March 28, 1944. S. F. ARMINGTON ET AL 2,345,313

SCRAPER

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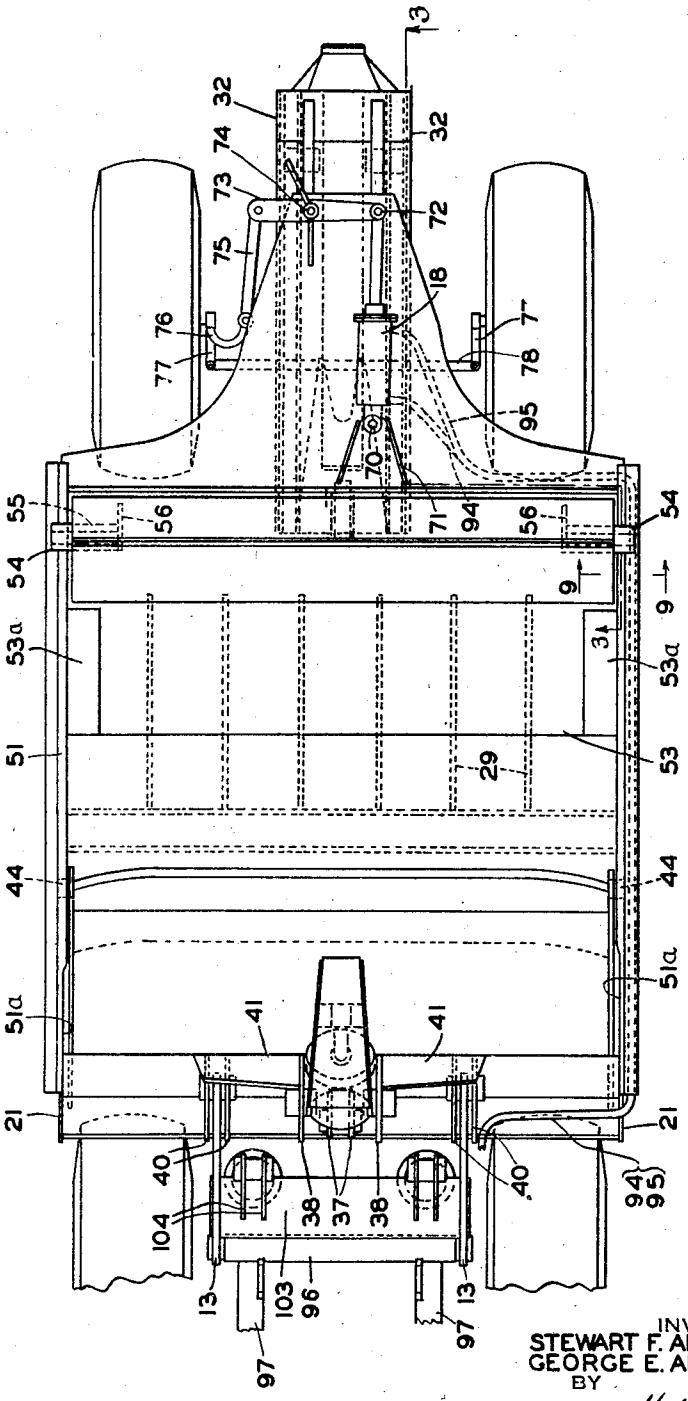

FIG. -2

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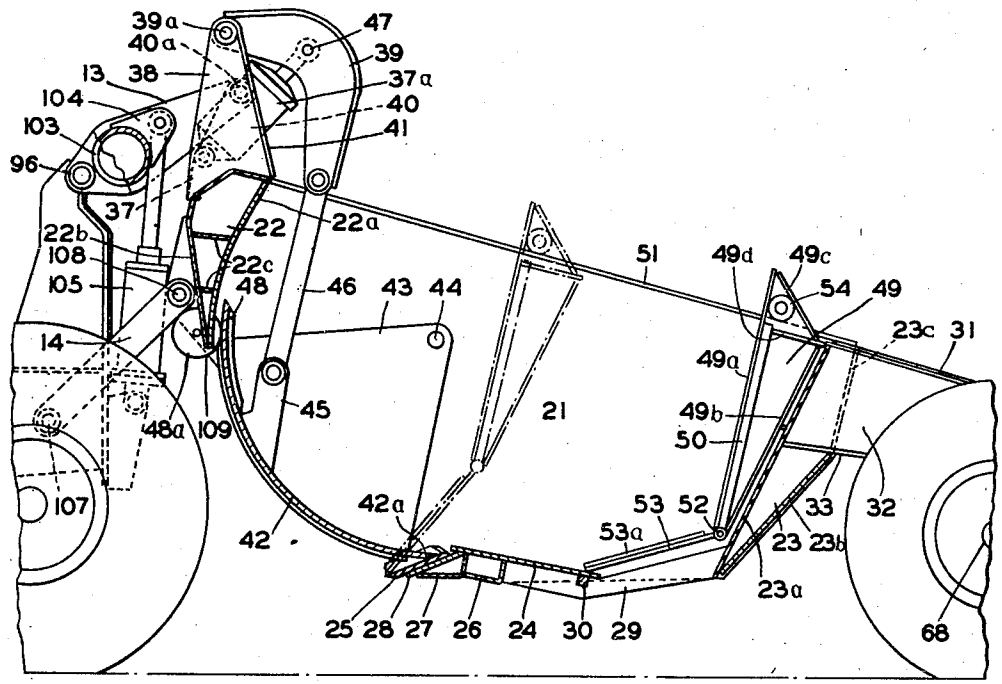

FIG.-5

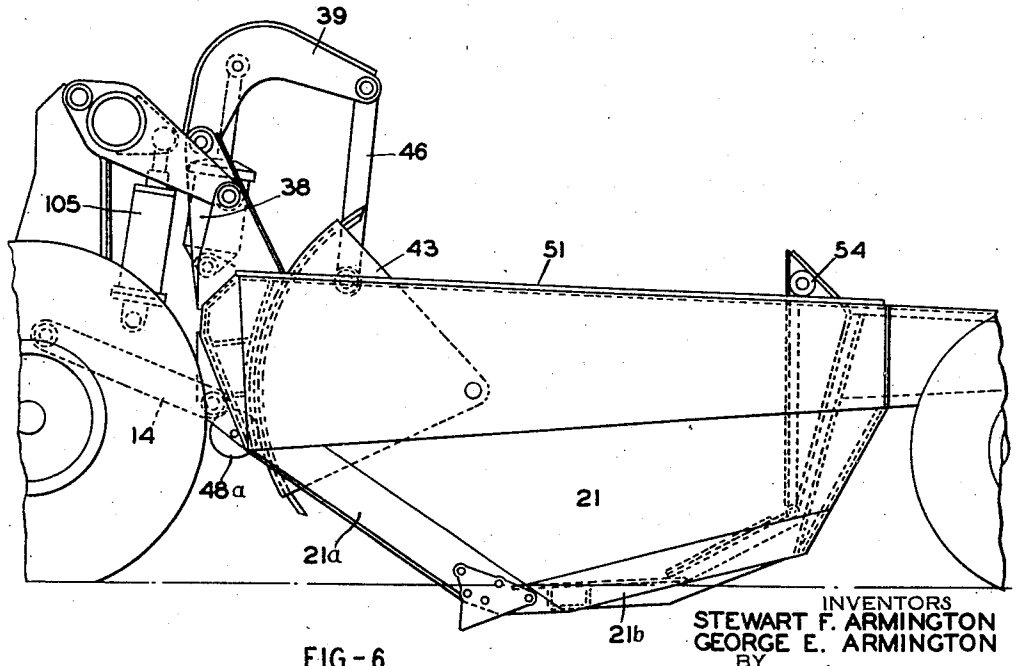

FIG.-6

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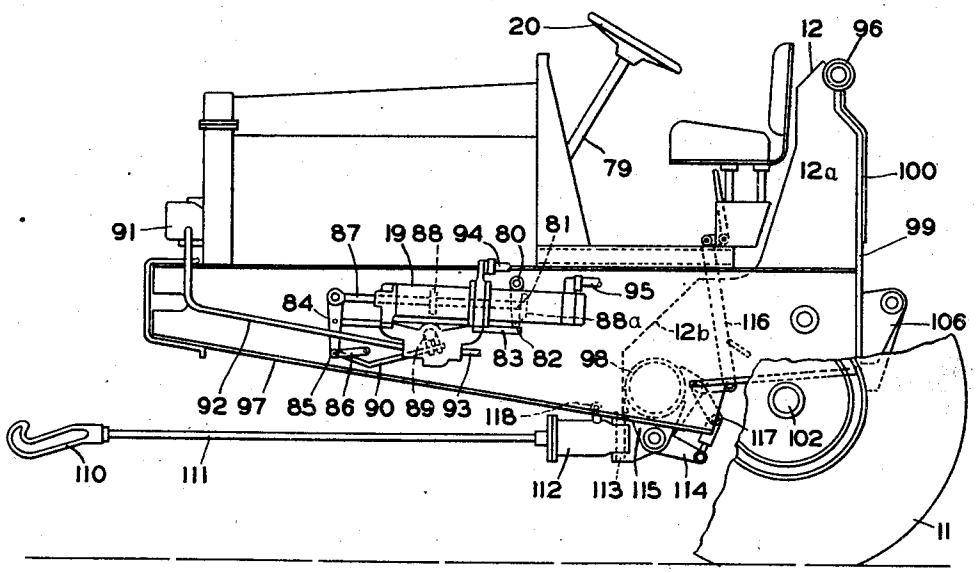

FIG.-7

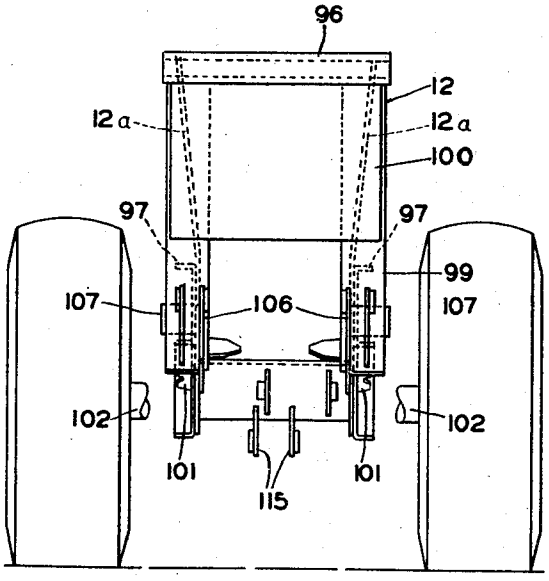

FIG.-8

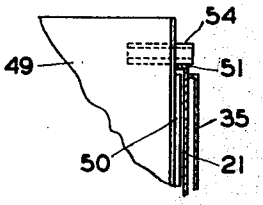

FIG.-9

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UNITED STATES PATENT OFFICE

2,345,313

SCRAPER

Stewart F. Armington, Willoughby, and George E. Armington, South Euclid, Ohio, assignors to The Euclid Road Machinery Company, Euclid, Ohio, a corporation of Ohio

Application May 24, 1941, Serial No. 394,964

4 Claims. (Cl. 37—126)

This invention relates to improvements in a carrying scraper adapted to dig, transport and discharge earth material.

Among the objects of the present invention are the provision of a very strong bowl construction with a tail piece integral therewith and extending rearwardly therefrom for the attachment of wheels and a bumper; the provision of a novel ejector gate propelled and guided by mechanism in the bowl tail piece; the provision of novel supporting means for a discharging ejector gate; the provision of novel adjustable supporting means between the scraper bowl and a tractor vehicle, including a very rigid supporting structure on the tractor; a novel combination of improved steering mechanism with the scraper; and other improved features which will be apparent from the accompanying drawings and description and the essential features of which will be set forth in the claims.

In the drawings, Fig. 1 is a side elevation of our improved equipment; Fig. 2 is an enlarged top plan view of the same; Fig. 3 is a fragmental sectional view taken along the line 3—3 of Fig. 2; Fig. 4 is a transverse sectional view taken along the line 4—4 of Fig. 3; Figs. 5 and 6 are enlarged views of the central or bowl portion of Fig. 1, showing the parts in different positions with certain portions of Fig. 5 being shown in central longitudinal section for a clearer understanding of the construction; Fig. 7 is an enlarged side elevation of the tractor shown in Fig. 1; Fig. 8 is an elevational view taken from the right-hand side of Fig. 7; while Fig. 9 is a fragmental sectional view taken along the line 9—9 of Fig. 2.

Referring generally to the structure shown in Fig. 1, a tractor 10 supported on a single pair of driving wheels 11 has at its front end a power unit and at its rear end an upstanding rigid frame structure 12 to which are pivoted upper and lower links 13 and 14. The rear ends of these links are pivotally connected to the scraper bowl or scoop 15 which has a tail piece 16 extending rigidly from its central rear portion. Beneath the tail piece is a pair of steering wheels 17 which are controlled by means of a power cylinder 18 mounted on the tail piece receiving its power from a booster steering device 19 located on the tractor frame and controlled from the steering wheel 20.

Referring first to the digging bowl 15, this comprises a pair of side plates 21 rigidly connected together at their forward ends by a hollow box beam 22 and at their rearward ends by a hollow box beam 23. A bottom plate 24 is rigidly connected between the side walls and is provided at its forward edge with a digging blade 25 preferably curved slightly upwardly and forwardly at its portions nearer the side walls. This blade is reinforced by a channel beam 26 placed just rearwardly of the digging edge and welded to the bottom plate 24. This is connected by plates 27 and 28 to the cutting blade providing a substantially triangular hollow beam just back of the blade and giving a very strong construction at this point. A plurality of parallel reinforcing bars 29 are welded to the channel beam 26 at the front end and to the box beam 23 at their rear ends and to the bottom plate 24 where they are contiguous. A cross bar 30 ties the bars 29 together along the rear edge of the bottom plate. The box beam 23 comprises a plate 23*a* extending from side wall to side wall and forming the rear limiting surface of the bowl. This is welded to plates 23*b* and 23*c* which form the rear wall of the beam which is completed at the top by the plate 31 which forms part of the tail piece. The side walls 21 are reinforced by plates 21*a* and 21*b* extending along the forward and bottom edges respectively of each side wall. The corner where the side wall terminates opposite the cutting blade 25 is reinforced by a casting 21*c* in the shape of a digging tooth. The upper portion of each side wall is reinforced by channel 35 welded to the side wall with the flanges facing inwardly. This forms in effect a box beam along each side wall connected to the box beams 22 and 23 which forms a very rigid frame around the entire upper edge of the bowl rigidly connected also with the tail piece 16 extending rearwardly. The space between the web of channel 35 and the side wall 21 also provides housing space for certain power conduits as later described. The beam 23 has a central opening near its upper edge to receive the guiding and drive mechanism for the ejector gate to be later described. This opening is defined on the sides by a pair of channels 32 which form the sides of the tail piece. These channels have their flanges facing each other and have their top flanges connected together by the plate 31 which extends from the rear of the tail piece to the plate 23*a* of the box beam 23. The lower flanges of these channels are tied together by a plate 33 which extends through the box beam 23 and is secured to both plates 23*a* and 23*b*. The channels 32 are tied together at their rear ends by a cross channel construction 34 to which is attached a bumper 36. It will be noted that the channels 32 taper,

The steering knuckle arms 77 of the two wheels are connected together by the tie rod 78. Thus when power is supplied to one end or the other of the motor 18 the wheels are steered in opposite directions.

The power supply for the motor 18 comes from the booster steering mechanism 19 previously referred to located along the side frame of the tractor. This mechanism is more fully described and claimed in the copending application of George E. Armington, Serial No. 429,557, filed February 4, 1942, for Booster steering device, to which reference may be had for further description if necessary. Briefly stated the steering wheel 20 controls a steering column 79 which through the usual worm and gear connection oscillates a shaft 80 which controls a pitman arm 81. This arm is pivotally connected at 82 to a link 83 running forward to a lever 84. This lever has a pin and slot pivot at 85 with a link 86 secured to the frame of the tractor. Pivoted to the upper end of lever 84 is a piston rod 87 carrying a piston 88 in one cylinder and a piston 88a in a second cylinder. Fluid is supplied alternatively to opposite faces of piston 88 under control of a plug valve at the point 89. The position of this valve is controlled by a link 90 connected with lever 84. The supply of motive fluid to piston 88 is from a pump 91 mounted on the front of the tractor and connected by conduit 92 to one side of the valve at the point 89. Fluid passing through the cylinder for operating piston 88 (or passing through a by-pass not shown) is available at the conduit 93 for controlling various hoists for operating the scraper. In the operation of this booster steering device when wheel 20 is turned the lead valve at the point 89 is positioned to send pressure fluid against one face or the other of piston 88 thus causing movement of the piston rod 87 in one direction or the other. Obviously piston 88a moves in a similar fashion and forces fluid through either conduit 94 or 95 depending on the direction of movement of piston 88a. These conduits as shown in the various views are conducted through the hollow space between channels 35 and side walls 21 and are suitably connected to opposite ends of the motor 18.

The means connecting the tractor and scraper bowl previously briefly mentioned at 12, 13 and 14 will now be more fully described. The rigid frame member 12 as best seen in Figs. 7 and 8 comprises a pair of side plates 12a rigidly connected at their upper edges to a link supporting boss 96 and extending downwardly along the inner faces of the main tractor side frame members 97 to which they are secured by welding. The lower portions of these plates extend forwardly and downwardly as indicated at 12b, Fig. 7, where they are rigidly connected together by the torque tube 98. Along the rear edge of each plate 12a is secured a vertically extending plate 99 at right angles to the plates 12a and welded thereto. A reinforcing plate 100 extends between the plates 99 and is welded thereto and to the boss 96 as best seen in Fig. 8. Plates 101 are welded to the tractor frame members 97 and to the plates 12a and to these plates is bolted the housing for the axle 102 which supports the drive wheels 11. This gives a very rigid construction because the axle housing, the torque tube 98 and the plate 100 form very strong transverse members and the plates 12a and the tractor frame channels form very strong longitudinally extending members.

On opposite ends of the boss 96 are pivotally secured the links 13 previously mentioned. Just ahead of these pivotal connections a tube 103 is rigidly secured between the two links. At spaced points near the ends of this tube are provided duplicate pairs of parallel ears 104 to which are connected the piston rods of the two hoists 105. The cylinders of these hoists are pivotally connected to brackets 106 which are rigid with the frame at the rear end of the tractor. The rear ends of links 13 are connected at 40a to the ears 40 previously mentioned. The lower set of links 14 are pivotally connected at bosses 107 rigidly mounted on the frame member 12. The other ends of these links are pivotally connected at 108 to ears 109 welded on the box beam 22. It results from this construction that when pressure fluid is supplied to the hoists 105 by means not shown, the links are raised to the position in Fig. 5, which is the carrying position of the scraper, or lowered to the position of Fig. 6 which is the digging position. Obviously when the points 40a and 108 on links 13 and 14 are in dead center position between the points 96 and 107, respectively, and the rear axle 68, the distance between wheels 11 and 17 is greatest. This condition is approximately true when the scraper is digging and this gives a long wheelbase when little or no maneuverability is required. When the parts are in the position of Fig. 5, however, then the wheel base is shortened and this is an advantage as it gives greater maneuverability when the scraper is transporting material from one point to another.

It will be understood that the engine of the tractor is connected by means, not shown, to the driving wheels 11. The engine and most of the weight of the tractor is ahead of the axle 103 and this gives a greater driving effect upon the wheels 11. Also the arrangement of the links 13 and 14 and their connection with the tractor is such that the tractor remains approximately level in all positions of the scraper bowl.

It will be understood that pressure fluid power lines are connected from conduit 93 to the hoists 105 which control the vertical position of the bowl and also to the hoist 37a which controls the front gate and to the hoist 63 which controls the ejector gate. Suitable control valves are of course provided for these hoists, the description of which is not necessary here as they are well understood by those skilled in this art.

The bumper 35 is used when necessary to supply additional digging power to the scraper bowl by a pushing vehicle. With the construction here shown a very rigid connection is provided from the pushing vehicle through the tail piece 16 and the box beam construction around the scraper bowl and thence through the side walls and bottom to the digging blade 25. All of these connections are direct and rigid and give very efficient digging action.

However, it is sometimes desirable to provide additional power by pulling the scraper rather than by pushing. This has the additional advantage that it provides additional driving power on the wheels 11 causing them to pull better and prevents buckling between the scraper and tractor such as is likely to occur when a pushing vehicle is used. For attachment to a pulling vehicle I have provided a hook 110 connected by a pull bar 111 to a spring take-up in the housing 112. This housing has a vertical pivot at 113 in a clevis lever 114 which is pivotally mounted in ears 115 on the torque tube 98. A

control lever 116 operates through a toggle 117 to raise and lower the hook 110 as required. Springs 118 extending laterally from each side of housing 112 to the side members of the tractor frame allow swiveling action around the pivot 113 with a tendency to return the hook 110 to central position.

It will be noted that the combined tractor and scraper vehicle has overall lines pleasing in appearance as viewed in Fig. 1 as compared with the vertical post connection previously utilized between the tractor and scraper. Also the link connection here disclosed avoids the alinement problems formerly met with in the vertical column connection. The hoists 105 are in an inconspicuous position between the tractor and scraper and there take up the least room. They are also well protected against injury. The hoist 63 in the tail piece is also obviously well housed against injury. The ejector gate rolls back and forth with a minimum of friction and is kept square in the bowl by means of the rear extension 57 housed in the long tail piece. The power for moving this ejector gate is applied directly to the middle of the rear side thereof and places the application of the ejecting force substantially at the point of maximum force requirements. This cuts down the size of the members required. The scraper bowl is substantially entirely unobstructed from above so that the scraper may be unloaded by a shovel if desired and the unit is equipped with speedy forward and reverse gearing so that it is especially adapted for use as a shuttle unit or for short hauling.

What we claim is:

1. In an earth moving scraper comprising a bowl having side walls and a bottom and open at the front end, an ejector adapted to move from rear to front along said bowl to discharge material out of the front end thereof, a hinged flap having an edge pivotally connected to the bottom of said ejector and having another edge adapted to scrape along said bottom, said flap being arranged to underlie a portion of the material in the bowl when said ejector is in its rear position, tracks controlling the vertical position of said ejector, said tracks rising from rear to front relative to said bowl bottom, and means for moving said ejector in a fore and aft direction, whereby said flap is gradually raised toward a vertical position during an ejecting action.

2. In an earth moving scraper comprising a bowl having side walls and a bottom and open at the front end, an ejector adapted to move from rear to front along said bowl to discharge material out of the front end thereof, tracks extending along the upper portions of said side walls, rollers on said ejector for supporting the latter on said tracks, said tracks overlying end portions of the ejector beneath them to hold said ejector in said bowl, and said tracks being cut away at one end of said bowl to the full width of said ejector to permit insertion of the ejector into the bowl.

3. Earth moving apparatus comprising a scraper bowl, wheel means supporting said bowl, said bowl having sides and a bottom and being openable at the front end where said bottom is provided with a digging edge, an ejector movable along said bowl from rear to front to discharge material out of the front end of said bowl, a straight inclined track supporting said ejector for lifting the latter as it moves from rear to front of said bowl, a hollow beam rigid with said bowl and extending rearwardly therefrom, a guide member for said ejector rigid therewith and enclosed in said hollow beam, and guide means for said guide member in said hollow beam and parallel to said track.

4. Earth moving apparatus as defined in claim 3, and including a cylinder and piston motor enclosed in said hollow beam and connected between said beam and said ejector to move said ejector in discharging direction by expansion of said motor.

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March 28, 1944. J. L. ANDERSON 2,345,314

CUTTING MACHINE

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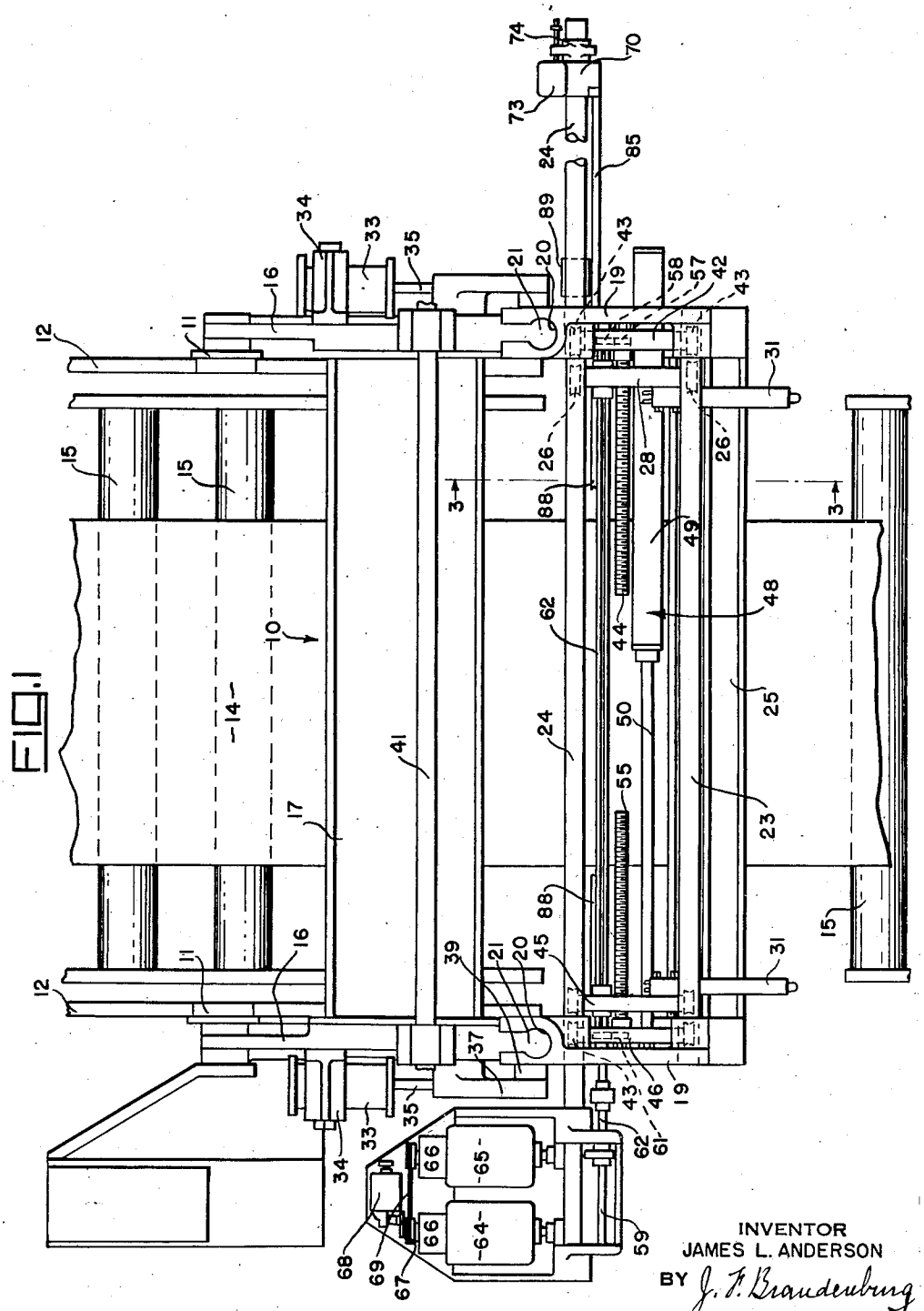

FIG. 1

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