Jan. 7, 1930. A. J. CLAUSEN 1,742,494

CHARGING MACHINE

Filed Dec. 22, 1926 2 Sheets-Sheet 1

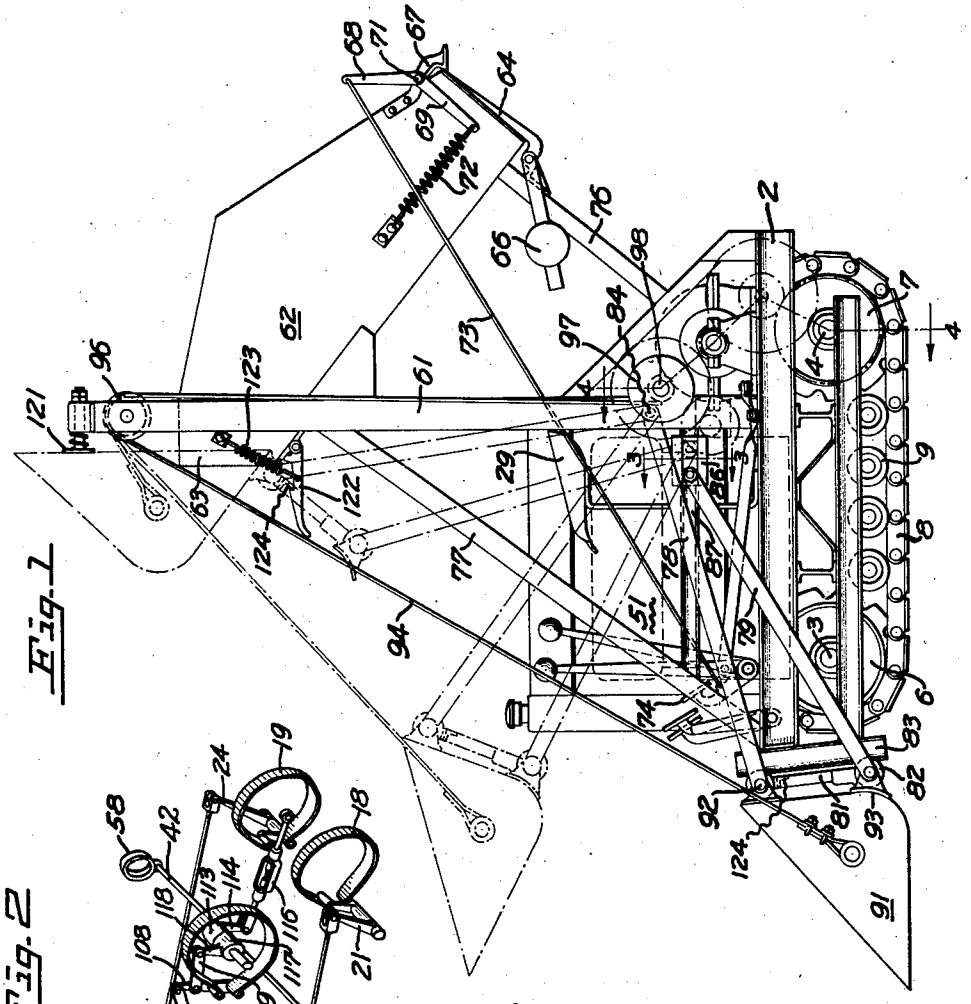

Fig. 1

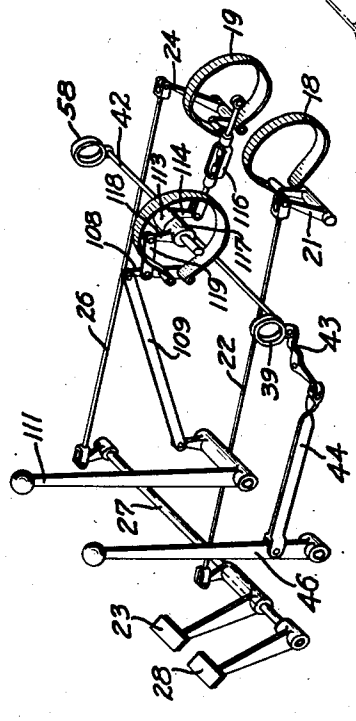

Fig. 2

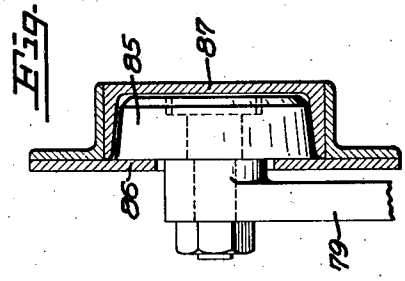

Fig. 3

INVENTOR
ANDREW J. CLAUSEN
BY Charles S. Evans
HIS ATTORNEY.

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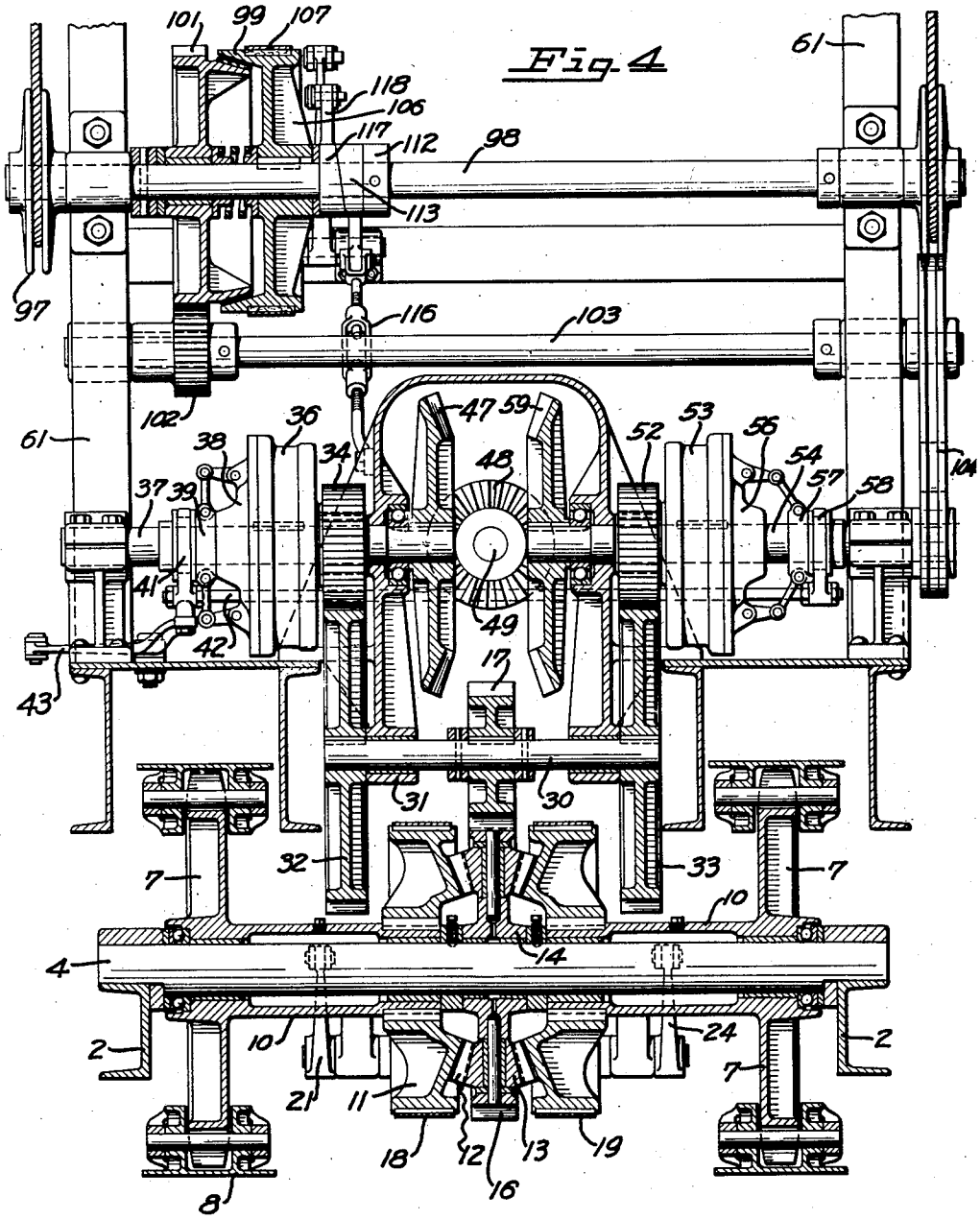
Filed Dec. 22, 1926 2 Sheets-Sheet 2

Fig. 4



INVENTOR
ANDREW J. CLAUSEN
BY Charles S. Evans
HIS ATTORNEY.

Patented Jan. 7, 1930

1,742,494

UNITED STATES PATENT OFFICE

ANDREW J. CLAUSEN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO MARCHAL-CLAUSEN MFG. CO., OF OAKLAND, CALIFORNIA, A COPARTNERSHIP CONSISTING OF VICTOR L. MARCHAL AND ANDREW J. CLAUSEN

CHARGING MACHINE

Application filed December 22, 1926. Serial No. 156,278.

My invention relates to a machine for picking up quantities of material and conveying it to the point of use or disposal.

One of the objects of the invention is the provision of a batch charger for scooping up measured quantities of sand and gravel for concrete construction and conveying the batch of material to the mixer.

Another object of the invention is the provision of a machine of the character described with controls readily operable by one man.

Since a machine of this character is subject to stresses of great magnitude and must frequently operate under conditions in which room for maneuvering is limited, it is also an object to provide a compact mechanism, with low center of gravity when loaded and which can be handled in restricted spaces.

Other objects and valuable features, together with the foregoing will be set forth in the following description of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood however that I do not limit myself to the showing made by the said description and drawings, as I may adopt variations of my preferred form within the scope of my invention as set forth in the claims.

Referring to the drawings:

Figure 1 is a side elevation, the scoop being shown at different points on its path of movement by means of dash and dot lines.

Figure 2 is a perspective skeleton view of the various controls, the foot control operating the hopper gate being omitted.

Figure 3 is a sectional view showing the construction of the guide for the roller attached to the end of the lower scoop arm. The plane of section is indicated in Figure 1 by the line 3—3.

Figure 4 is a sectional view showing the power transmission shafting and gearing and their associated parts, including the tractor track. The plane of section is indicated by the line 4—4 of Figure 1.

Broadly considered my invention comprises a self propelling vehicle preferably of the track-laying tractor type to the frame of which are fixed upright standards for supporting a slant bottomed hopper. Pivotally connected to the vehicle frame on each side adjacent the base of the standards are two arms, the outer ends of which are pivotally connected to a cradle, adapted in the lower position of the arms to rest in nearly vertical position against a thrust head fixed on the frame of the vehicle. Pivotally connected to the cradle is a scoop which in the lower position of the cradle lies substantially on the ground so that with movement of the vehicle it may be thrust under the material awaiting handling; the stresses of such loading being carried by the thrust head. A cable suitably fastened to the scoop on each side passes over a sheave near the top of each standard and around a narrow spool; and means are provided for connecting the prime mover of the vehicle to propel it in either direction and to turn it, and also to rotate the spools so as to wind up the cables to lift the scoop from its loading position toward the upper end of the hopper in which is a charging opening. During the initial movement of the scoop, it and the cradle move as one upon the pivotally connected arms, the connection of the cables being at a point to insure this, but as the cradle nears the limit of its upward movement, it is caught by a latch and the continued pull of the cables lifts the scoop from the cradle, turning it on its pivot, so that the parts come to rest in their upper or discharge position, with the upper edge of the cradle adjacent the hopper and the scoop tipped upwardly and toward the hopper to permit its load to discharge by gravity into the hopper. When tension on the cables is released the scoop falls back on the cradle, releasing the latch. Scoop, cradle and supporting arms then sink back to loading position adjacent the ground, means being provided to control this recovery movement. Means are also provided for controlling the discharge of material from the hopper.

All of the controls are handily arranged adjacent the seat of the driver, who alone operates the machine. One of the chief uses of the machine is that of connecting unit between the concrete mixer and the material sup-

ply in highway construction. When so employed one machine replaces many laborers with wheelbarrows, and has been found to be the fastest, most dependable and cheapest method of keeping aggregate in measured quantities moving steadily from the piles to the mixer. The machine also has other uses in engineering works, one of the chief of these being that of a truck loader.

Considered in detail, the machine of my invention includes a self-propelling vehicle of the track-laying tractor type comprising a vehicle frame 2, mounted on the axles 3 and 4 carrying the sprockets 6 and 7. The sprockets are surrounded by the usual track 8 which may be of any desired construction and which is supported between the sprockets on the wheels 9 carried on the frame in accordance with well known practice.

Journaled upon the fixed axle 4, as shown in Figure 4, are the sleeves 10 on the outer end of each of which, the sprocket 7 is formed and on the inner end of which is keyed the brake drum 11, which also carries the gear 12 in mesh with the pinions 13 journaled on the spider 14, journaled on the shaft 4 between the two brake drums. The spider 14 is provided with a gear 16 in mesh with the driving pinion 17, the structure just explained thus comprising a differential drive for the sprockets 7. Surrounding the brake drums are brake bands 18 and 19 respectively, best shown in Figure 2. The brake band 18 is connected by the lever arm 21 and the connecting rod 22 with the pedal 23; and the brake band 19 is connected by the lever arm 24, connecting rod 26, and rod 27 with the pedal 28. Both the pedals are arranged convenient to the seat 29 in which the operator sits. Thus the pedals 23 and 28 provide means for steering the vehicle thru the control of the differential gears 12.

The driving pinion 17 is fixed upon the shaft 30 journaled in suitable bearings 31 arranged on the frame of the vehicle, and on the ends of the shaft are keyed the gears 32 and 33. The gear 32 is in mesh with the gear 34, rigid with the clutch element 36 and together journaled on the shaft 37 to which is fixed the other clutch element 38 controlled by the shift collar 39 which is operatively connected with the yoke 41 fixed on the end of the control rod 42. The control rod is connected thru the lever 43 and link 44 with the lever 46 arranged adjacent the seat of the driver. Also fixed on the shaft 37 is the gear 47 in mesh with the driving gear 48 arranged on the end of the propeller shaft 49. The propeller shaft is driven by the internal combustion engine 51 in accordance with the usual practice. The gear 33 is in mesh with the gear 52, which like the gear 34 is also rigid with the clutch element 53, both being loose upon the shaft 54 similar to shaft 37, and to which is fixed the other clutch element 56 controlled by the shift collar 57 operated by the yoke 58 also fixed on the control rod 42. The inner end of the shaft 54 also carries a gear 59 which like its companion gear 47 is in mesh with the driving gear 48, but on the opposite side from the gear 47, so that rotation of the gear 48 drives the gears 47 and 59 and therefore their respective shafts 37 and 54 in the opposite direction. The proportion and arrangement of the clutches is such that when the clutch elements 36 and 38 are engaged on one side to connect the shaft 37 with the shaft 30 thru the gears 32 and 34, the clutch elements 53 and 56 are disengaged so that the gear 52 with its clutch element 53 idles on the shaft 54. With movement of the control lever to neutral position, the clutch elements 36 and 38 are disengaged. With further movement of the control lever, the clutch elements 53 and 56 are engaged, and the driving connection is thru gear 59, shaft 54, clutch elements 53 and 56 and gears 52 and 33. Thus the direction of rotation of the driving pinion 17, and therefore the direction of motion of the vehicle is controllable by the lever 46. There is thus provided a track-laying tractor which is readily maneuvered in limited space.

Arranged rigidly on the frame 2 of the tractor are two standards 61 between which is arranged a hopper 62 with its charging end 63 between the upper portions of the standards. The hopper is preferably arranged with a sloping bottom to facilitate the discharge of its contents and at the lower end is provided with a gate 64 normally returned to closed position by the counterweight 66. The gate is kept closed under load by the latch 67 fixed rigidly with the lever arms 68 and 69 on the pivot shaft 71. A spring 72 is secured to the arm 69 to resiliently retain the latch in position and a rod 73 connects the arm 68 with a pedal 74 adjacent the seat of the operator, thus providing means for the ready release of the gate and the dumping of the load. The hopper and standards are rigidly braced upon the frame of the vehicle by the structural members 76 and 77 and the hopper is so disposed that the center of gravity is kept as low as possible, while at the same time the discharge end is high enough to permit the deposit of the load in a truck.

Means are provided for picking up measured quantities of material from the ground and depositing them in the hopper. Pivotally mounted upon the frame of the vehicle on each side, adjacent the base of the standards and on the opposite side from the hopper are two arms 78 and 79. At their outer ends these arms are pivotally connected to a cradle 81 having flanged rollers 82 adapting it to rest in substantially upright position against the thrust head comprising the structural elements 83 rigidly fixed on the end of the

vehicle frame. Preferably the thrust head as shown in Figure 1 slopes toward the vehicle as it approaches the ground so that pressure against the cradle in the direction of the vehicle frame tends to move the cradle downwardly in a slight degree. Preferably the arms 78 are connected to the vehicle frame by fixed pivots 84, while each of the arms 79 is provided with a roller 85 mounted within a slideway 86 fixed on the frame member 87, so that the connection of the arms 79 to the vehicle frame is both pivotal and slidable.

Disposed on the cradle is a scoop 91 preferably pivotally connected to the cradle by the pivot shaft 92 adjacent the upper portion of both scoop and cradle, the lower portion of the scoop resting against the seat 93 on the cradle. The scoop is preferably of the open top type with bottom and back to facilitate loading by being thrust into the material. Connected to each side of the scoop by any suitable means is a cable 94 which passes upwardly over a sheave 96 arranged near the top of the standard on that side, thence downwardly to a spool or drum 97 fixed on the end of the shaft 98, so that with rotation of the shaft the cables are wound up on the spools. Journaled on the shaft 98 is the clutch element 99 having the gear 101 integral therewith. The gear is in mesh with the pinion 102 fixed on the shaft 103 which is connected by the chain 104 to the shaft 54. Thus the gear 101 and clutch element 99 run continuously with the propeller shaft 49. Splined on the shaft 98 is the other clutch element 106, about which is disposed the brake band 107, controlled by the lever arm 108 connected by the link 109 to the control lever 111. Arranged loosely on the shaft 98 against the fixed collar 112 is the cam collar 113 having an arm 114 thereon anchored to the fixed housing by a link including the turnbuckle 116, so that by adjustment of the turnbuckle, the cam collar may be adjusted. Interposed between the cam collar and the clutch element 106 is a complementary cam collar 117 having an arm 118 connected by the link 119 to the lever arm 108. The proportion and arrangement of these parts is such that movement of the control lever 111 in one direction turns the cam collar 117 to press the clutch element 106 into engagement with the clutch element 99 and simultaneously release the brake band 107, while movement of the control lever in the opposite direction effects the recovery movement of the cam collar 117 to the position farthest to the right as seen in Figure 4 so as to release the clutch elements and simultaneously tightens the brake band 107. It will be seen from this then, that the control lever 111 permits the operator to wind up the cables 94 to raise the scoop and to control the unwinding of the spools when the scoop is allowed to fall of its own weight.

The positions of the pivots connecting the arms 78 and 79 to the vehicle frame are such that with the raising of the scoop, the cradle at its highest point engages the lower edge of the hopper, continued tension on the cables then swinging the scoop upwardly into the position shown by the dash and dot lines of Figure 1 and against the spring held bumper 121, in which position it lies in the charging opening of the hopper so that the load falls by gravity out of the scoop and into the hopper. As soon as the scoop starts to tip upwardly off of the cradle, the latch 122 is drawn by the spring 123 into engagement with the lug 124 holding the cradle in its upper position during the completion of the dumping movement of the scoop. The clutch elements 99 and 106 are so adjusted as to their engagement by means of the turnbuckle 116 that slippage of the clutch occurs when the cradle and scoop have reached their highest position, in the event the operator does not release the clutch at exactly the proper moment. After the load has been discharged from the scoop into the hopper, the weight of the scoop is sufficient to unwind the cables from the spools, and as it settles back upon the cradle it strikes and releases the latch 122 so that both scoop and cradle are then free to fall into loading position, the descending movement being controlled by the suitable application of the brake band 107 thru control lever 111. The points of attachment of the cables 94 to the scoop are arranged with reference to the pivot 92, so that tension on the cables raises scoop, cradle and arms together, the lever arm tending to cause pivotal movement of the scoop on the cradle gradually increasing as the cradle nears the top of its movement until finally as the cradle reaches it position against the hopper, the scoop is swung upwardly to dumping position.

From the above it will be seen that with the scoop in the lower position substantially against the ground as shown in Figure 1, forward movement of the vehicle pushes the scoop under the material lying loose in a pile in front of the vehicle, the thrust being carried against the thrust head 83 and the stresses being such as to hold the scoop down against the ground while the load is being picked up. The scoop full of material, as for example crushed rock, is then raised and dumped into the hopper, and since the scoop is of predetermined capacity, the desired number of loads of crushed rock and of sand may be raised and dumped into the hopper in the desired proportions, the extreme flexibility of the vehicle permitting it to move from one supply pile to another as the need may arise. Having loaded a batch of aggregate in the desired proportions of sand and rock, the vehicle then proceeds to the concrete mixer where the load is dumped directly into

the skip of the mixer. While the mixer is working on this particular batch, the machine collects another load. It is thus possible to keep close contact between the supply piles and the mixer even over distances which would make it impracticable to transport the materials by the usual wheelbarrows. It will be obvious, without a special discussion, that my machine is suitable also for loading trucks with loose material or material which involves only light digging and this is especially true in excavations where limited space or other conditions make it impossible for trucks to approach close to the material to be handled. My machine is capable of operating within a very limited range and having loaded the hopper is then capable of ascending slopes impracticable for the ordinary truck to dump the load.

I claim:

1. A machine of the character described comprising a vehicle including a frame, a thrust head on said frame, a cradle, arms for mounting the cradle on the frame and positioning it against the thrust head or above the frame, a scoop mounted on the cradle, and means for raising the scoop and cradle from the thrust head to position above the frame.

2. A machine of the character described comprising a vehicle including a frame, a thrust head on said frame, a cradle, arms for mounting the cradle on the frame and positioning it against the thrust head or above the frame, a scoop pivotally mounted on the cradle, and means for raising the scoop and cradle from the thrust head to a position above the frame and for turning the scoop on its cradle to dumping position.

3. A machine of the character described comprising a vehicle including a frame, a thrust head on said frame, a cradle, arms for mounting the cradle on the frame and positioning it against the thrust head or above the frame, a scoop pivoted adjacent its upper edge to the upper edge of the cradle, and means for raising the scoop and cradle together from the thrust head to a position above the frame and for turning the scoop on its pivotal mounting to dumping position.

4. A machine of the character described comprising a vehicle including a frame, a thrust head on said frame, a pair of arms pivotally mounted on each side of said frame, a cradle pivotally connecting the outer ends of the arms and adapted to lie against the thrust head, and a scoop pivotally mounted on the cradle.

5. A machine of the character described comprising a vehicle including a frame, a thrust head on said frame, a pair of arms pivotally mounted on each side of said frame, a cradle pivotally connecting the outer ends of the arms and adapted to lie against the thrust head, and a scoop pivotally connected at its upper end to the cradle and abutting against the cradle at its lower end.

6. A machine of the character described comprising a vehicle including a frame, a thrust head on said frame, a pair of arms pivotally mounted on each side of said frame, one arm of each pair being slidably pivotally connected to the frame, a cradle pivotally connecting the outer ends of the arms and adapted to lie against the thrust head, and a scoop pivotally mounted on the cradle.

7. A machine of the character described comprising a vehicle including a frame, a thrust head extending downwardly and rearwardly on said frame, a cradle, rollers on said cradle for bearing against said thrust head, arms for mounting said cradle on said frame and positioning it against said thrust head or above the frame, and a scoop mounted on said cradle.

8. A machine of the character described comprising a vehicle including a frame, a thrust head extending downwardly and rearwardly on said frame, a cradle, rollers on said cradle for bearing against said thrust head, a pair of arms pivotally connected to said cradle and said frame, a pair of arms pivotally connected to said cradle and pivotally and slidably connected to said frame, and a scoop mounted on said cradle.

In testimony whereof, I have hereunto set my hand.

ANDREW J. CLAUSEN.