

No. 706,382.

Patented Aug. 5, 1902.

R. E. BURKE.
ROAD GRADING MACHINE.

(Application filed Dec. 2, 1901.)

(No Model.)

3 Sheets—Sheet 1.

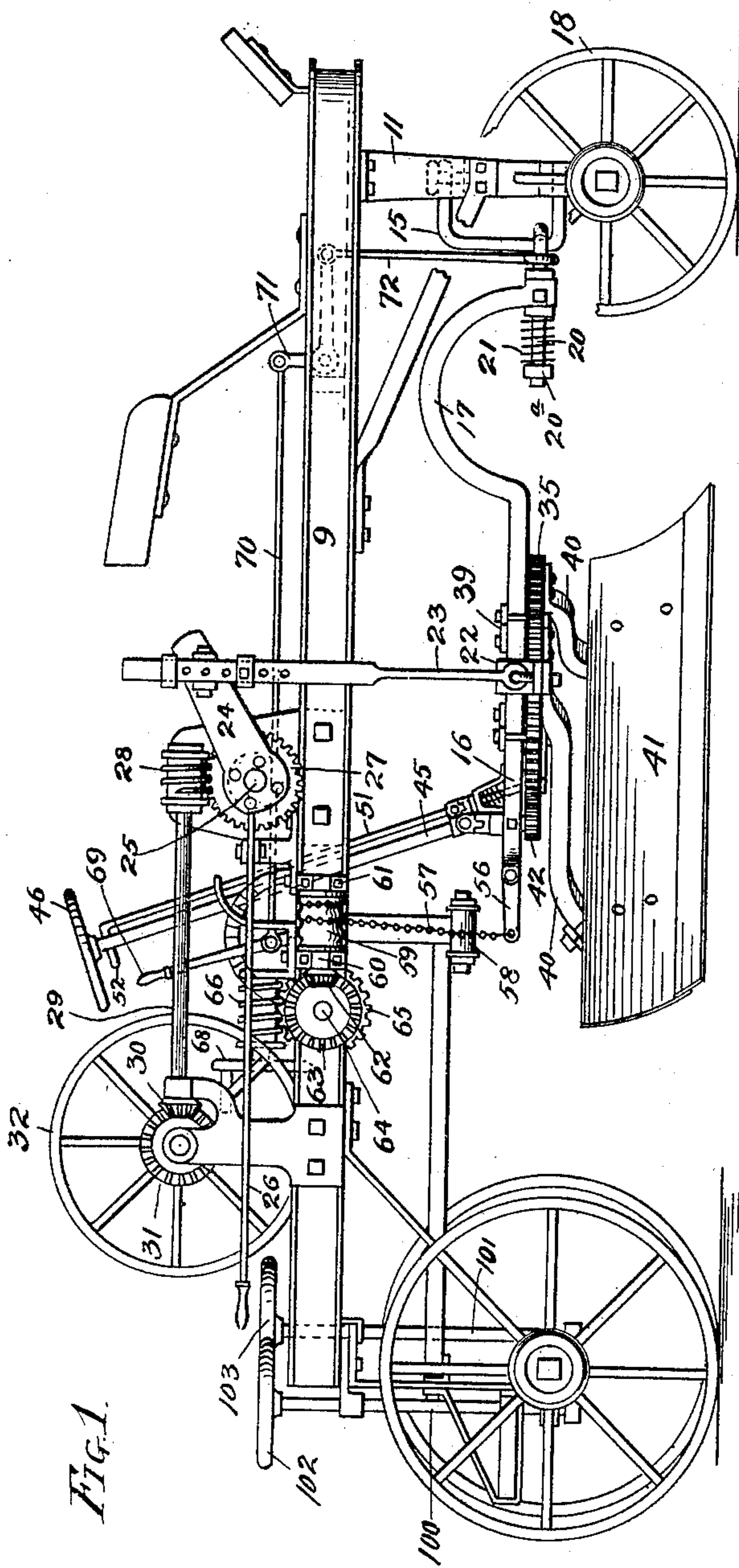


FIG. 1.

WITNESSES:

F. B. Townsend,
George E. Haley

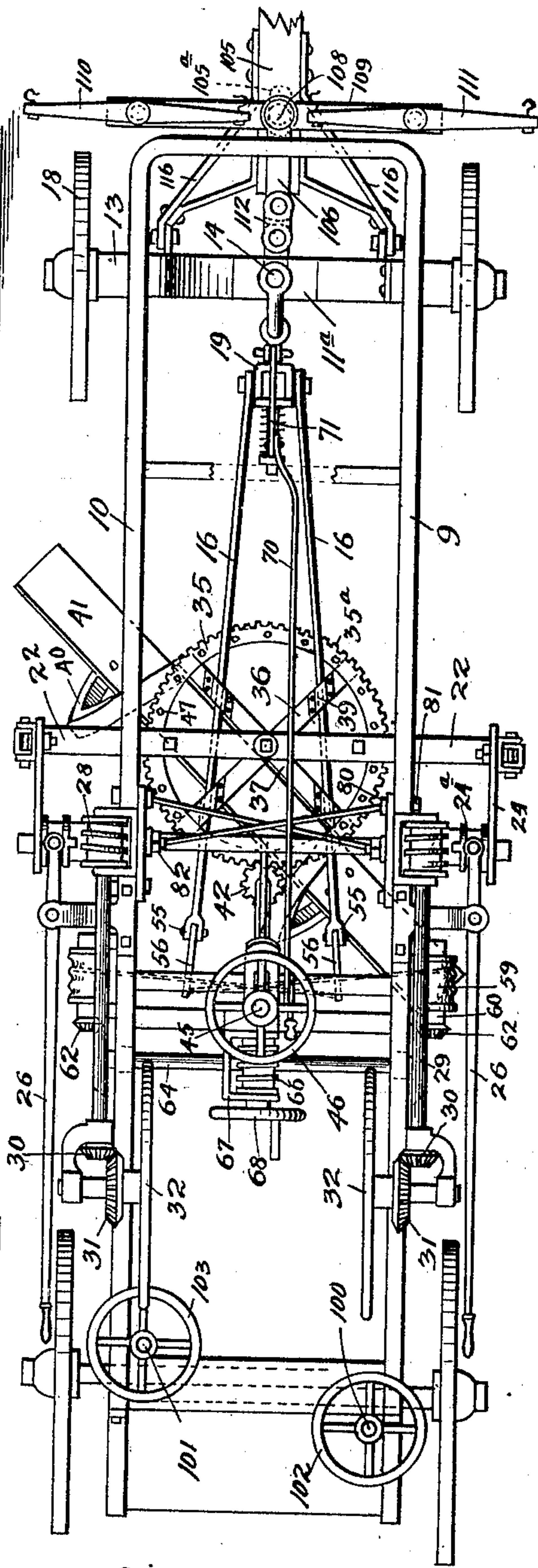


FIG. 2.

INVENTOR.

INVENTOR:
Robert E. Burke.
BY *Samuel N. Ford.*
ATTORNEY.

No. 706,382.

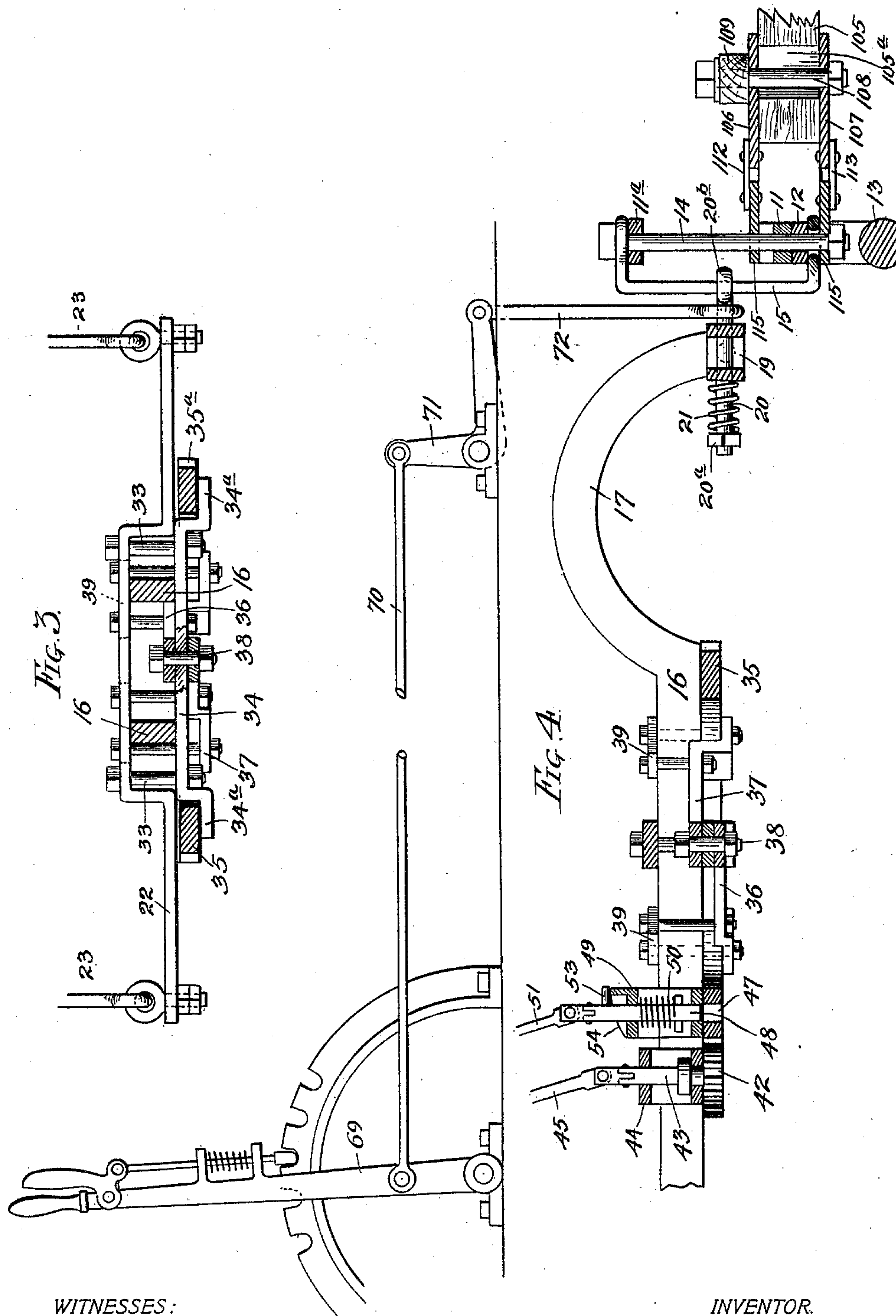
Patented Aug. 5, 1902.

R. E. BURKE.
ROAD GRADING MACHINE.

(Application filed Dec. 2, 1901.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:
F. B. Townsend
George E. Halcy

INVENTOR.
Robert E. Burke
BY *Samuel N. Ford*
ATTORNEY.

No. 706,382.

R. E. BURKE.
ROAD GRADING MACHINE.
(Application filed Dec. 2, 1901.)

Patented Aug. 5, 1902.

(No Model.)

3 Sheets—Sheet 3.

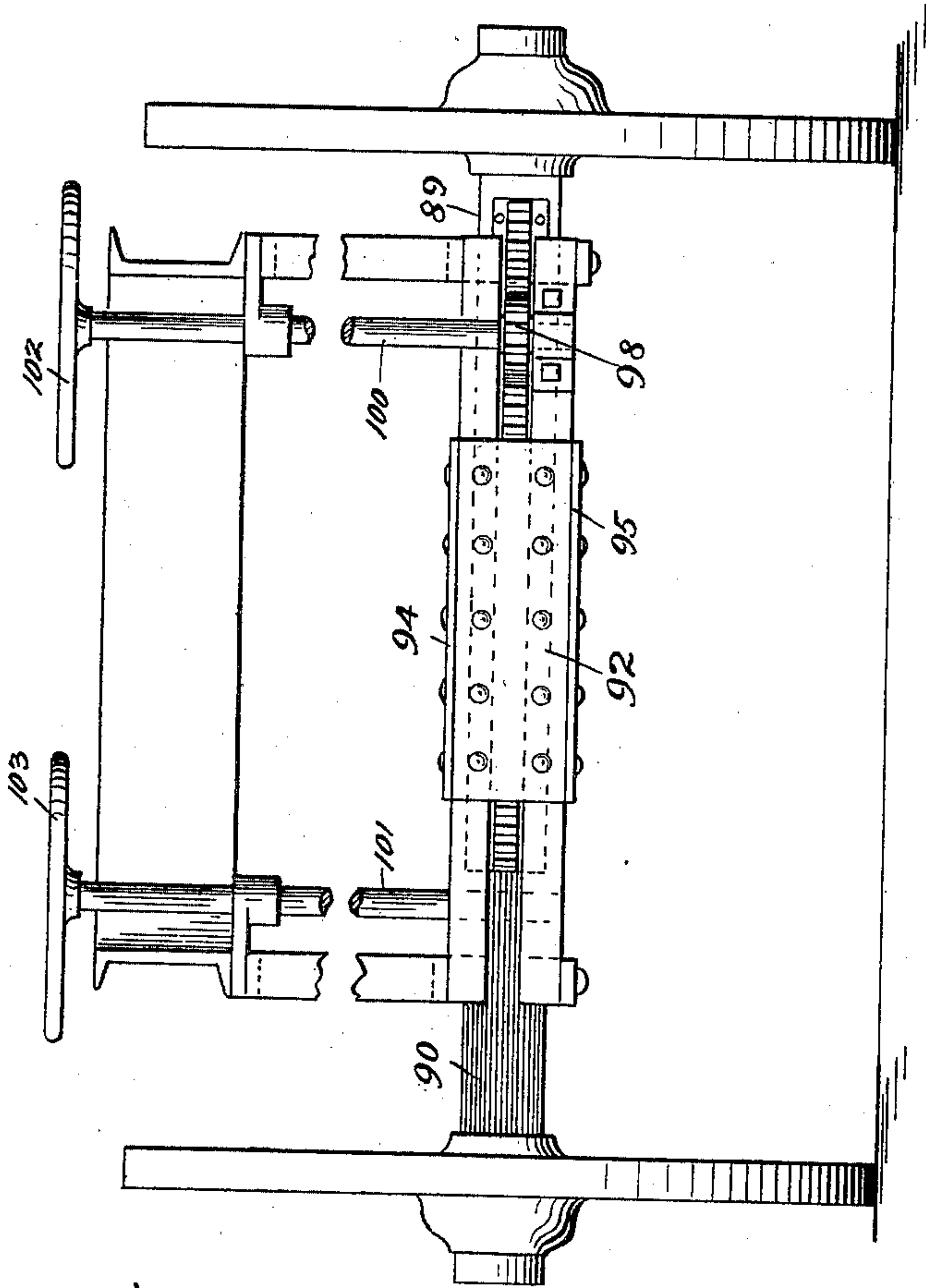


Fig. 5

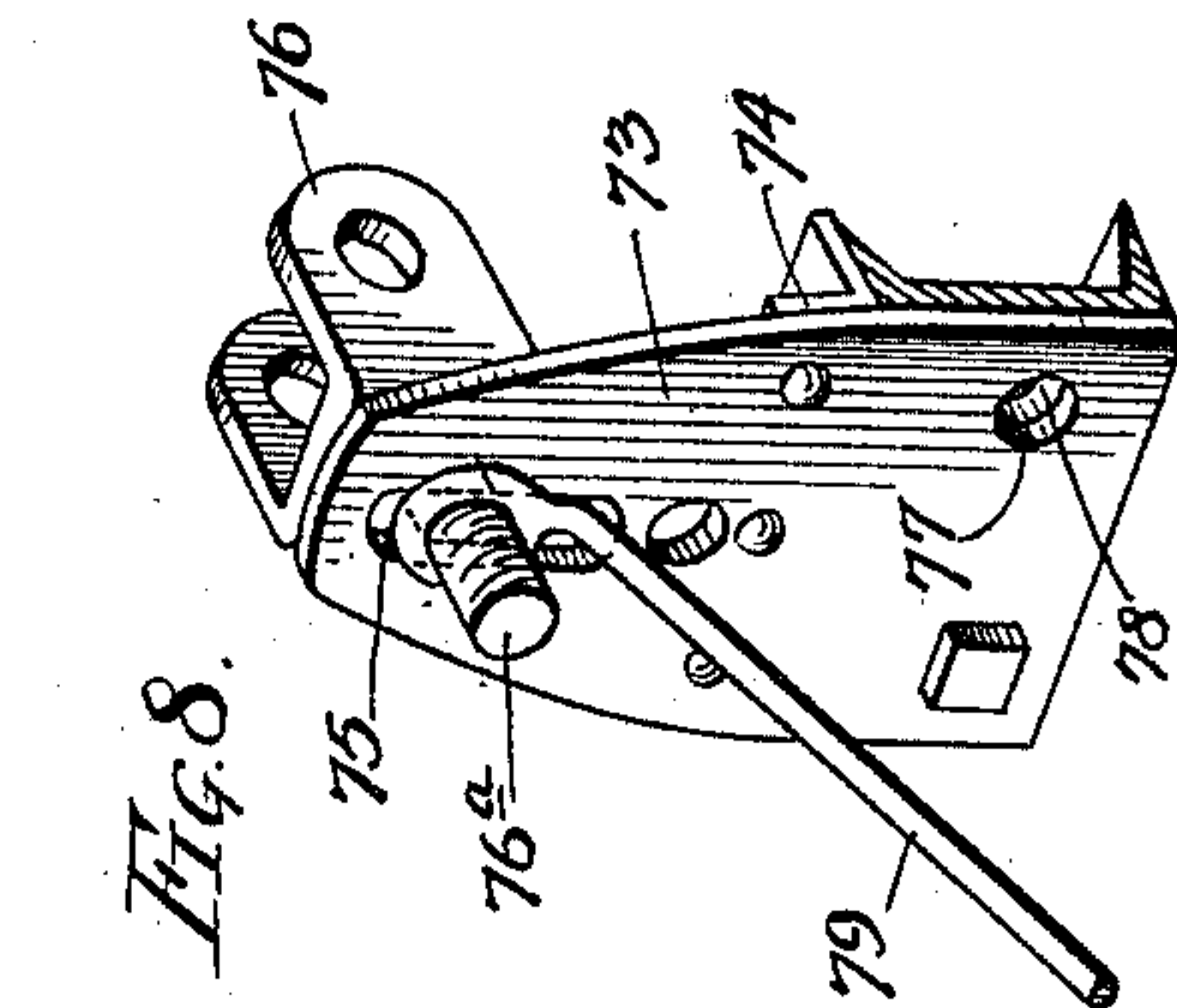


Fig. 8

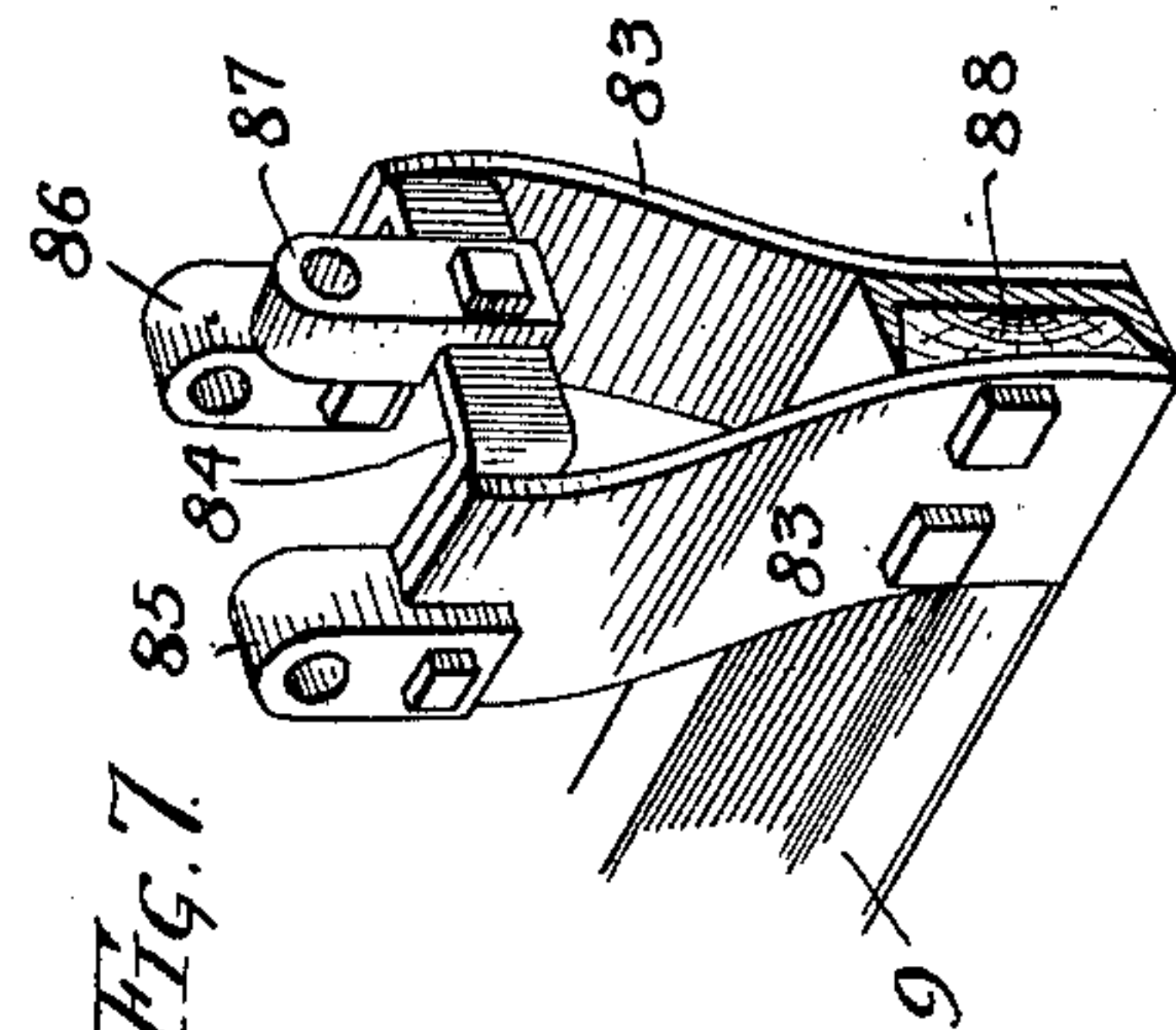


Fig. 7

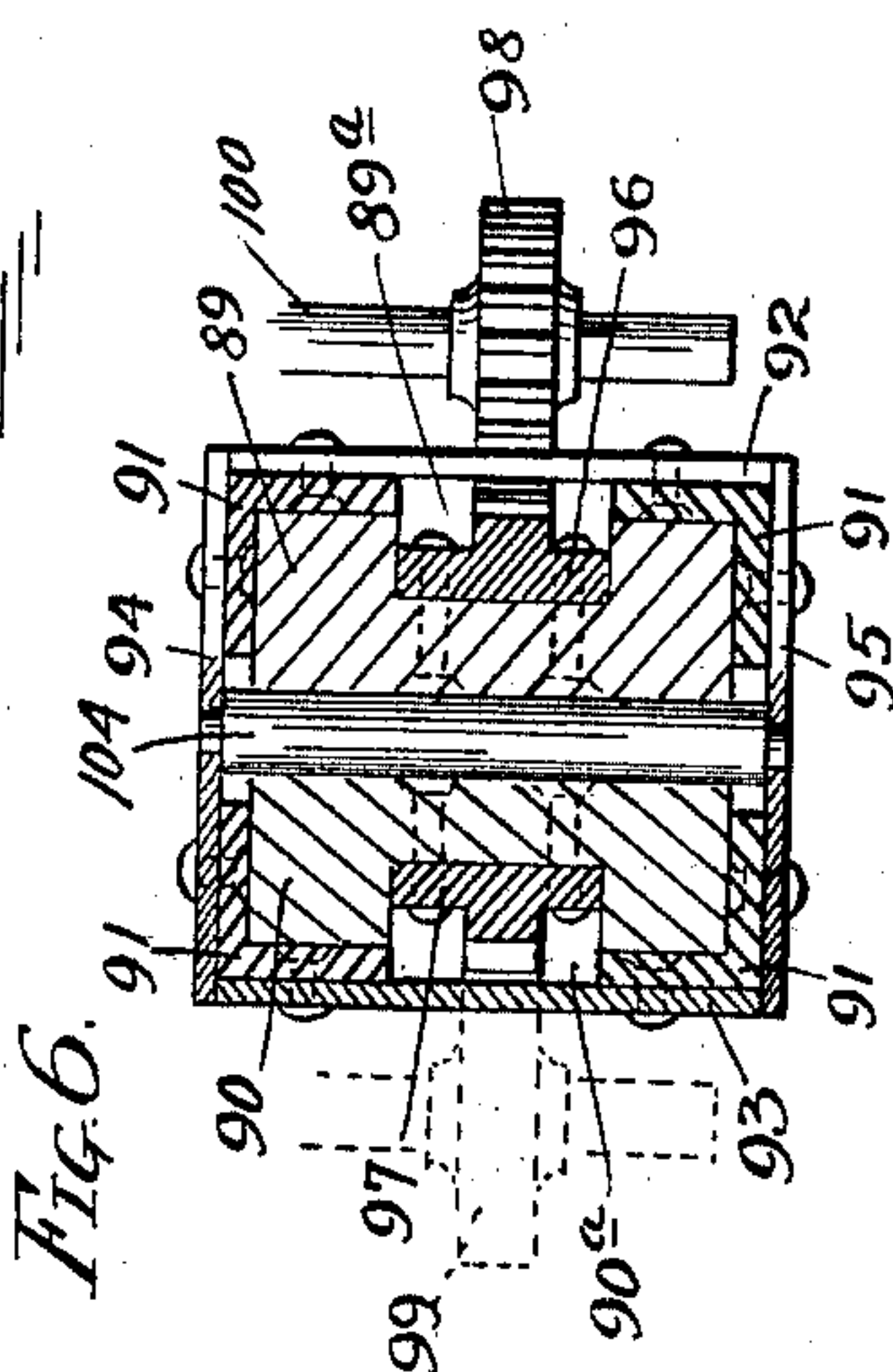


Fig. 6

WITNESSES:
F. B. Townsend
George E. Hulley

INVENTOR.
Robert E. Burke
BY Samuel N. Ford.
ATTORNEY.

UNITED STATES PATENT OFFICE.

ROBERT E. BURKE, OF ANDERSON, INDIANA, ASSIGNOR TO M. B. WILSON,
OF CHICAGO, ILLINOIS.

ROAD-GRADING MACHINE.

SPECIFICATION forming part of Letters Patent No. 706,382, dated August 5, 1902.

Application filed December 2, 1901. Serial No. 84,370. (No model.)

To all whom it may concern:

Be it known that I, ROBERT E. BURKE, a citizen of the United States, residing at Anderson, in the county of Madison and State of Indiana, have invented certain new and useful Improvements in Road-Grading Machines, of which the following is a specification.

This invention relates to certain improvements in that class or type of road-grading machines in which a transversely-disposed scraper-blade is suspended by suitable supports from the body of a four-wheeled carriage, the scraper-blade being disposed between the fore and aft wheels of the machine and being equipped with mechanism controlled from the operator's platform on the machine for raising and lowering the scraper-blade, as well as changing the inclination thereof, so as to vary both the depth and the angle at which the cut is made. A machine of this general character is illustrated in a prior patent granted to me on the 21st day of August, 1900, No. 656,317. My present invention contemplates a practical reorganization of the machine covered by said Letters Patent for the purpose of eliminating and overcoming certain objectionable features and incapacities of the said earlier machine; and to this general end my invention consists in certain improved features of construction in a machine of the character referred to, substantially as hereinafter described, and more particularly pointed out in the claims.

My invention, in the preferred form in which I embody the several features thereof, is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved machine in complete and operative form. Fig. 2 is a plan view of the machine as shown in Fig. 1. Fig. 3 is a detail vertical transverse section through the circle-plate and its supports. Fig. 4 is a detail view, considerably enlarged and partly in longitudinal vertical section, illustrating the means I employ for effecting a quick lifting of the scraper-blade to pass an obstruction and also illustrating my improved means for locking the circle-plate in any adjusted position. Fig. 5 is an elevation, partly broken away, of the

rear end of the machine, illustrating my improved construction of extensible rear axle. Fig. 6 is an enlarged vertical transverse section through the rear axle and illustrating the antifriction devices for facilitating the easy travel of the sections of the axle past each other. Fig. 7 is a detail perspective view, enlarged, of one of the side brackets which supports certain of the operating devices; and Fig. 8 is a similar view of another side bracket-plate which supports certain other of the operating devices and also permits of their vertical adjustment.

Referring to the drawings for a detailed description of the several parts and elements comprising my invention and the manner of assembling them, 9 and 10 designate a pair of parallel side beams constituting the principal elements of the supporting-frame or body of the machine and formed, preferably, of channel-steel. The front end portions of these side beams rest upon and are secured to a V-shaped bolster 11, this latter at its flat lower end resting upon a second bolster (indicated at 12, see Fig. 4,) which latter bolster lies slightly above and is secured at its opposite ends to the front wheel-axle 13. The meeting faces of the bolsters 11 and 12 are united centrally thereof by the king-pin 14, on which latter and extending rearwardly thereof is swiveled a clevis 15.

16 designates a pair of rearwardly-divergent bars extending longitudinally of the machine and upwardly arched near their forward ends, as indicated at 17, to provide a cut-under for the forward traction-wheels 18 as they are turned at an angle to the line of draft in making a sharp turn with the machine. Between the forward ends of said bars is a head-block 19, through which a horizontal draw-rod 20 loosely passes, its rear portion being encircled by a stiff compression-spring 21, interposed between a nut or head 20^a on said rod and the head-block 19. The forward end of the draw-rod is formed into an eye 20^b, which encircles the clevis 15.

Referring now more particularly to Figs. 3 and 4, 22 designates a horizontally-disposed bar, the central portion of which is upwardly offset, as shown at 22^a, and overlies and rests upon the two longitudinally-extending bars

16. This bar 22 is suspended at its ends by intermediate vertical links 23, which are connected at their upper ends to the outer extremities of a pair of crank-arms 24, slidably mounted on a transverse shaft 25, disposed approximately centrally of the main frame members 9 and 10. The hubs of the arms 24 are constituted by clutch members 24^a, which latter are splined on the shaft 25 and are adapted to be thrown by rearwardly-extending levers 26 into and out of engagement with the faces of gear-wheels 27, loosely mounted on the shaft 25. Said gear-wheels are adapted to be operated, respectively, by worms 28 on the corresponding ends of a pair of longitudinal shafts 29, supported in suitable brackets, as hereinafter more particularly described, the shafts 29 being driven from a pair of hand wheels 32 through a pair of intermediate bevel-pinions 30 and 31 on the shaft 29 and the hubs of the hand-wheels, respectively. Lying directly beneath the central upstanding portion of the transverse bar 22 and secured thereto by bolts 33 is a second bar 34, similar in form to the bar 22, but having shorter end portions 34^a, on which rests a flat annular circle-plate 35, the outer periphery of which is toothed, as indicated at 35^a. As additional supports for said circle-plate I employ a pair of transversely-extending short bars 36 and 37, which latter intersect each other at right angles and also cross the upstanding portion of the lower transverse member 34 centrally thereof, the three members being united at a point in line with the center of the circle-plate by a bolt 38, all as plainly shown in Figs. 3 and 4. The bars 36 and 37, besides being centrally united to the bar 34 and to each other, as last described, are also hung from the main longitudinal bars 16 by means of suitable clips 39. The outer ends of the cross-bars 36 and 37 underlie the ring-plate 35, thereby forming additional supports and guides for the latter. It will be observed that these ends of the cross-bars are downwardly offset, whereby they not only support but center the ring-plate, so as to maintain the same in true concentric relation to the central bolt 38. From the under side of the ring-plate 35 is suspended by suitably-curved arms 40 the scraper-blade 41. The rotation of the toothed ring-plate, whereby the angular set of the scraper-blade is determined, is effected by means of a pinion 42, fast on the lower end of a short shaft 43, vertically journaled in a bracket 44, carried by and between the main supporting members 16, the upper end of this shaft being united by a compound pivot-joint to the lower end of an obliquely-disposed shaft 45, which latter is provided at its upper end with a hand-wheel 46 within convenient reach of the operator. As a means for locking the plate in any adjusted position I perforate the ring-plate 35 with a series of holes 47, adapted to be entered by a locking-pin 48, carried in a bracket 49 and normally pressed downwardly into locking po-

sition by a coiled spring 50. The pin 48 has a pivotally-connected operating rod or stem 51, extending upwardly parallel with and adjacent the rod 45 and provided at its upper end with a bent arm 52 for operating the same. The withdrawal of the pin from the circle-plate is effected by a lug 53, extending laterally from the upper end of the pin and overriding a spiral cam-surface 54, formed on the upper end of the bracket 49. By the mechanism last described the circle-plate is afforded a secure seat and may be easily turned to bring the scraper-blade to any desired angle and may be easily locked and unlocked.

Referring now to the mechanism employed for swinging the scraper-blade bodily laterally of the machine, it will be observed that the rear ends of the main supports 16 are jointed, as shown at 55, and to the rear ends of the pivoted sections 56 thus formed are connected chains 57, which pass laterally of the machine to the opposite side thereof over suitable guides 58, thence upwardly and around winding-drums 59, fast on short wayshafts 60, mounted in bracket 61, carried by the side channel members 9 and 10. The rear ends of the shafts 60 are equipped with beveled pinions 62, which are driven by beveled gears 63, fast on a transverse shaft 64, mounted in the side frame members 9 and 10. This latter shaft is provided centrally thereof with a worm-gear 65 engaged by a worm 66, mounted in a suitable bracket 67 above the shaft 64 and operated by a hand-wheel 68. The chains 57 are similarly wound upon the drums 59, so that when the chain on one drum is wound up the other chain on the companion drum is simultaneously unwound. The purpose of jointing the rear ends of the main blade-supporting members 16, as described, is to enable said members to be raised to the maximum height desired without interfering with the transverse framework of the machine lying directly above said members and carrying the guide-rollers 58. Heretofore in machines of this type the elevation of the blade has been limited by the contact of the rear ends of the longitudinal blade-supporting members with the overlying frame structure of the machine.

The hand-wheels 32 and the connections therefrom to the transverse bar 22 constitute the means for gradually raising and lowering the scraper-blade, it being understood that the clutches 24^a are normally in engagement with the gears 27. My invention also comprehends means whereby the frame carrying the scraper-blade can be suddenly dropped and as quickly elevated in order to enable the machine to safely pass over an obstruction or elevation in its path of travel which is not designed to be removed or engaged by the blade. The means for suddenly lowering the blade comprise the rearwardly-extending horizontal hand-levers 26, already described in connection with the clutches 24^a. By drawing these levers inwardly the clutches

are thrown out of engagement with their operating worm-gears 27, and the blade and its frame will thereupon drop by gravity into contact with the underlying ground. The operation of suddenly elevating the blade-carrying frame is accomplished by means of a hand-lever 69, which through a horizontal connecting-rod 70, a bell-crank 71, and a vertical connecting-rod 72 acts to elevate the forward end of the blade-frame to any desired height within the limits of the vertical reach of the clevis 15.

Owing to the great strain and very considerable friction between the worm 28 and its gear 27 on each side of the machine it is desirable to hold the worm in operative engagement with its gear as rigidly as possible and at the same time adjust the relation of the parts to compensate for wear as may be found necessary. The means I have provided for this purpose are illustrated in detail in Fig. 8, in which 73 designates a solid flat metal bracket-plate secured to and resting upon the side channel-beam 10 by means of an angle 74, the lower portion of the bracket lying against the inner vertical face of the channel. The upper end of the bracket is provided with a vertical slot 75, through which passes the screw-threaded stem 76^a of a horizontal bracket 76, in and between the arms of which the worm 28 and its actuating-shaft 29 are journaled. Registering apertures 77 and 78 are formed through the lower end of the bracket 73 and the web of the channel, respectively, and through these holes extend the screw-threaded lower ends of a pair of diagonal brace-rods 79, the latter extending from the lower ends of the brackets diagonally across and between the side members of the main frame and at their upper ends having eyes which pass over the threaded stems 76^a of the brackets 76. Lock-nuts 80 and 81 on opposite sides of the channel and juxtaposed bracket secure the lower ends of the diagonals in adjustable relation to the channel, while a similar lock-nut 82, applied to the threaded stem 76^a of the bracket 76, clamps the latter, the bracket-plate 73, and the eye at the upper end of the diagonal securely together. By slightly loosening the nut 82 and subsequently screwing the nuts 80 and 81 both in a direction on or off the diagonal the bracket 76 may be adjusted down or up through the slot 75, thereby effecting the vertical adjustment of the worm relatively to its gear, while the diagonals 79 in their character as braces or tie-rods secure the worm-brackets rigidly against lateral displacement from true operative position. This comparatively simple device I have found greatly increases the ease and facility with which the frame may be adjusted and at the same time increases the longevity of the worm and its gear.

Fig. 7 illustrates a simple, strong, and convenient bracket which I have devised for sustaining the stub-shaft which carries the

hand-wheel 32 and bevel-gear 31 and also the rear end of the worm-shaft 29, carrying the bevel-pinion 30. This bracket comprises the two principal side members or plates 83, a U-shaped transverse member 84, connecting the upper ends of the side plates, and three journal-bearing blocks 85, 86, and 87. The side plates 83 are rigidly bolted at their lower ends on opposite sides of the channel-beam of the main frame, a concaved wooden block 88 being conveniently interposed in the channel opposite the outside plate to form a solid bearing therefor, and the upper portions of the plates 83 are spread to a certain extent to admit between them the U-shaped member 84, the parallel arms of which are rigidly secured to and flush with the upper ends of the plates 83. The two upstanding channel-blocks 85 and 86 are bolted at their lower ends securely to the tops of the plates 83 and in transverse alinement relatively to the channel, and together constitute the bearings for the short shaft which carries gear 31 and hand-wheel 32. The similar upstanding bearing-block 87 is secured at its lower end to the transverse element of the U-shaped brace and constitutes the journal-bearing for the rear end of the worm-shaft 29, carrying the bevel-pinion 30. This construction of bracket is cheaply made, easily assembled, and affords an extremely-rigid bearing for the shafts carrying the intermeshing bevel-pinions 30 and 31, maintaining the latter always in true and easy running engagement.

My invention also contemplates certain improvements in the means for supporting the rear axle of the machine-frame and rendering the latter longitudinally extensible. This has commonly been done in prior constructions by forming the axle in two telescoping or overlapping sections carried in a suitable box or case connected to the main frame and slidably engaging the outer surfaces of the overlapping sections of the axle. According to my present invention I construct the rear axle in two overlapping sections 89 and 90, which are contained within a skeleton frame formed by four angle-beams 91, so disposed as to constitute a rectangle in cross-section and rigidly united by vertical front and rear plates 92 and 93 and horizontal top and bottom plates 94 and 95, respectively, the angle-irons being securely riveted to these plates within the right angles formed by the junction of their side margins and containing between them the overlapping axle-sections 89 and 90, which latter are in the form of solid-metal bars grooved longitudinally on their outer opposite faces, as shown at 89^a and 90^a, respectively, to receive a pair of racks 96 and 97, secured therein, respectively. These racks are engaged by pinions 98 and 99, fast on a pair of vertical shafts 100 and 101, respectively, the upper ends of which are provided with hand-wheels 102 and 103. Heretofore the adjustment of the sections of the axle has been accompanied by considerable friction

between the overlapping parts thereof, and my present invention contemplates the removal of this objection by the interposition of a series of vertical rollers 104, disposed between the proximate faces of the sections 89 and 90 and journaled in the top and bottom plates 94 and 95 of the casing which unites the angle-irons 91.

In Figs. 2 and 4 is illustrated an improved draft-rigging, which I prefer to employ in connection with the above-described machine. As shown in said figures, the tongue or pole (designated by 105) passes at its inner end between a pair of parallel top and bottom plates 106 and 107, respectively, the outer ends of these plates being united by a vertical bolt 108, on which is pivoted the whiffletree 109, to the outer ends of which latter are pivoted in turn a pair of singletrees 110 and 111. The main line of draft extends through the plates 106 and 107, a pair of links 112 113, and a second pair of plates 115, which latter are pivoted directly on the king-bolt 14. A pair of diagonal braces 116 connect the inner end of the pole laterally with the front axle 113 near the outer ends thereof, thus providing for the angular swing of the front axle relatively to the frame by a sidewise thrust on the pole, relieving the latter of all direct strain longitudinally thereof, for which purpose the bolt 108 passes through an enlarged slot 105^a, formed through the pole and out of contact with the said bolt. It will be observed that the lower end of the king-bolt 14 passes through the meeting faces of the upper and lower bolsters 11 and 12, while the upper end of the king-bolt passes through a transverse brace or bar 11^a, secured rigidly between the side members of the upper V-shaped bolster 11 and constituting an element thereof.

The operation of the several parts constituting my improvements is obvious or has been already explained in connection with the description of the same and need not, therefore, be more particularly set forth.

Among the principal advantages resulting from my improved construction of a machine of this type are the means for quickly elevating and lowering the blade-carrying frame independently of the regular vertical adjusting devices therefor, the improved means for supporting and operating the circle-plate, the improved arrangement of operating mechanism serving to swing the blade as an entirety laterally of the machine, and finally the improved construction of extensible rear axle and the means for operating the same with a minimum of friction, and consequently with greater ease and rapidity.

A machine of this character necessarily possesses a large number of adjustments and manipulations in the operation thereof, all of which demand the close attention of the operator. To effect these adjustments and manipulations with the greatest possible ease by mechanism located most convenient to the hand of the attendant has been one of the

principal objects in this invention, and in the mechanism herein shown and described I believe the above-stated result has been satisfactorily secured.

I claim—

1. In a machine of the class described, the combination, with the main longitudinally-disposed blade-supporting bars, of an externally-toothed circle-plate disposed therebeneath and having the scraper-blade pendent therefrom, a plurality of intersecting supporting-bars hung from said main longitudinal bars and disposed transversely of the circle-plate and at their outer ends supporting the latter, and a pinion engaging the toothed periphery of the circle-plate and operating means for said pinion, substantially as described.

2. In a machine of the class described, the combination, with the main longitudinally-disposed blade-supporting bars, of an externally-toothed circle-plate disposed therebeneath and having the scraper-blade pendent therefrom, a plurality of intersecting supporting-bars hung from said main longitudinal bars and disposed transversely of the circle-plate, said bars being vertically offset through their main body portions which lie within the circle-plate diametrically thereof and having their end portions underlying said circle-plate and forming both a support and a centering-guide therefor, and a pinion engaging the toothed periphery of the circle-plate and operating means for said pinion, substantially as described.

3. In a machine of the class described, the combination with the scraper-blade and its immediate supporting-frame, of means for effecting the vertical adjustment of said frame from the operator's platform, said means including as elements thereof a transverse shaft, arms on said shaft from which the blade-supporting frame is suspended, worm-gears on said shaft and worms for operating the same, and clutch mechanisms intermediate said arms and worm-gears and levers for operating said clutches, whereby the arms may be maintained in rotative engagement with the gears or may be freed therefrom to permit the blade to drop suddenly, substantially as described.

4. In a machine of the class described, the combination, with the scraper-blade of a pair of longitudinally-disposed main supporting-bars therefor suspended from and beneath the main frame of the machine, the rear ends of said main supporting-bars having end sections pivoted thereto in vertical planes, and means for vertically adjusting said blade and its supporting-bars relatively to the main frame of the machine in which adjustment said pivoted sections yield downwardly to permit the extreme upward movement of the blade and its bars without interference with fixed elements of the main machine-frame, substantially as described.

5. In a machine of the class described, the

combination with the main frame of the machine and the scraper-blade and the two longitudinally-disposed and rearwardly-divergent supporting-bars therefor suspended from the main frame, of means for adjusting said blade and its supporting-bars laterally of the machine-frame, said means comprising a pair of drums journaled adjacent and parallel with the principal side members of the machine-frame and supported by the latter, chains attached to the rear ends of the blade-supporting bars and carried thence over suitable guides to and around the drums on the sides of the machine-frame respectively, a shaft extending transversely of the main frame, bevel-gears fast on the ends of said shaft, bevel-pinions on the adjacent ends of the drum-shafts and engaging said bevel-gears, and a worm-gear and operating devices therefor engaging and driving said transverse shaft, substantially as described.

6. In a machine of the class described, the combination, with the longitudinally-disposed main supporting-bars, the intersecting circle-plate-supporting bars suspended therefrom and the toothed circle-plate and its attached scraper-blade supported and centered by said last-named bars, said circle-plate having a series of locking-apertures formed there-through, of a driving-pinion for rotating said circle-plate supported on the main longitudinal bars and a vertically-reciprocable spring-actuated locking-pin also supported on said bars directly above the path of travel of said locking-apertures and adapted to engage the latter, and means for withdrawing said locking-pin, the same comprising a spiral cam-surface axially coincident with the locking-pin and a laterally-projecting lug on the latter engaging said cam-surface to raise the pin out of locking engagement with the circle-plate, substantially as described.

7. In a machine of the class described, the combination, with the main carrying-frame and the blade-supporting frame suspended therefrom and longitudinally disposed therebeneath, and mechanism for quickly elevating the forward end of the blade-supporting frame in order to enable the blade to surmount an obstruction, said mechanism comprising a hand-lever and segment-rack therefor mounted on the main frame, and rod and lever connections therefrom to the forward end of the underlying blade-supporting frame, substantially as described.

8. The combination with the longitudinal side members of the main frame of a pair of upstanding bracket-plates bolted thereto on

opposite sides of the machine, said plates being vertically slotted near their upper ends, a transverse shaft journaled in and between said bracket-plates below the slots thereof and carrying worm-gears on the outer ends thereof, worms and supporting-brackets therefor, the stems of which latter extend through the slots of the bracket-plates, a pair of intersecting diagonally-disposed brace-rods uniting the shank of each worm-bracket with the base of the opposite bracket-plate, and lock-nuts for adjusting said brace-rods longitudinally and through the latter adjusting the relation of the worms to their gears, said parts being assembled and operating substantially in the manner described.

9. The combination with the side channel-beam of the main frame and a filling-block interposed therein of a bracket secured thereon adapted to form a support for cooperating elements of the blade-adjusting mechanism, said bracket comprising a pair of upwardly-divergent side plates bolted at their lower ends on opposite sides of the channel through the web of the latter and the filling-block, a horizontal U-shaped brace uniting the upper ends of the side plates, and upstanding journal-blocks secured on the upper ends of the side plates and on the transverse element of the U-shaped brace, said bearing-blocks constituting journals for a pair of shafts disposed at right angles and carrying interengaging bevel-pinions constituting elements of the blade-adjusting mechanism, substantially as described.

10. In a road-machine of the character indicated, the combination with a rear axle formed in two overlapping extensible bar-sections having longitudinal grooves in their outer faces respectively, of a housing for said axle-sections, the same comprising four angle-bars slidably engaged by the outer corners of the axle-sections and top and bottom and front and rear plates rigidly tying together said angle-plates, a series of anti-friction-rollers journaled in said top and bottom plates between the inner opposite faces of the axle-bars and engaging the latter in rolling contact, and means for adjusting the axle-bars longitudinally of each other comprising racks secured in the grooves of the bars and pinions engaging said racks, substantially as described.

ROBERT E. BURKE.

In presence of—

LAURA A. BURKE,
WILLIAM S. DIVEN.