

March 6, 1951

E. M. McCANN
COTTON CHOPPER

2,544,036

Filed Sept. 10, 1946

7 Sheets-Sheet 1

Fig. 1.

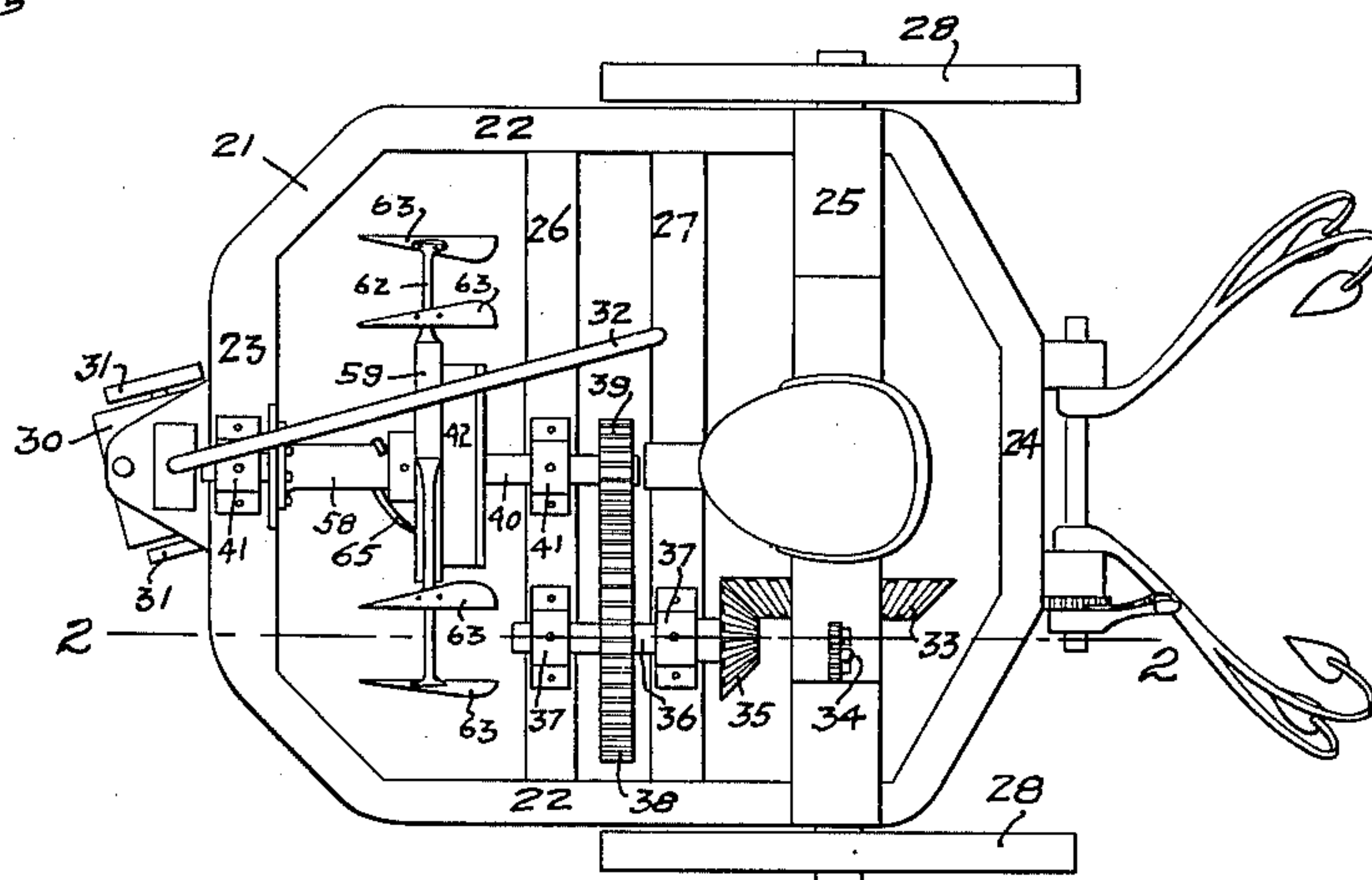
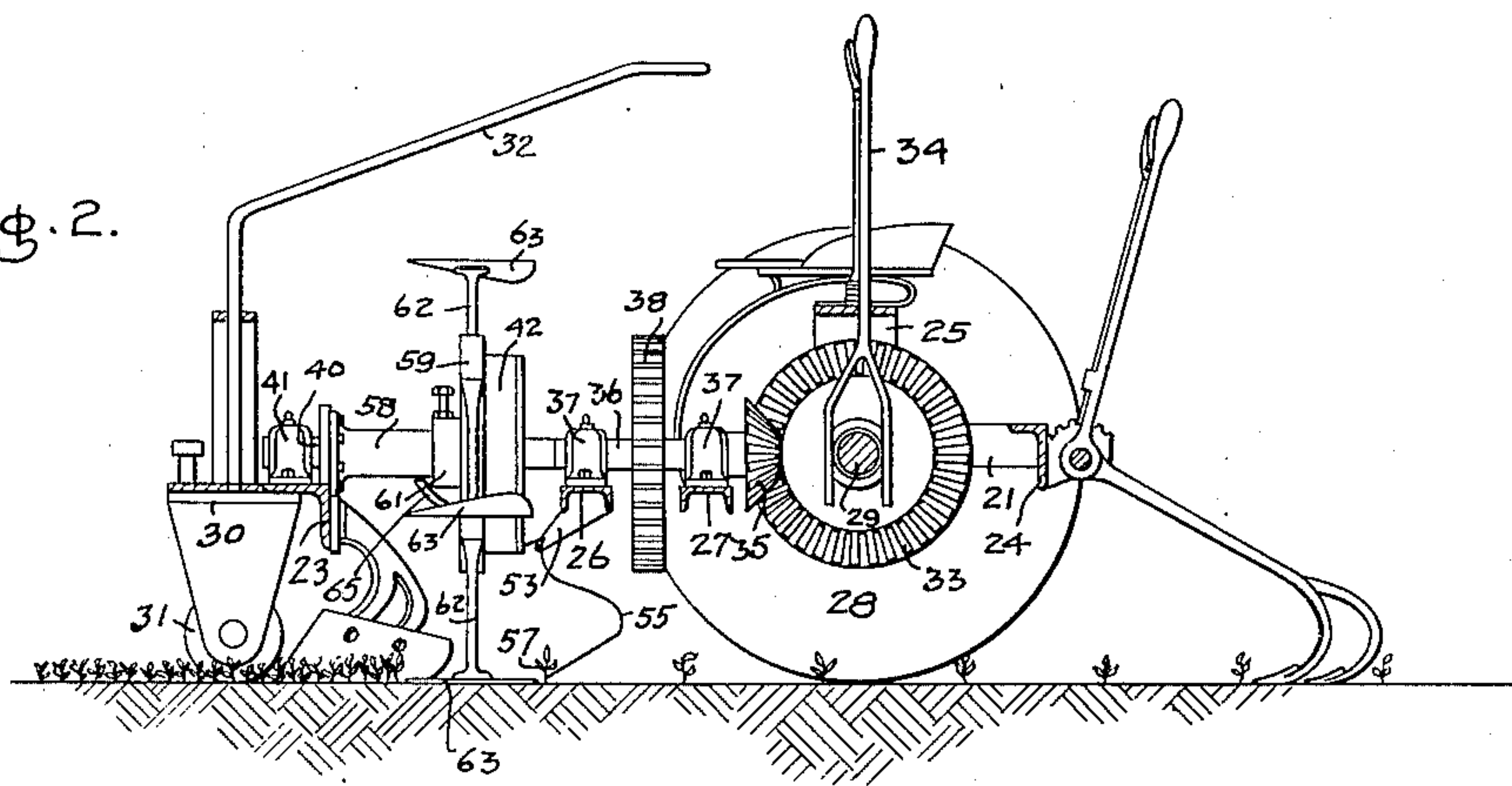


Fig. 2.



Edward M. McCann
INVENTOR.

BY *P. J. Elliott*

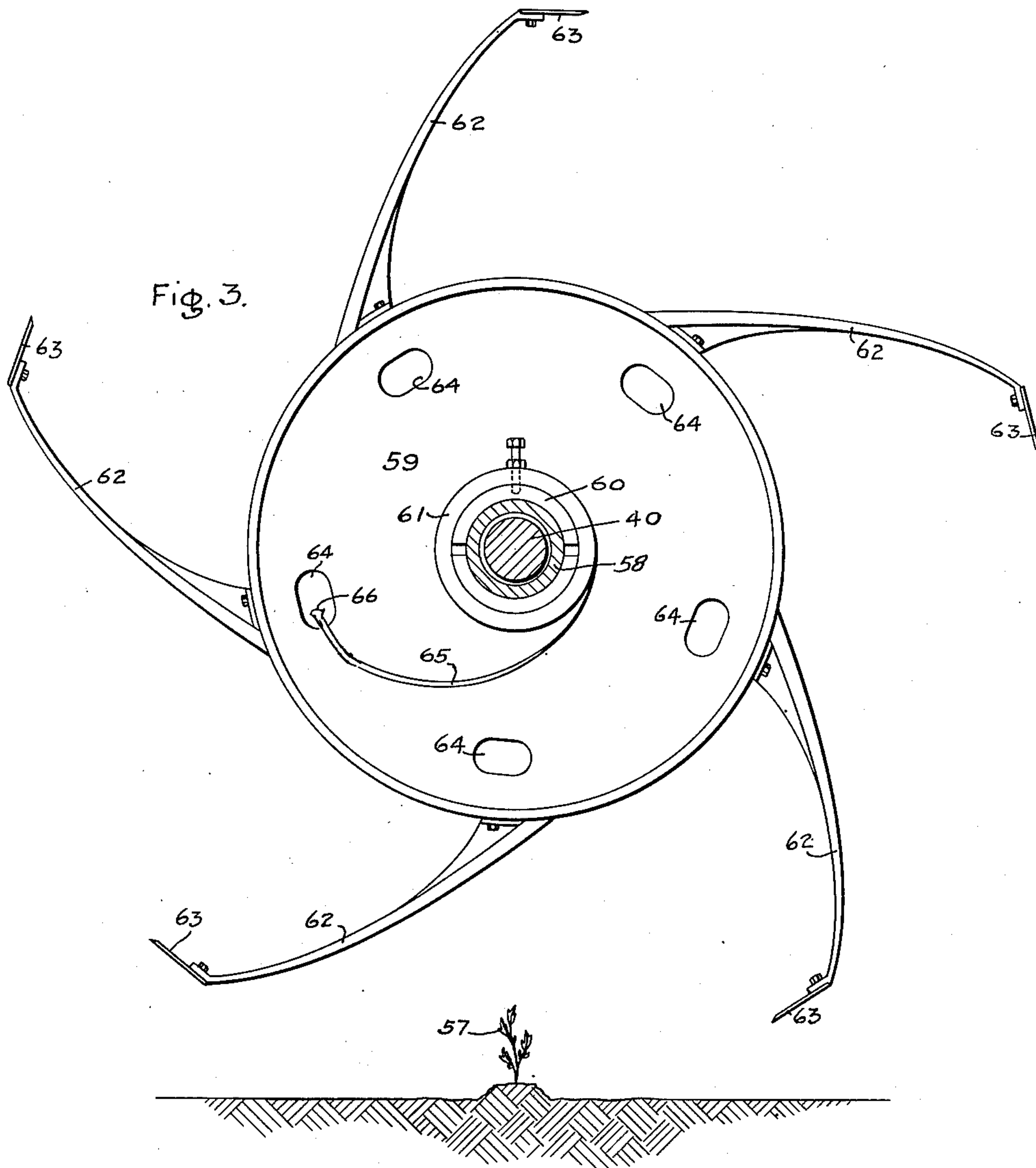
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Edward M. McCann

INVENTOR

BY

P. J. Elliott

ATTORNEY

March 6, 1951

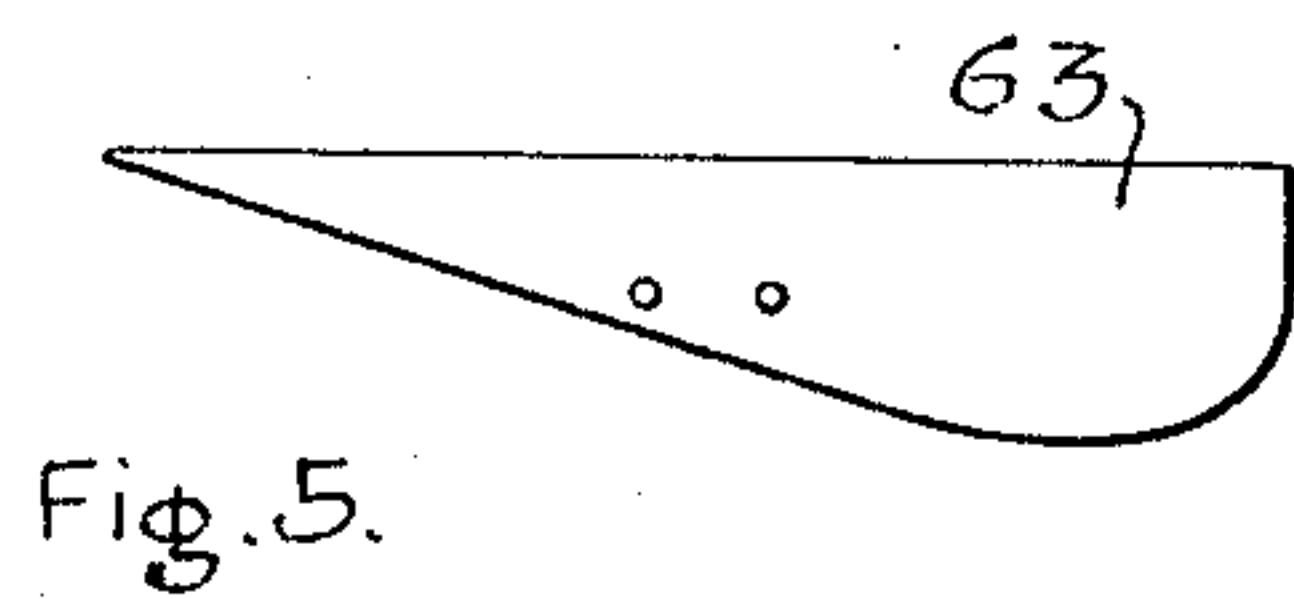
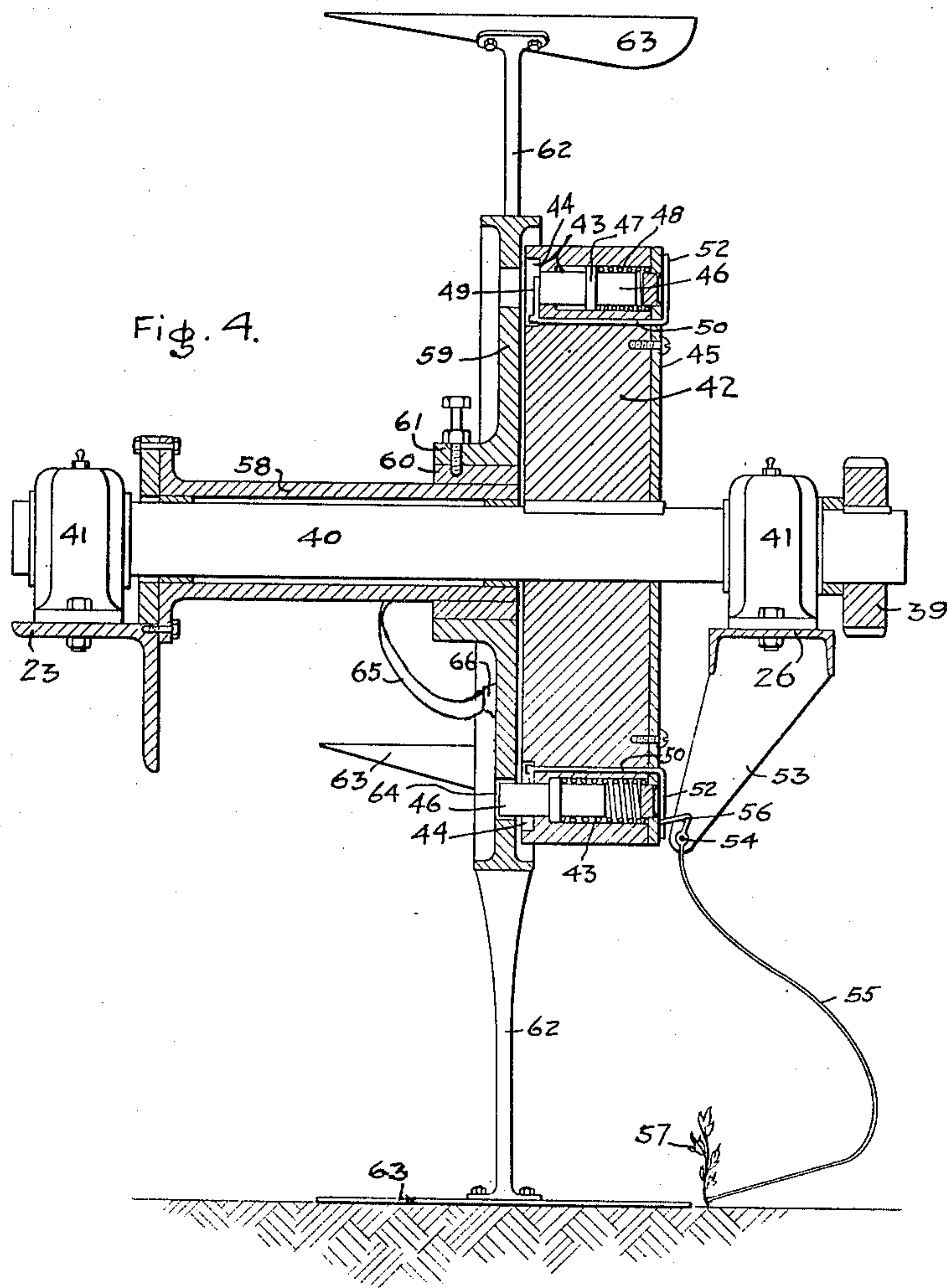
E. M. McCANN

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Edward M. McCann

INVENTOR

BY

ATTORNEY

March 6, 1951

E. M. McCANN

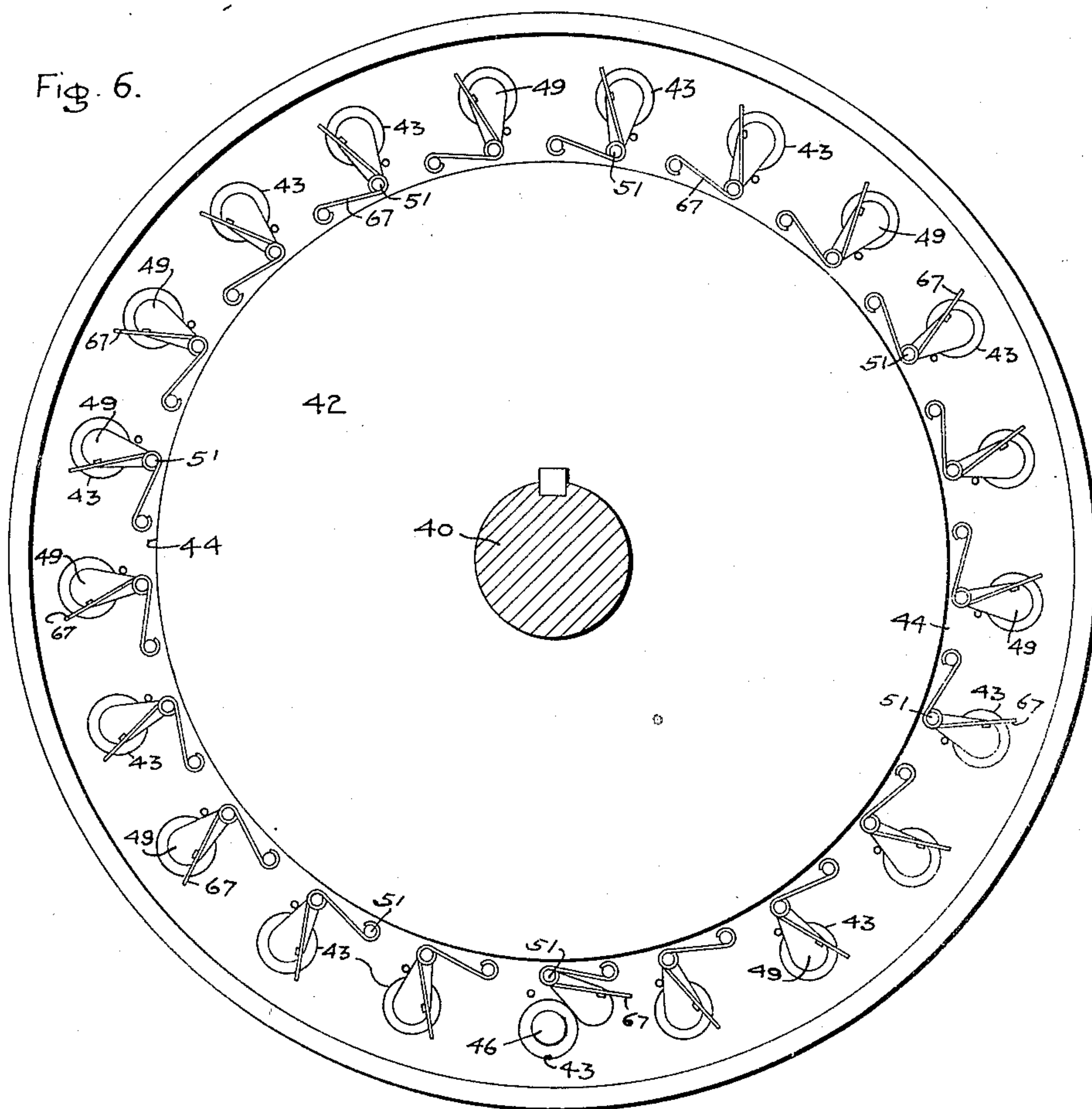
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Fig. 6.



Edward M. McCann
INVENTOR.

BY *T. J. Elliott*

March 6, 1951

E. M. McCANN

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Fig. 7.

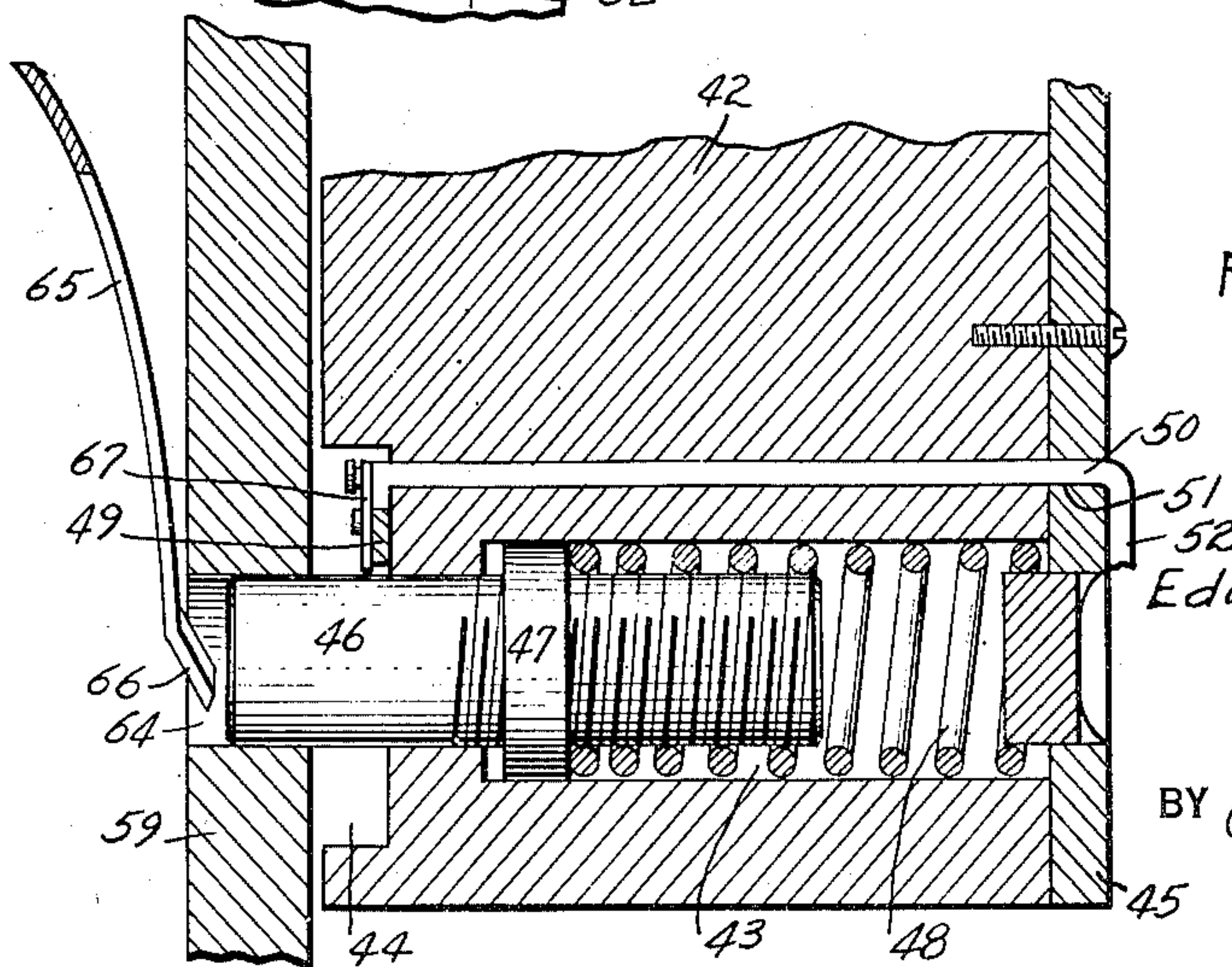
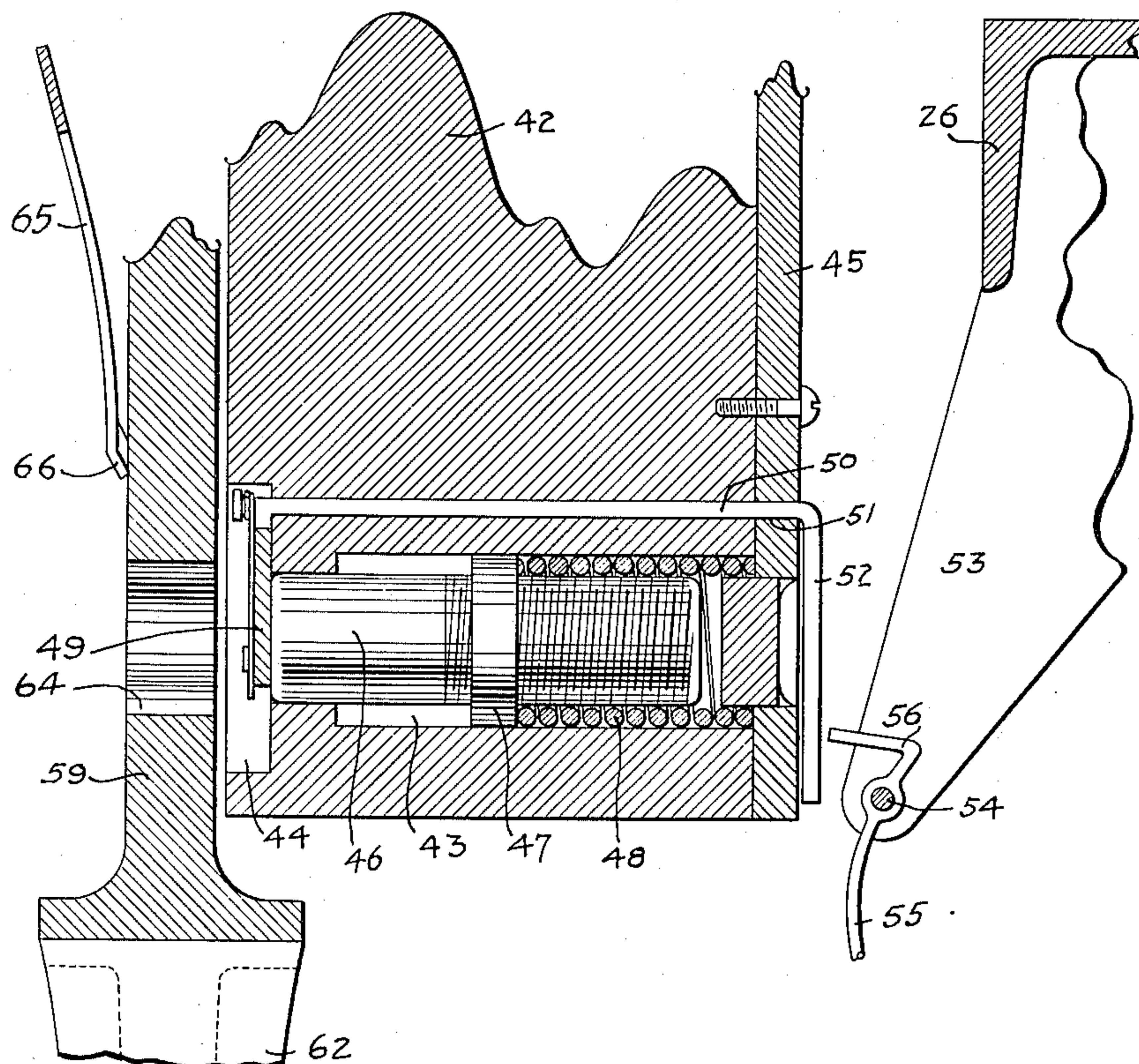


Fig. 8.

Edward M. McCann

INVENTOR

BY

[Signature]

ATTORNEY

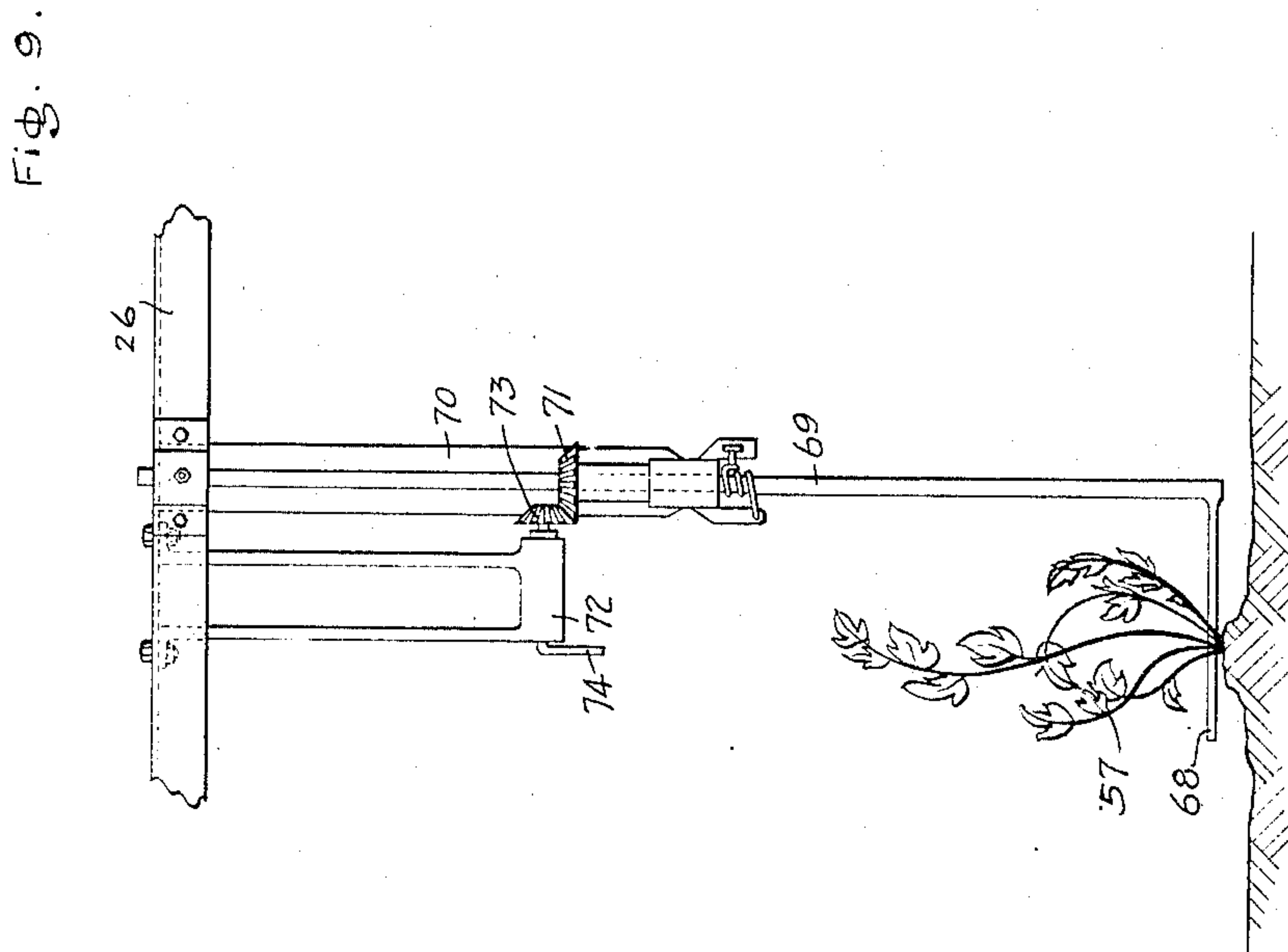
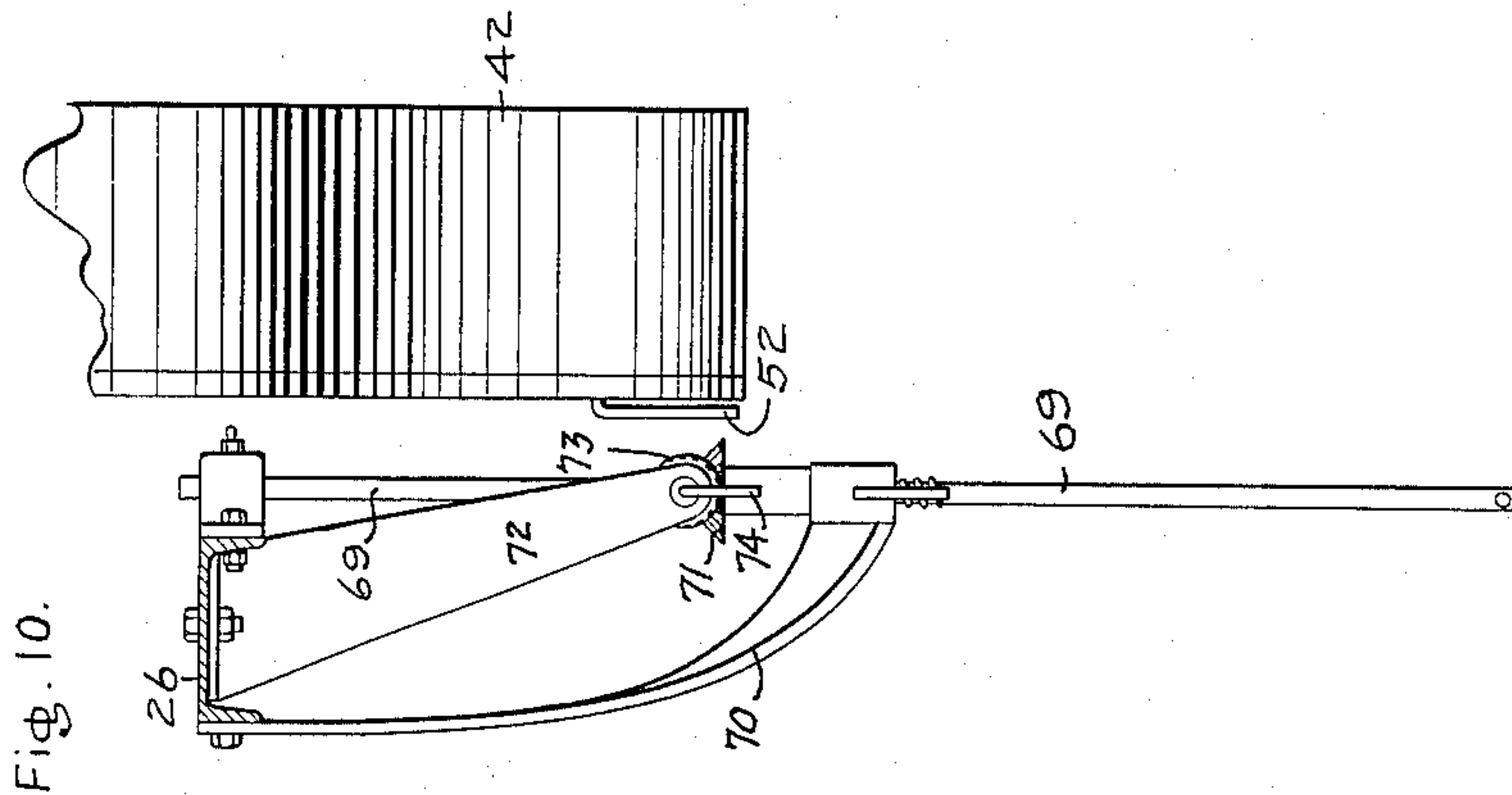
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COTTON CHOPPER

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Edward M. McCann
INVENTOR.

BY *A. F. Elliott*

March 6, 1951

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COTTON CHOPPER

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Fig. 12.

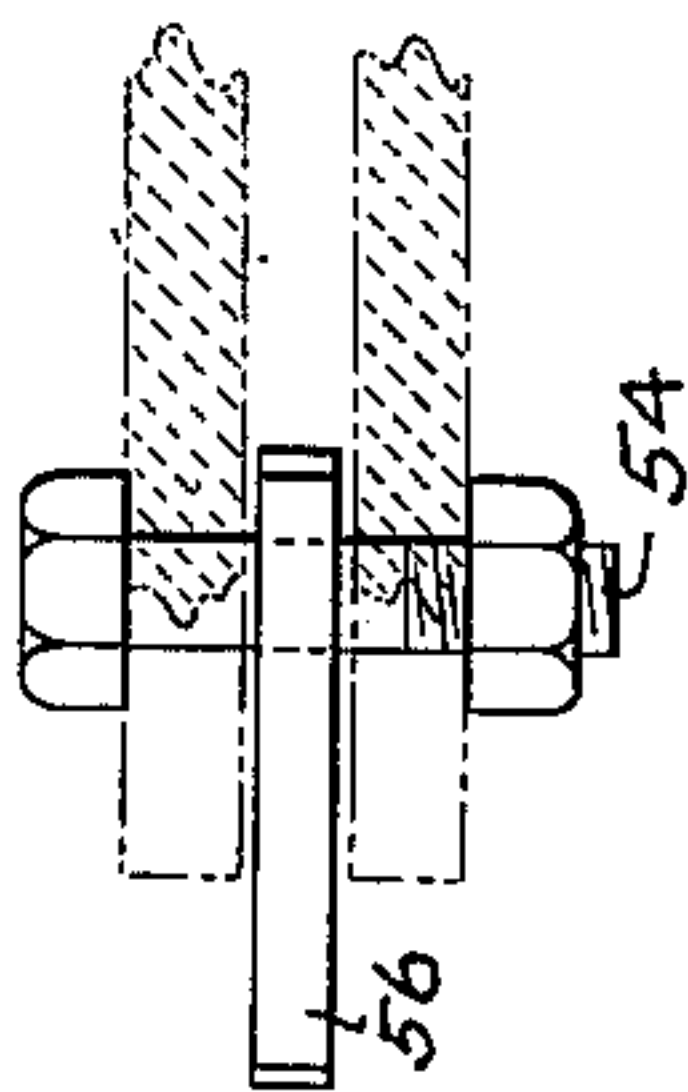


Fig. 14.

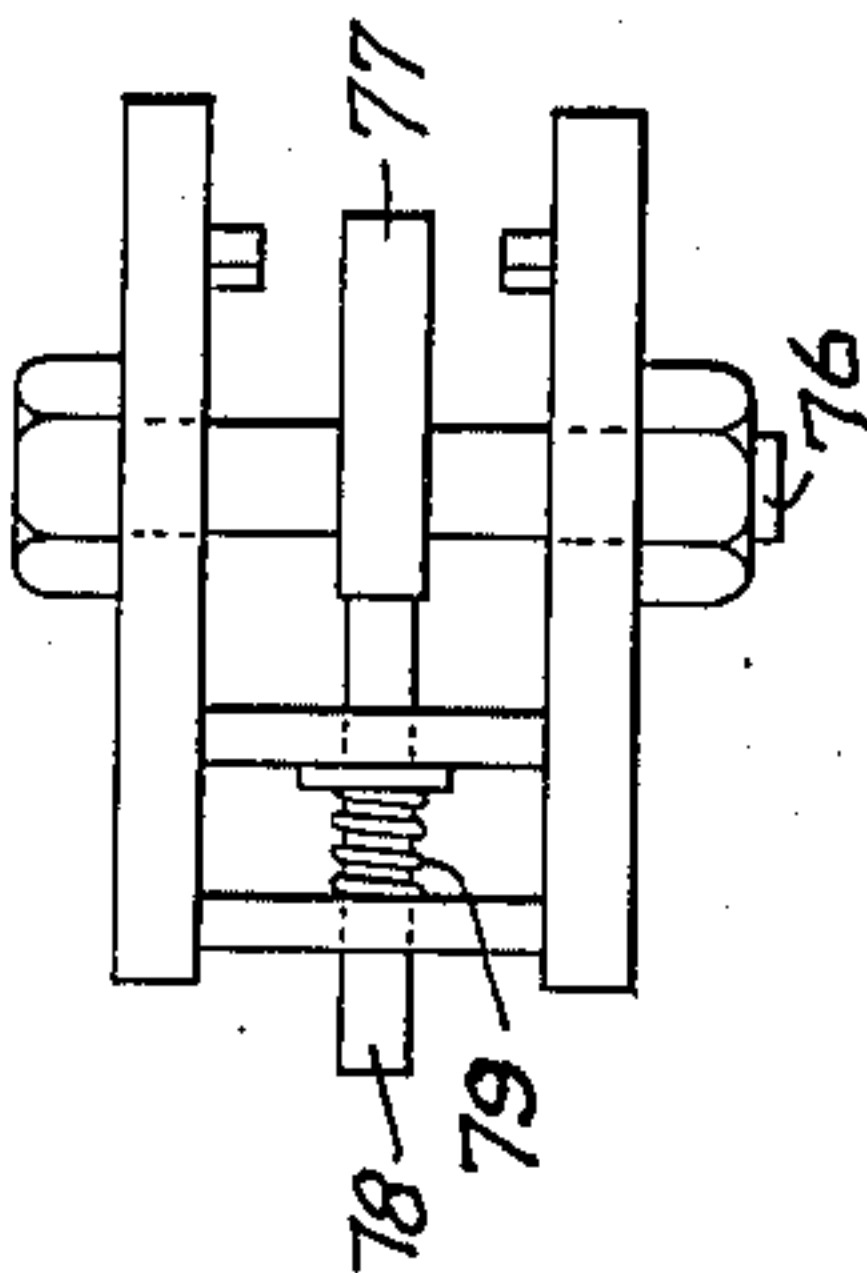


Fig. 16.

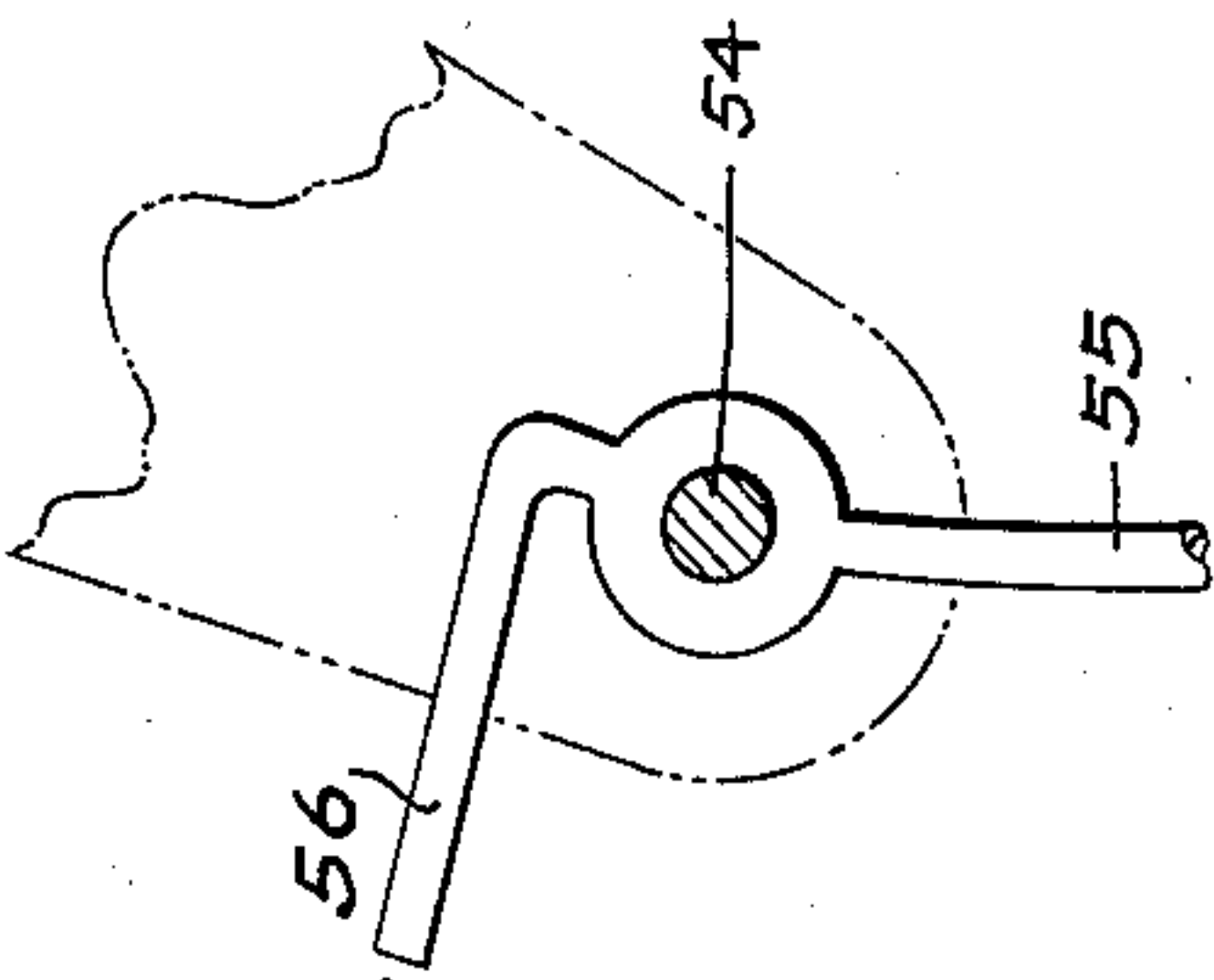
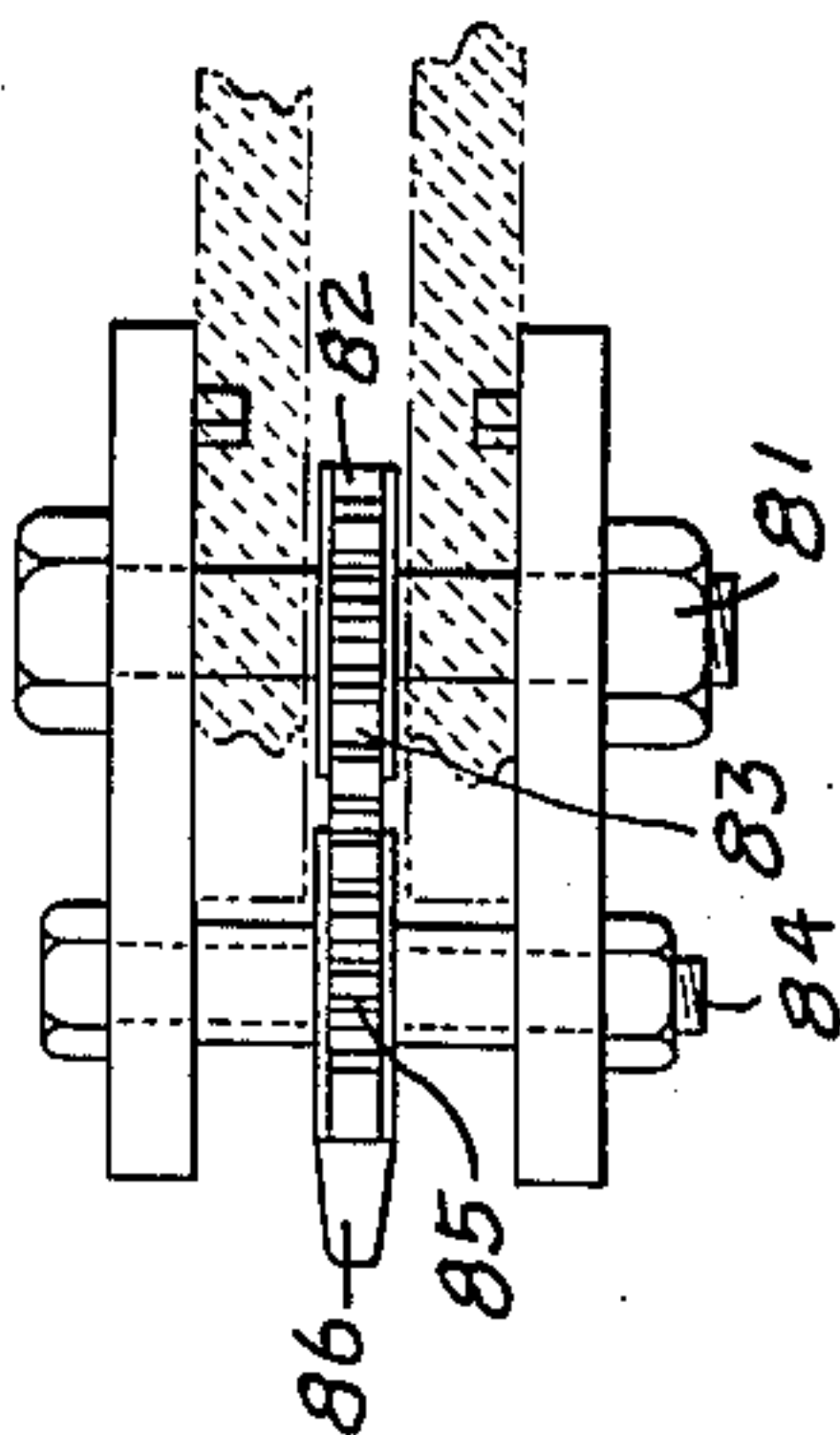


Fig. 11.

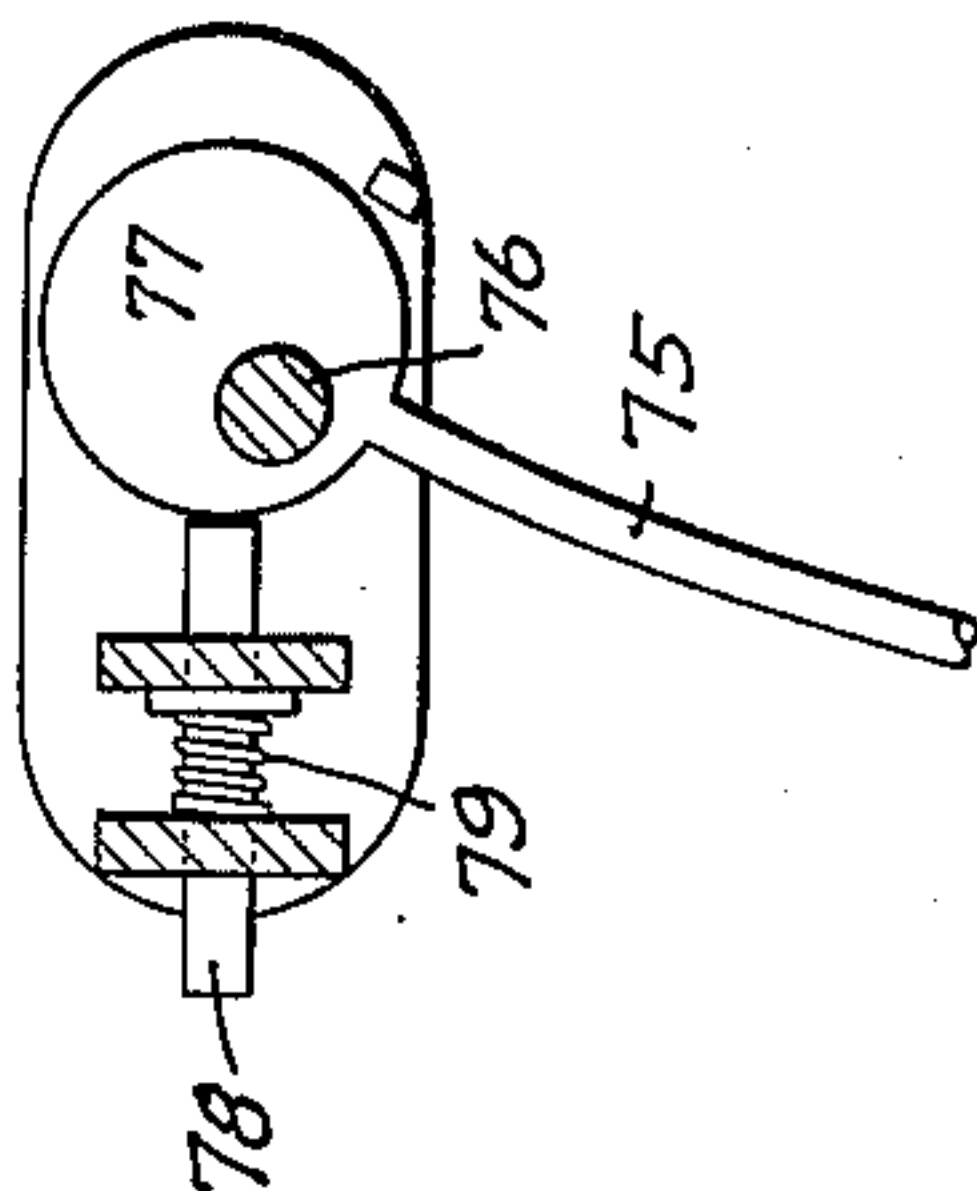


Fig. 13.

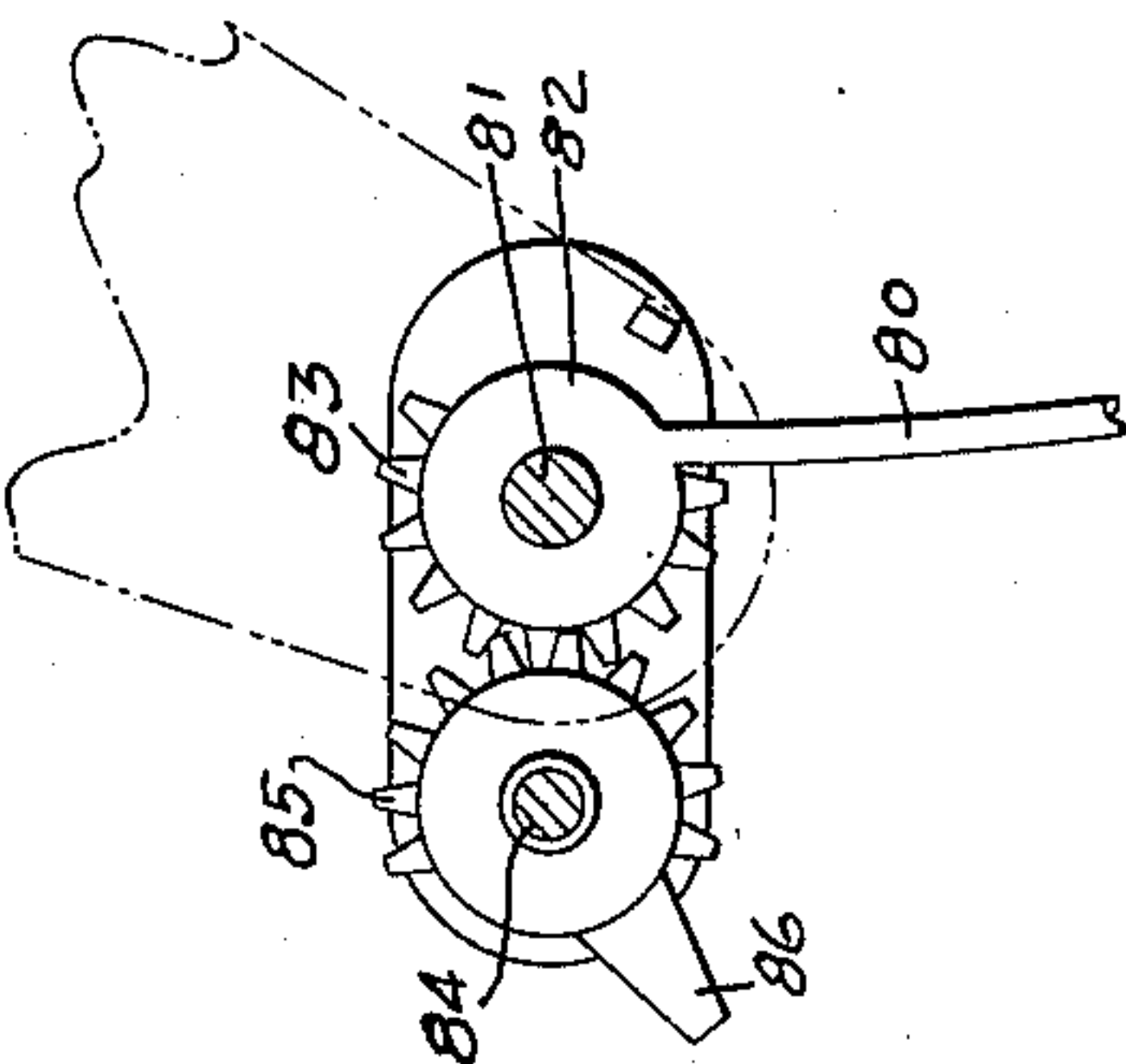


Fig. 15.

Edward M. McCann
INVENTOR.

BY *R. J. Elliott*

UNITED STATES PATENT OFFICE

2,544,036

COTTON CHOPPER

Edward M. McCann, Tacoma, Wash.

Application September 10, 1946, Serial No. 696,061

6 Claims. (Cl. 97—15)

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This invention relates to agricultural machinery, especially to those adapted to thin out plants planted in rows, and more especially to those machines known as cotton choppers.

The objects of my invention are to provide a machine which will hoe out every plant except one in a row every predetermined number of inches, leaving a row of evenly spaced plants undisturbed; which will operate when the plants are small; which will operate equally well when the plants are well grown; which may be operated over the same row a plurality of times and will always leave the same plants standing; which may be turned around and operated in the reverse direction over the same row and will again leave the same plants undisturbed; to which suitable cultivators or other soil conditioning tools may be attached for simultaneous action on the soil between the rows. Further objects are to provide a machine which is of simple, rugged construction, of high efficiency, of low cost and easy to keep in repair and in which the operator is only required to steer and generally oversee the machine as it automatically performs the work required. A further object is to provide a machine which operates in proportion to the size of the chopping hoe and is not dependent on the speed of travel of the machine nor on the distance traveled thereby. An additional object is to provide a machine which is controlled by the first plant met after the hoe has acted to eradicate the previously met plants, leaving such plant undisturbed, in other words, if there is an empty space in a row, the machine does not act until the next plant is reached when it acts to miss such first plant and destroy the next plants within the space swept by the hoe.

I attain these and other objects by the devices and arrangements illustrated in the accompanying drawings, in which—

Fig. 1 is a plan of my improved cotton chopper; Fig. 2 is a vertical longitudinal section thereof, taken on the line 2—2 in Fig. 1; Fig. 3 is a front elevation of the chopper disk and its hoes, in its normal static position; Fig. 4 is a vertical longitudinal section of the operating mechanism; Fig. 5 is a plan of one of the hoe blades; Fig. 6 is an elevation of the front side of the flywheel; Fig. 7 is a vertical longitudinal section of a portion of the flywheel and the adjacent chopper disk, showing the mechanism adapted to connect the two parts together, in its withdrawn position permitting the flywheel to rotate without moving the chopper disk; Fig. 8 is a similar view showing the same mechanism in its active position; Fig. 9

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is a front view of a form of the trigger adapted for use in larger plants, and Fig. 10 is a side elevation thereof; Figs. 11 and 12, 13 and 14, 15 and 16 are, respectively, side views and plans of the three forms of trigger connections with the chopper control mechanism.

Similar numerals of reference refer to similar parts throughout the several views.

Referring to the drawings, it will be seen in Fig. 1 that the frame 21 of my improved cotton chopper comprises two parallel side frame members 22 joined by a front member 23 and a rear member 24. A seat member 25 extends across the frame, over the axle, with a suitable seat for the machine operator. Also a front cross member 26 is mounted between the side members 22 and is adapted to receive bearings for the countershaft and operating shaft, hereinafter described, and a second cross member 27 is similarly mounted parallel with and slightly to the rear of said cross member 26, and is adapted to hold the bearing of the countershaft.

This frame 21 is mounted on two main rear wheels 28 and these wheels are suitably secured to and rotate the main shaft 29. The front of the frame 21 is supported on a bogie truck 30, pivotally secured under the center of the front member 23, and provided with two side wheels 31, which span the row of plants to be thinned. The truck 30 is controlled on its pivot by the handle 32 extending rearward therefrom to a position adjacent to the operator, for steering the machine.

A large bevel gear wheel 33 is slidably mounted on the shaft 29, driven by the main wheels 28, and is controlled in its position by the handle bar 34, so as to be thrown into or out of mesh with the complementary small bevel gear 35.

This bevel gear 35 is secured to the rear end of the countershaft 36. This countershaft 36 is mounted in bearings 37 on the two above described cross members 26 and 27, and is provided, at a point between said bearings 37, with a large gear wheel 38 secured thereon.

This gear 38 meshes with a small gear wheel 39 which is mounted on the rear end of the operating shaft 40. This shaft 40 is mounted in bearings 41 secured substantially in the centers of the front cross member 26 and the front member 23 of the frame 21.

The ratios of gears 33—35 and 38—39 are such as to multiply the rate of rotation of the operating shaft 40. The flywheel 42, which is mounted upon the shaft 40 and rotates therewith, therefore, turns at a high rate and absorbs momentum as it is rotated, and this momentum supplies the

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operating force to turn the hereinafter described chopping disk against the resistance of the ground being hoed.

This flywheel is provided with a plurality of holes 43 (twenty-one are shown in Fig. 6) equally spaced around its central axis and each parallel to said axis. These holes 43 are positioned near the periphery of the flywheel. An annular groove 44 is made in the front face of the flywheel, and these holes 43 all open into said groove. A plate 45 is secured to the rear side of the flywheel 42 and is provided with holes therein corresponding with, but smaller than the holes 43, said holes being normally closed by plugs screwed therein. Each hole 43 is of two diameters, the front end thereof being smaller than the major portion of the hole, thus leaving a shoulder at the front end.

A pin 46 is mounted in each said hole 43 and is of such diameter as to pass freely through the smaller end thereof. This pin 46 is provided with a circular flange 47 surrounding its mid section and limiting the outward motion of the pin 46 by its engagement with the above described shoulder in the hole. A light spring 48 is mounted around the inner end of the pin 46 between said flange 47 and the rear plate 45, urging the pin outward when the pin is free to move.

Control members 49 are mounted in the annular groove 44, adjacent to each said hole 43, and each is adapted to normally cover or block said hole in order to retain the pin 46 in its withdrawn or restrained position in the hole. Each member 49 is fixedly mounted on a pivot rod 50 passing through and adapted to turn in a hole 51 through the flywheel 42 and positioned adjacent to and parallel with the hole 43, and this rod 50 is provided with an operating lever 52 extending at right angles to the rod 50 and lying close to the rear face of the flywheel 42. These parts 52 and 49 are arranged so that when the levers 52 extend radially in their normal positions the members 49 cover the respective holes 43, and so that if one of the levers 52 is engaged by a delaying element, the lever will turn the pivot rod 50 and swing the member 49 from the hole 43, thus releasing the pin 46 from restraint and permitting it to immediately be propelled outward by the spring 48.

A bifurcated bracket 53 is mounted on and extends downward from the front cross member 26 of the frame 21, to a point close to the lowermost edge of the flywheel 42. This bracket 53 is provided with a horizontal pivot pin 54, which supports a light trigger. This trigger comprises a long arm 55, extending down to a point just above the soil and adapted to engage the first cotton plant which has been left in the row. The other end of the trigger comprises a head 56 extending adjacent to, but not normally touching, the above described levers 52 as they pass. However, when the trigger arm 55 engages the cotton plant 57, it is turned on the pivot pin 54, thus moving the head 56 into the path of the levers 52 so that the first lever to reach the head 56 is moved backward (relatively to the flywheel) and the pin 46 therein is thrust out therefrom as above described. The trigger is of light construction and moves easily when engaged by the plant 57, but the pivot action is somewhat restricted by friction so that uneven motion of the machine will not cause the trigger to swing and unintentionally engage the lever 52.

A sleeve 58 is fixedly secured to the front member 23 of the frame 21 and extends rearwardly

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therefrom around the above described operating shaft 40. A chopper disk 59 is mounted on the rear end of the sleeve 58. An adjustable friction bearing 60 is mounted between the boss 61 of the disk 59 and the sleeve 58, to resist the free motion of the disk on the sleeve.

The chopper disk 59 is provided with five hoe arms 62 extending therefrom at equally spaced intervals, and each arm is provided with a hoe blade 63, removably secured thereto. The hoe blades 63 are flat and have a straight cutting edge and, in plan, are substantially triangular, the apex of the triangle being forward and the cutting edge being substantially parallel with the direction of motion of the machine.

The chopper disk 59 is provided with five operating holes 64, arranged at equal distances from the center of the disk and equally spaced from each other. These holes 64 are arcuate and oblong in form and their central radii are equal to the central radii of the above described pins 46 in the flywheel 42. The rear face of the chopper disk 59 is immediately adjacent to the front face of the flywheel, so that when one of the pins 46 is released and flies out from its hole it immediately enters the next hole 64 in the chopper disk and passes to its far end, as the pin is passing outward under the action of the spring 48, engaging the end of the hole 64 and forcibly causing the disk 59, with its hoes 63 to turn on the sleeve 58 until the pin 46 is removed from the hole 64.

A fixed spring 65 is secured to the sleeve 58 and extends to the face of the chopper disk 59, exerting a strong pressure thereagainst. The tip 66 of this spring 65 is bent towards the disk 59 and is positioned so as to enter the hole 64, in which the pin 46 is acting at the moment when the following hoe has reached its normal static position, namely, when the disk 59 has made one-fifth of a revolution under the impulse of the flywheel 42. At this same moment the bent tip 66 of the spring 65 flips into the hole 64 and hits the end of the pin 46 a sharp blow, forcing it back into the hole 43 and again compressing the light spring 48 and, at the same time, the member 49 swings out over the hole 43 to retain the pin 46 therein. The member 49 is moved to close the hole 43 both by the centrifugal force acting thereon and by a spring 67 engaging it in the groove 44.

Thus it will be seen that when the trigger arm 55 engages a cotton plant 57, the chopper hoe 63 is released and is swung to dig out the plants immediately beyond said plant 57, and that the next hoe is held in readiness to be similarly released as soon as the arm 55 has reached the next undisturbed plant in the row, so that as the machine advances down the row a single plant is left undisturbed for every stroke of the chopper hoes.

When the plants 57 are small and tender I prefer to use the above described trigger arm 55 but if they are strong and somewhat stiff, the arm 55 would have to climb over them as the machine advanced, thus holding the trigger head 56 forward too long, causing the chopper disk to continue to turn more than one-fifth of a turn and cutting out too many plants in the row. For this cause I provide another form of trigger when larger plants are to be thinned. This device is illustrated in Figs. 9 and 10. In this case the trigger comprises a horizontal arm 68 extending from a vertical rod 69 mounted in bearings on a bracket 70, extending down from the rear cross member 26 of the frame 21.

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This vertical rod 69 carries a bevel gear 71. A second bracket 72 depends from the cross member 26 adjacent to the bracket 70. A horizontal rod is mounted in a bearing at the end of the bracket 72 and carries at one end a bevel gear 73 which meshes with the above gear 71. The other end of the horizontal rod is bent at right angles to form an arm 74. This arm 74 is positioned in such relation to the flywheel 42 that normally it hangs down well away from it, but when the plant 57 turns the arm 68 and the parts 69, 71 and 73, the arm 74 is raised and lies in the path of the levers 52 to release the pin 46 as above described.

In Figs. 11 and 12 are shown the details of the trigger 55, 56, in which the end of the bracket 53 is forked and the pivot 54 passes through both tines. The pivot 54 is screw-threaded to control the friction of the trigger against the tines of the bracket. In Figs. 13 and 14, the trigger arm 75, which corresponds to the arm 55, is mounted on a horizontal pivot pin 76 which is eccentrically placed in the circular head 77. This head engages a horizontal pin 78 to push it out, against the action of a spring 79, and into the path of the levers 52 as they pass.

In Figs. 15 and 16 the trigger arm 80 is similarly mounted on a pivot pin 81, which passes through the circular head 82, having gear teeth 83 thereon. Another pin 84 is mounted parallel to the pin 81 and has a gear wheel 85 meshing with the teeth 83. An arm 86 extends from the gear wheel 85 and normally is removed from the path of the levers 52 on the flywheel 42 but is raised to engage such a lever when the arm 80 is moved by engagement with the plant 57.

Many other forms of devices to engage the levers 52 when the trigger engages a plant, may be used, and the above are illustrated and described purely as samples of such devices. It is, of course, understood that the choppers 63 act in advance of the plant 57, thus leaving it undisturbed, and that the width of the blade 63 governs the minimum spacing between plants after the machine has passed. Also, it is evident that when the row has once been thinned, the machine may be used, possibly with a change in the form of the hoe blades, to again act on the soil between the plants of a row to cultivate it and keep it clean of weeds, as the same plants which tripped the trigger in the first instance would again trip it, with like results.

Though I have described this machine as a cotton chopper, it is evident that it may be used, with suitable changes and adjustments, to thin out any kind of plant which has been planted in rows.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. In a machine of the class described, the combination of a wheeled vehicle spanning the row of plants to be thinned; a shaft driven by the movement of said vehicle; a flywheel mounted on said shaft; a rotary chopper disk mounted concentrically with said shaft, in front of said flywheel but disconnected therefrom, and having plant choppers mounted thereon; a series of spring actuated pins mounted in said flywheel; openings in said chopper disk in coordinated position with said pins, and adapted to be successively engaged by one of said pins, to temporarily lock said chopper disk to said flywheel; restraining members normally holding said pins in withdrawn positions; levers on the rear side of said flywheel and connected to and adapted to turn

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said restraining members out of normal restraining positions; a trigger mounted on said vehicle, to the rear of said flywheel, and depending therefrom to engage a plant in the row and to be moved thereby to engage and turn one said lever as it passes; and a fixed spring pressing on said chopper disk and adapted to enter the opening in which the pin is engaged, to thrust said pin out of said hole and into its restrained position.

2. In a machine of the class described, comprising a wheeled vehicle having a shaft rapidly rotated by the movement of the vehicle, a flywheel mounted on the shaft, and a chopper disk mounted concentrically with said shaft, in front of said flywheel but disconnected therefrom, and having plant choppers mounted thereon; in combination with means to momentarily connect the flywheel with the chopper disk; a trigger mounted on said vehicle, to the rear of said flywheel, and depending therefrom to engage a plant to the rear of the plant choppers, and adapted to be moved as the vehicle advances; means adapted to normally block said connecting means from action; and means adapted to be engaged by said trigger, when moved by the plant, to remove said blocking means, whereby the chopper disk is actuated by said flywheel.

3. In a machine of the class described, comprising a wheeled vehicle having a shaft rapidly rotated by the movement of the vehicle, a flywheel mounted on the shaft, and a chopper disk mounted concentrically with said shaft, in front of said flywheel but disconnected therefrom, and having plant choppers mounted thereon; in combination with means to momentarily connect the flywheel with the chopper disk; a trigger mounted on said vehicle, to the rear of said flywheel, and depending therefrom to engage a plant to the rear of the plant choppers, and adapted to be moved as the vehicle advances; means adapted to normally block said connecting means from action; means adapted to be engaged by said trigger, when moved by the plant, to remove said blocking means, whereby the chopper disk is actuated by said flywheel; and a spring engaging said chopper disk and adapted to disconnect said chopper disk from said flywheel when the chopper disk has moved a predetermined amount to stop the rotation thereof, and whereby said blocking means is restored to blocking position.

4. In a machine of the class described, the combination with a wheeled vehicle; a rotary body mounted in said vehicle and having hoe arms extending therefrom and adapted to chop out some of the plants in a row; a flywheel driven by said wheeled vehicle at a high rate; pins mounted on said flywheel and adapted to engage said rotary body to rotate it, but normally restrained from such engagement; control members mounted on said flywheel and each adapted to restrain said pins from engagement with said rotary body; and a pivoted arm adapted to engage a plant of said row and thereby withdraw one said control member from a pin, thereby connecting said rotary body with said flywheel.

5. In a machine of the class described, the combination with a wheeled vehicle; a rotary body mounted in said vehicle and having hoe arms extending therefrom adapted to chop out some of the plants in a row; a flywheel driven by said vehicle at a high rate; pins mounted on said flywheel and adapted to temporarily engage said rotary body to start the rotation thereof by the momentum of said flywheel; control members mounted on said flywheel, each said member con-

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trolling one said pin to restrain the pin from engagement with the rotary body; a pivoted arm adapted to engage a plant of said row and thereby withdraw one said control member from its restraining position of one pin, thereby connecting said rotary body with said flywheel; and a spring adapted to engage said pin to disconnect the rotary body from the flywheel, to stop the motion of the rotary body, and to restore the control member to its restraining position.

6. In a machine of the class described, the combination with a wheeled vehicle spanning the row of plants to be thinned; a trigger depending therefrom and adapted to engage a plant in the spanned row and to be moved thereby as the vehicle advances; a flywheel driven by the wheeled vehicle at a high rate and adapted to store up energy; a rotary body mounted adjacent the fly-

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wheel and having hoe arms adapted, when actuated by said stored energy, to chop out the plants in advance of the plant engaged by the trigger; a pin mounted on said flywheel and released by said trigger to engage and actuate said rotary body; and a spring engaging said rotary body and adapted to stop its rotation after it has turned a predetermined degree.

EDWARD M. McCANN.

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10

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The following references are of record in the file of this patent:

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