Dec. 30, 1924.

1,521,246

E. H. LICHTENBERG

CONCRETE LOADING, MIXING, AND DISTRIBUTING MACHINE

Filed Jan. 31, 1921 3 Sheets-Sheet 1

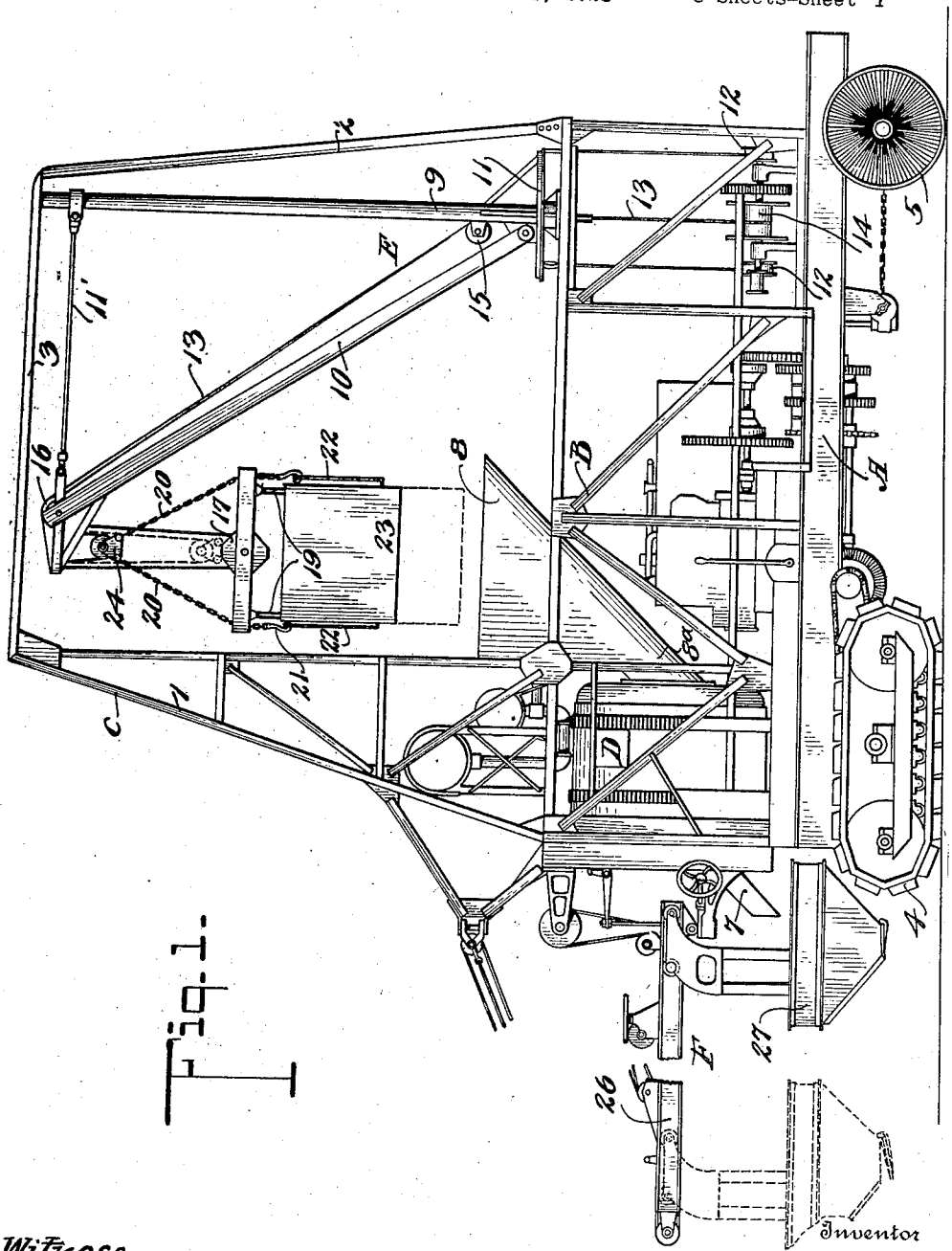


Fig. 1.

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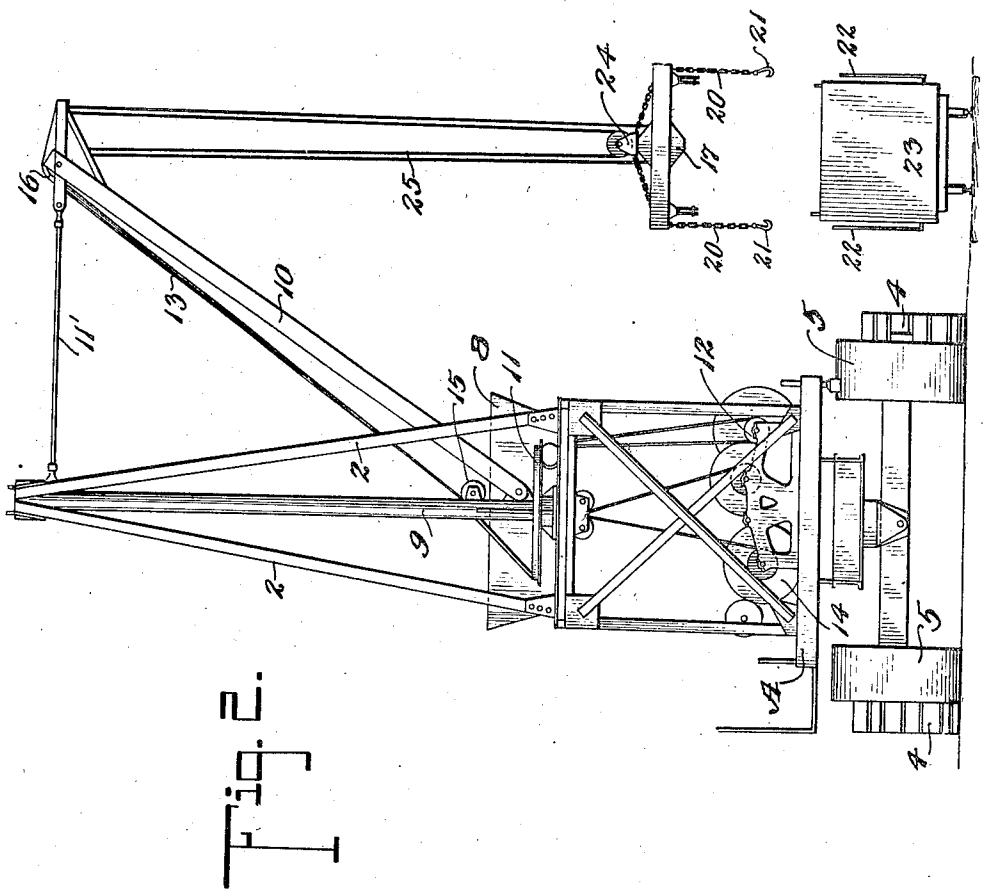


Fig. 2.

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CONCRETE LOADING, MIXING, AND DISTRIBUTING MACHINE

Filed Jan. 31, 1921 3 Sheets-Sheet 3

Fig. 3.

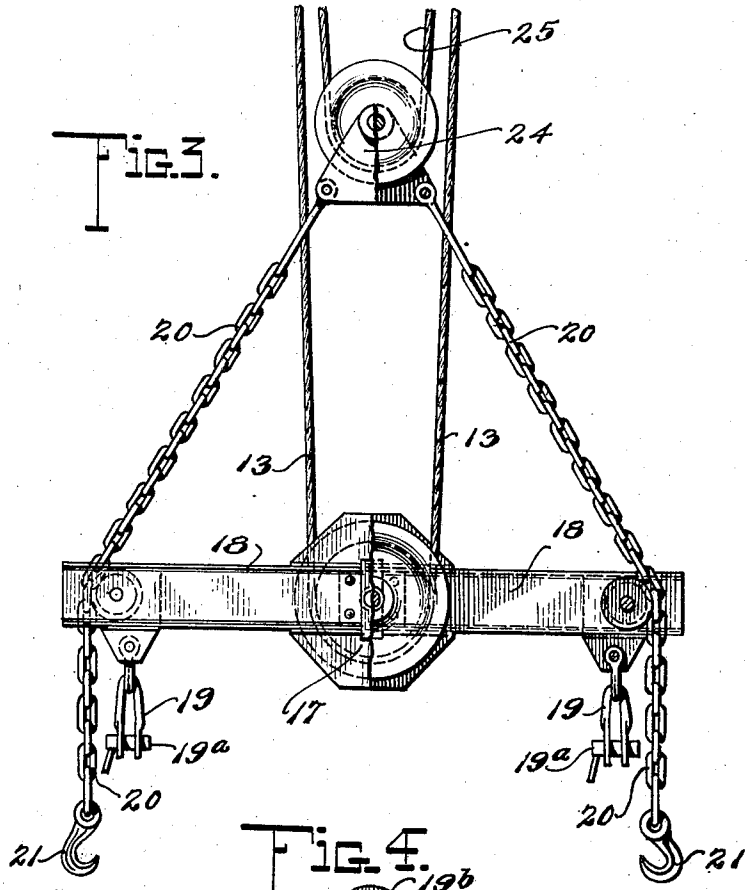
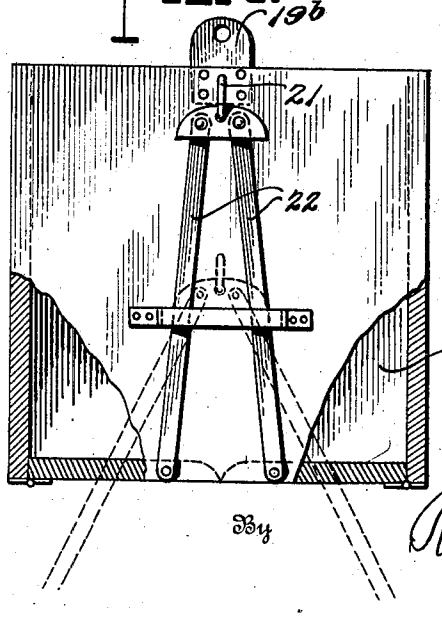


Fig. 4.



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Patented Dec. 30, 1924. 1,521,246

UNITED STATES PATENT OFFICE.

ERICH H. LICHTENBERG, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ROEHRING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

CONCRETE LOADING, MIXING, AND DISTRIBUTING MACHINE.

Application filed January 31, 1921. Serial No. 441,358.

To all whom it may concern:

Be it known that I, ERICH H. LICHTENBERG, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Concrete Loading, Mixing, and Distributing Machines, of which the following is a specification.

The object of my present invention has been to produce a machine capable of handling concrete aggregates in enormous quantities, a machine which is portable so that it may be advanced under its own power as work upon a continuous surface progresses, and combining instrumentalities for performing the functions of unloading the aggregates from a source of supply, conveying the said aggregates to a hopper or receiver upon the machine, mixing the aggregates as they are supplied to a suitable mixing unit from said receiver, and distributing said aggregates by properly depositing the same upon the subgrade which is being concreted.

The power plant for the machine is operatively connected with the derrick loading and unloading means, the mixing unit and the distributing unit, as well as adapted to advance the machine as the work proceeds. The machine as hereinafter set forth is designed especially for use in connection with industrial railways such as now commonly employed to convey concrete aggregates to the site, usually a subgrade, at which they are to be mixed and distributed. Such industrial railways are now comprised largely of trackage, trucks to operate thereover, and batch receptacles or boxes removably mounted on the trucks so that they may be bodily detached, lifted off the track, and their contents discharged where necessary. My machine is designed to handle at one time a batch receptacle or car body having a capacity of approximately sixty-five cubic feet of aggregates, having the approximate weight of seven thousand (7000) pounds, the same being bodily transferred to the mixing unit of the machine, handled thereby, and subsequently discharged from said mixing unit and distributed over the field or area of deposit for the mixed aggregates in the form of concrete.

Owing to the tremendous quantity of materials which must be transferred to the receiver on the machine which supplies the mixing plant, it has been necessary for me to design special contrivances which will discharge the materials to the receiver (which latter directly supplies the mixing drum of said mixing plant or unit), in a slow even feed; otherwise clogging of the receiver and improper operation of the mixing unit would result and efficient operation of the machine be prevented.

A further and important phase of the invention has been to so design the machine that its several main units may not only work conjointly, but are arranged so as to operate with a maximum efficiency, and to handle the materials under somewhat varying conditions of service. With this in view, I have devised a special arrangement or mounting of certain derrick means employed for elevating and carrying the batch receptacles over the batch receiver of the mixing unit, said derrick being arranged so that its boom may swing upon an arc of approximately 180 degrees, and equipped with batch box grappling and dumping means of a special type. In the use of my machine, the derrick admits of picking up of batch boxes at one side of the machine, carrying them to the receiver, discharging them, and returning them to the point from which they are taken, or transferring them to the opposite side of the machine as empties, according to the requirements of the particular site of operation, and other factors controlling the efficient utilization of the machine in practice.

Additionally the design of my machine is intended to afford a fully balanced structure having a high degree of stability in operation and embodying specific features of frame construction, and controls, all of a special advantage as will become evident upon reference to the following description, in connection with the accompanying drawings in which:—

Figure 1 is a side elevation of a machine embodying the general construction employed for the purpose of the invention;

Figure 2 is a rear end view of said machine, certain features such as the power and mixing units being omitted for purposes of

clearness, and an industrial railway of the batch box or receptacle car type being shown.

Figure 3 is an enlarged view showing more clearly the crosshead and special detachable connections used between the hoisting cable means and the batch box.

Figure 4 is a side elevation of the batch box showing somewhat more clearly the arrangement of the operating members connecting the hoisting means with the bottom dumping doors of the box, portions of the box broken away and in section.

Referring to the drawings, A denotes the body or support frame of the machine, B the main framework, and C a superstructure consisting of a suitable braced tower-like frame 1 at the left, converging uprights 2 at the right, and a horizontal connecting bar 3 at the top. The body A comprises endless tracks or caterpillars arranged at one end thereof, and the steering wheels 5 located at the other end.

About midway upon the body A is carried a power plant 6, and suitable driving connections are provided between said power plant and the tracks 4, and other special units of which the machine is composed. At a point substantially above the tracks 4 is located the mixing unit D, and this embodies primarily a rotating drum of a well known type in which the aggregates are adapted to be mixed after a known manner, from which they are adapted to be discharged through a chute 7. A hopper or receiver 8 is mounted at one side of the mixing unit D, near the base of the tower-like portion 1 of the superstructure C, and this receiver 8 is adapted to feed the aggregates into the mixing drum by a chute 8^a at the lower end of said receiver.

At the rear end of the machine and approximately above the wheels 5 is located the loading and unloading unit E which embodies a derrick including the mast 9, the boom 10, a brace rod 11', and certain controls by which the whole unit is operated.

The mast 9 of the derrick E is stepped in any substantial manner on the upper part of the main framework B so that the said mast may turn freely in an arc of not less than, but preferably somewhat greater than, 180 degrees. A suitable line or cable 12^a operating on the cable ring 11 at the base of the mast 9 and connected with suitable operating drums 12 will preferably be used for controlling the turning of the mast and swinging of the boom 10 therewith, such movement being reversed as required. A hoisting cable 13 connected with the drum 14 leads over a grooved roller 15 on the mast 9 and a similar roller 16 at the upper end of the boom 10 around a sheave mounted in a suitable block 17 on a cross bar 18, and thence is secured in any substantial way to the top of the boom 10. The crosshead 18 is equipped with suitable devices 19 comprising pins 19^a to engage corresponding devices in the form of loops or plates 19^b upon the batch box or receptacle for connecting the two together. Additional connecting means between the batch receptacle and the derrick mechanism includes chains 20 having hooks 21 connected by operating members or bars 22 to suitable dumping means on the receptacle 23, which dumping means may comprise doors movably mounted in any suitable manner. The chains 20 are connected with a pulley block 24 about the pulley of which a dumping or controlling cable 25 passes, the same being susceptible of suitable operation at the proper time to effect dumping of the batch receptacle 23. In other words, relative movement of the parts 24 and 18 is designed to cause the dumping of the receptacle 23 when the latter has been elevated and moved to a position above the receiver or hopper 8. Any suitable driving connections may be employed between the motor 6 and the several drums by which the lines or cables of the derrick are operated.

The distributing unit by which the mixed concrete is delivered to the place of deposit is designated F and embodies a boom 26 and bucket 27. This unit may comprise operating instrumentalities of a type at present in use, known as the Koehring boom and bucket paving unit, and generally shown in Reissue Patent No. 13,617, granted September 16, 1913, my Letters Patent No. 1,141,470, granted June 1, 1915, or as set forth in my copending application, Serial No. 397,431, filed July 19, 1920. The mixing drum of the mixing unit D is operated by the motor 6, and motion may be transmitted from said drum to the distributing bucket 27, or otherwise effected within the purview of the invention. I do not attempt to illustrate certain of these details because the more mechanical connections are not essential to my invention.

With the foregoing general description of the various mechanisms of my machine in view, it will be noted that by adjusting the derrick substantially as shown in Figure 2, and operating the control lines or cables properly after the grappling means has been engaged with the batch receptacle 23, the said receptacle may be raised and swung into a position over the receiver or hopper 8, thereafter slowly dumped or discharged of the large quantity of aggregates therein so that the latter are slowly fed to the receiver 8, by controlling the operation of the cable 25, and then the emptied receptacle may be returned to the frame of the car which supports the same. If desired, the empty receptacle may be swung to the opposite side of the machine from that on

which it was first hoisted, and delivered to a point of deposit, or transferred to a separate industrial railway equipment. The materials supplied to the receiver 8 are properly fed into the mixing drum of the mixing unit D, are mixed by said unit, and thereafter discharged from the mixer into the bucket 27 of the distributor F. The bucket 27 is adapted to be caused to traverse the boom 26 and to automatically discharge its contents on the site where the concrete is to be laid.

The power plant or motor 6 is designed to be suitably geared to drive the caterpillars or endless tracks 4, by means of variable speed transmission, and in this way the whole machine will be caused to advance as the work of paving progresses.

In respect to the derrick E, the hoisting action may be obtained through the operation of the cable 13 by direct driving of the drum 14, while slacking on the cable will permit the paying out thereof and lowering of a connected receptacle 23, under the control of any suitable brake mechanism of a known type.

It will be apparent that the chains 20 operate in any suitable guiding means at the ends of the cross-head 18, and that the block 24 is adapted for relative movement respecting said cross-head whereby to draw the chains upward or permit them to slack with movement downward, the range of relative movement of the parts 20 and 18 being shown in Figures 1 and 2 by comparison of said figures. It is to be noted that the members or bars 22 are connected to any suitable doors 23^a enabling the receptacle 23 to be opened and closed, which doors are susceptible of movement into the dotted line positions illustrated in Fig. 1, in the dumping action of the machine. The batch receptacle 23 is of course elevated by operation of the cable 13 which is connected to the cross-head 18 and with the upper end of the boom 10, and the cable 25 is wound in at the same time and may assist in the hoisting operation. For this purpose the cross-head 18 has the members 19 and 19^a for detachable engagement with co-acting parts 19^b on the batch receptacle 23. When the batch receptacle has been hoisted to the position of Fig. 1, and the cable 25 is slacked, the block 24 will lower, permitting the door connections or bars 22 to move downwards and opening the doors 23^a, whilst the hoisting cable 13 remains stationary, holding the body of the box 23 stationary as well. After the dumping is performed by the slacking of the chains 20 on paying out the cable 25, the cable 25 is wound in to close dumping doors 23^a on the receptacle 23, and the batch box may then be swung over the car truck on which it is mounted for transportation purposes, and deposited on said truck. Or the doors 23^a may be closed later on in the swinging of the batch box to its seat on the truck of the industrial car, as for instance just previous to depositing the batch box on the car, this being immaterial to the invention.

Having thus described by invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a machine of the class described, in combination, a batch receptacle adapted to be removably carried by a car and comprising dumping doors, and a cable control for hoisting detachable connection with the batch receptacle body and its doors, the hoisting cable control embodying relatively movable devices engageable with the batch receptacle and said doors and operable to cause relative movement of such parts for discharging the receptacle into a hopper, the parts of one of the said movable devices having relative sliding movement over parts of the other devices when the movable devices are assembled in operative relation.

2. In combination, a cable hoisting means including cable parts, a batch box separate from the loading unit but designed to be handled thereby for hoisting and discharging purposes, said box comprising a body and dumping doors, cable connecting members attached to the box, a cross-head having detachable connections adapted to be engaged with said connecting members of the body of the box, a sheave on said cross-head upon which one of the said cable parts operates to hoist the cross-head and box when connected therewith, operating members on the box attached to the dumping doors thereof, connections leading from the other cable part to said operating members, guide means on the cross head for said last named connections, and means to impart simultaneous movement to the cable parts so that the box with its doors may be simultaneously hoisted, said means adapted to move the cable parts relatively to one another whereby the box body and its doors may move relatively so that the doors may open during such movement and discharge the contents of the box.

3. In combination, cable hoisting means, a batch box adapted to form the body of an industrial car comprising a body and dumping doors movably connected thereto, connecting members attached to the body of the box, operating members attached to the doors, a cross bar equipped with connecting parts for detachable connection with the connecting members on said batch box body, the cable means aforesaid including a cable movably connected with said cross bar to hoist the same and to hoist the box when connected therewith, chain elements having detachable connecting members to connect them with the operating members attached

to the doors, said chain elements having a sliding engagement with the cross head and cooperating with the cable means aforesaid, and the cable means being operable to effect relative movement of said cross bar and said chain elements, and thereby relative movement of the box body and its dumping doors for causing a discharge of the batch box under the control of the cable hoisting means.

4. In a machine as described, the combination of a body, moving supporting means for said body rendering it portable, a main frame on the body, a towerlike superstructure at one end of the main frame, a superstructure comprising upwardly converging members at the other end of said frame, a horizontal bar connecting said superstructures, a derrick mast stepped in said bar and upon the main frame, a boom on said mast, batch-receptacle engaging means connected with the derrick devices aforesaid and means to operate the derrick devices, together with a mixing unit disposed below the towerlike superstructure, a distributing unit extending from the main frame adjacent to said tower-like superstructure, a receiver for receiving materials conveyed to it by the derrick and conducting them to the mixing unit, the derrick mast being arranged near the converging members of the superstructure aforesaid, and the boom being adapted to swing from the side of the machine to a position over the said receiver, and power operated means for the derrick and mixing units all substantially as set forth.

In testimony whereof I affix my signature.

ERICH H. LICHTENBERG.