substantially as described.

4. A threshing-machine having a threshing-cylinder, a draper for carrying the grain and straw therefrom, a separator for separating the grain and straw, an agitator, an elevator for carrying the grain to the cleaner, a hopper for receiving the grain from the elevator and having an adjustable door, a cleaner onto

which the hopper discharges, a trough receiving the grain from the cleaner, an auger in said trough, and a hopper into which the auger discharges the grain from said trough, substantially as described.

5. A threshing-machine having a threshing-cylinder, a draper ascending therefrom, a separator at the top of the draper, fingers extending downwardly from said separator and forming a partition, and a rotary beater beating the straw against said fingers said fingers extending obliquely rearwardly under said beater, substantially as described.

6. A threshing-machine having a threshing-cylinder, a separator for separating the grain from the straw, an agitator comprising a grate, a chute below the grate, a wind-blast directed upwardly along the surface of the chute, a second chute descending from the top of the first chute but in the opposite direction, and fingers extending from the top of said second chute to carry the straw thereover, substantially as described.

7. A threshing-machine having a threshing-cylinder, a separator for separating the grain from the straw, an agitator comprising a grate, a chute below the grate, a wind-blast directed upwardly along the surface of the chute, a second chute descending from the top of the first chute but in the opposite direction, fingers extending from the top of said second chute to carry the straw thereover, and a box at the bottom of the second chute to catch the grain blown over, substantially as described.

8. A threshing-machine having a threshing-cylinder, a separator for separating the grain from the straw, a cleaner, an elevator for carrying the grain to the cleaner, an agitator for the straw, a carrier for the straw, two troughs, whereby one receives the uncleaned grain from the cleaner and the other receives the grain dropped from the straw when carried by the carrier, and an elevator for reconveying to the threshing-cylinder the grain from both the said troughs, substantially as described.

9. A threshing-machine having a threshing-cylinder, an agitator, a cleaner, means for conveying grain from the agitator to the cleaner, and means for conveying the uncleaned grain from the cleaner to the threshing-cylinder, said agitator comprising groups of transverse bars between which the grain passes, and short vertical bars between the groups to catch foreign substances, such as loose cylinder-teeth, substantially as described.

10. A threshing-machine having a threshing-cylinder, a cleaner, an elevator for conveying the grain to the cleaner, a trough for receiving the grain from the cleaner, an auger in said trough, means for operating the auger in either direction, a hopper, and means for supporting the hopper at either end of the trough, substantially as described.

11. A threshing-machine having a thresh-
ing-cylinder, a cleaner, an elevator for con-
veying the grain to the cleaner, a trough for
receiving the grain from the cleaner, an auger
5 in the trough, a hopper, and adjustable means
for supporting the hopper at the end of the
trough at varying heights, substantially as de-
scribed.

In witness whereof I have hereunto set my
hand in the presence of two subscribing wit- 10
nesses.

CHARLES BANKEY.

Witnesses:

FRANCIS M. WRIGHT,
K. LOCKWOOD NEVINS.