May 31, 1955 E. J. MILLER 2,709,514

CONVEYORS FOR SAND, GRAVEL, AND THE LIKE

Filed June 9, 1954 4 Sheets-Sheet 1

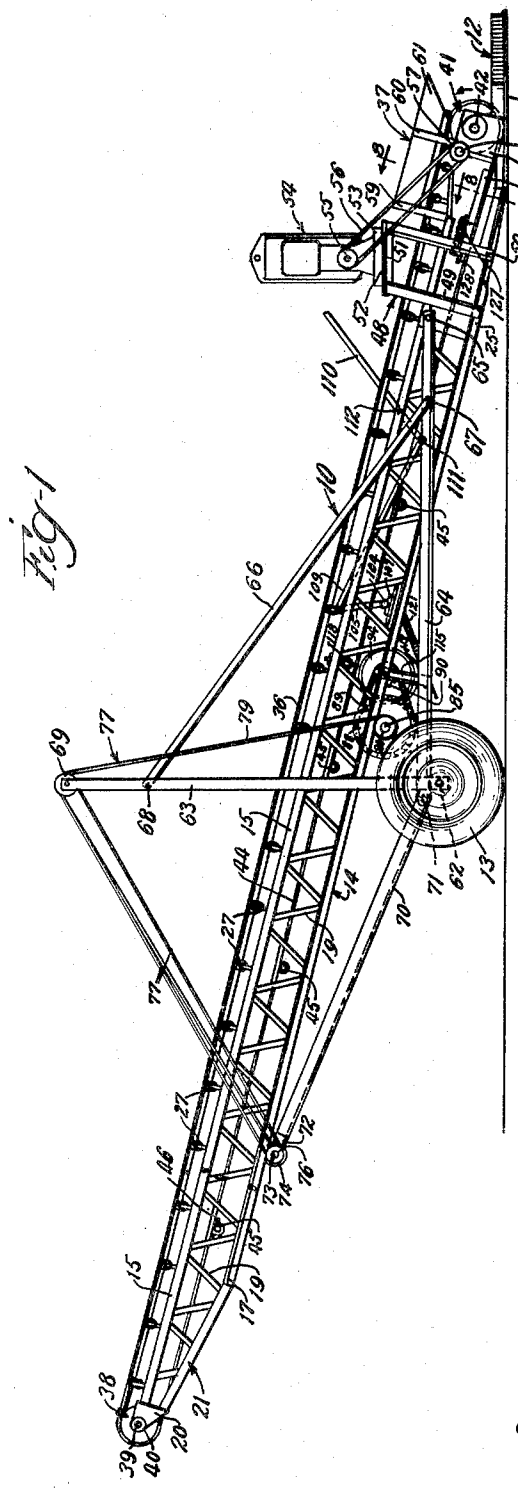


Fig-1

INVENTOR.
Eugene J. Miller
BY
Robert H. Wendt
Atty.

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CONVEYORS FOR SAND, GRAVEL, AND THE LIKE

Filed June 9, 1954 4 Sheets-Sheet 2

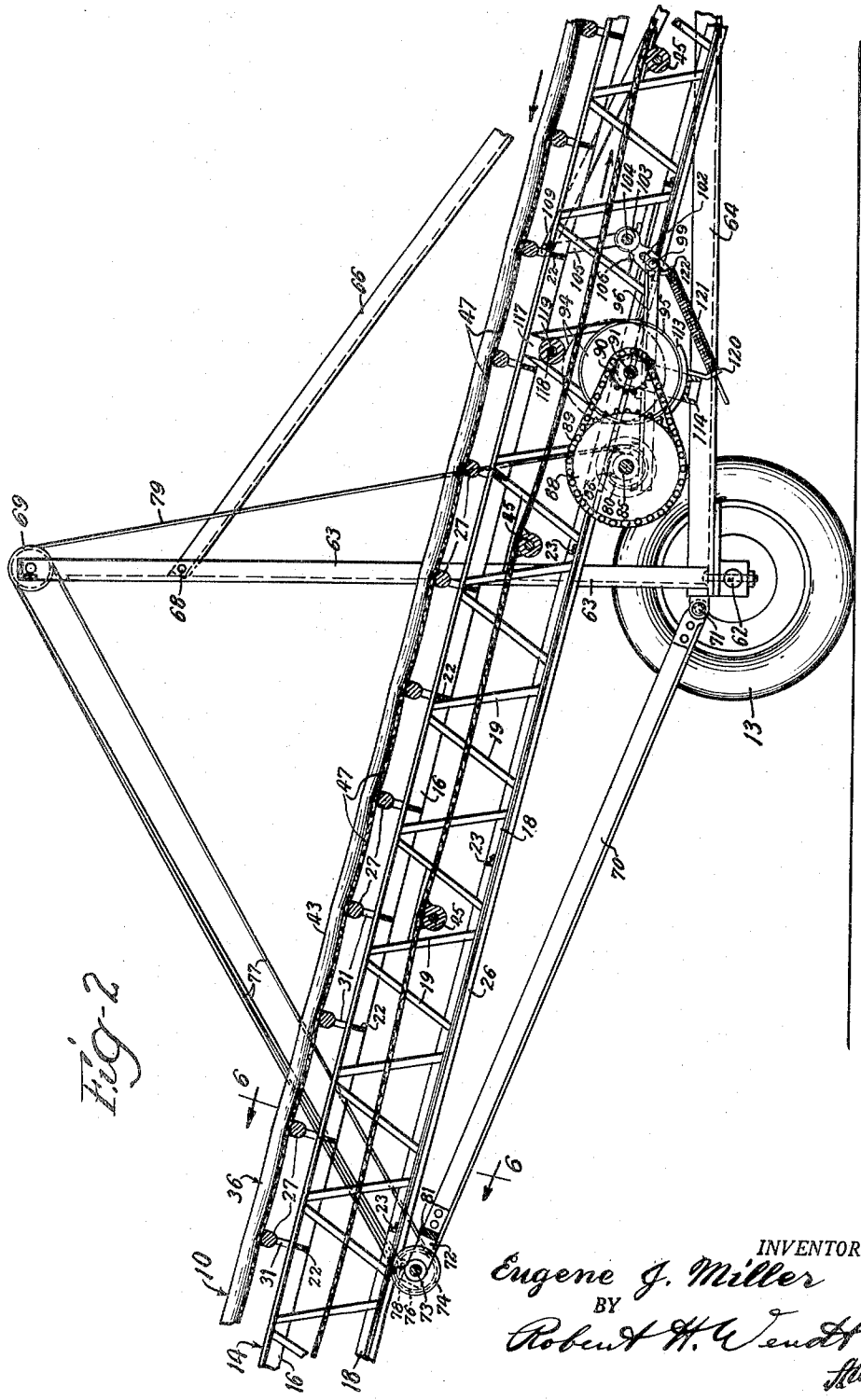


Fig. 2

INVENTOR.
Eugene J. Miller
BY
Robert H. Wendt
Atty.

May 31, 1955 E. J. MILLER 2,709,514

CONVEYORS FOR SAND, GRAVEL, AND THE LIKE

Filed June 9, 1954 4 Sheets-Sheet 3

Fig-3

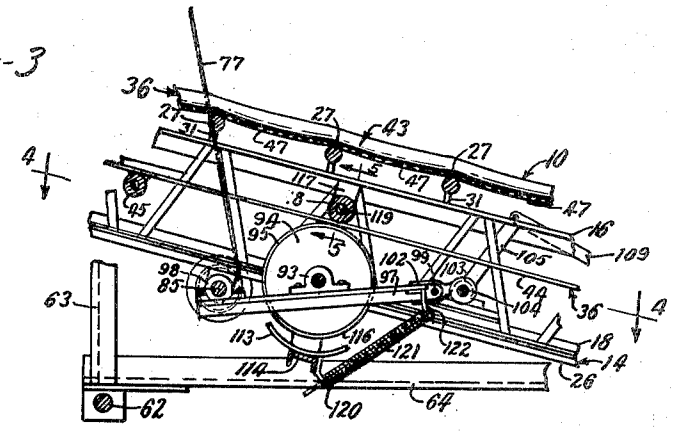


Fig-4

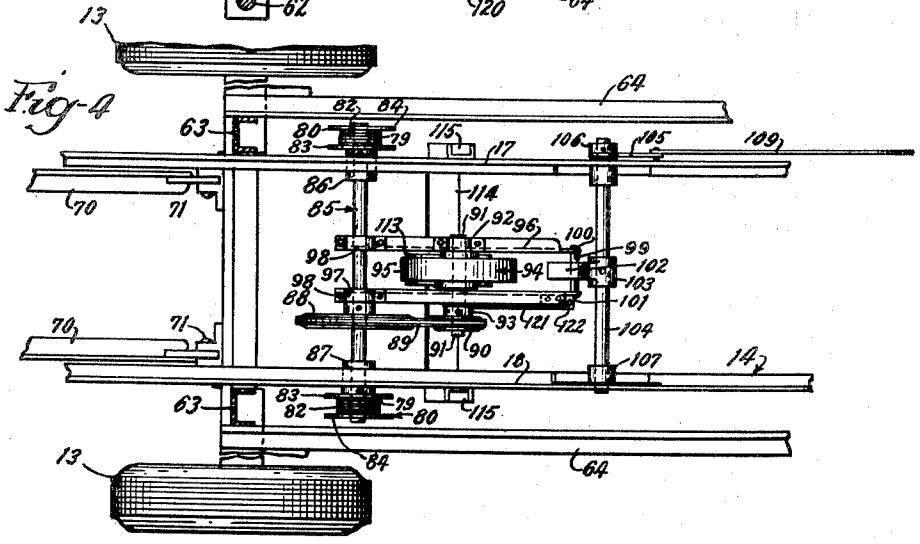


Fig-6

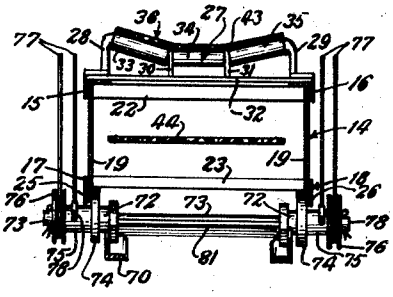
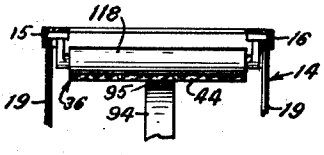


Fig-5



INVENTOR.
Eugene J. Miller
BY
Robert H. Wendt
Atty.

May 31, 1955 E. J. MILLER 2,709,514

CONVEYORS FOR SAND, GRAVEL, AND THE LIKE

Filed June 9, 1954 4 Sheets-Sheet 4

Fig. 7

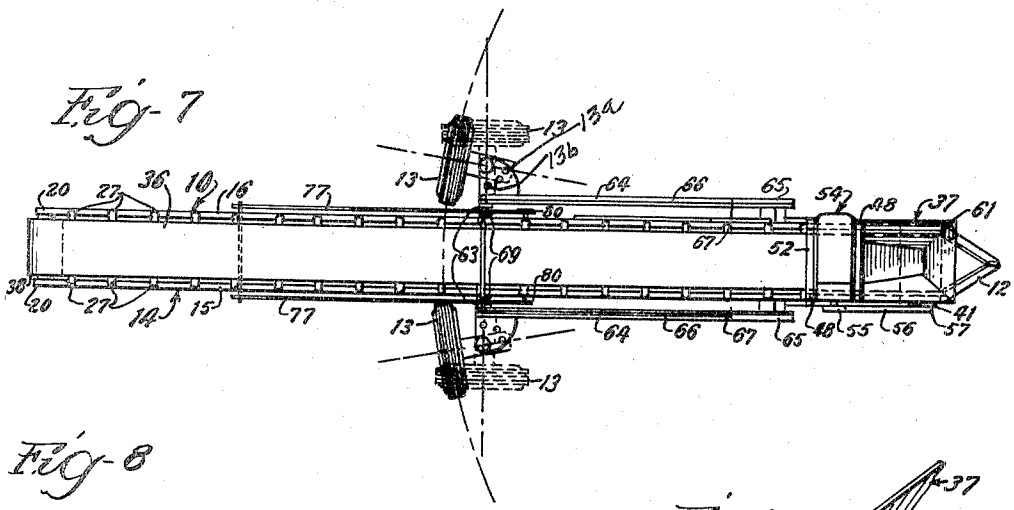


Fig. 8

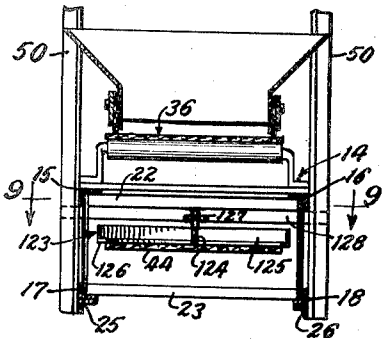


Fig. 10

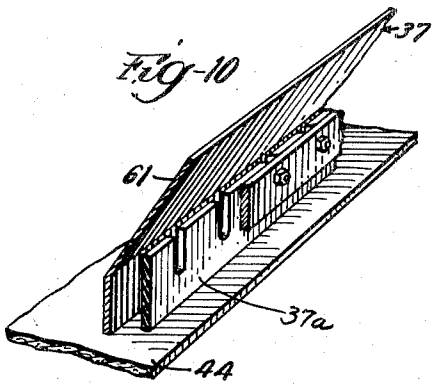
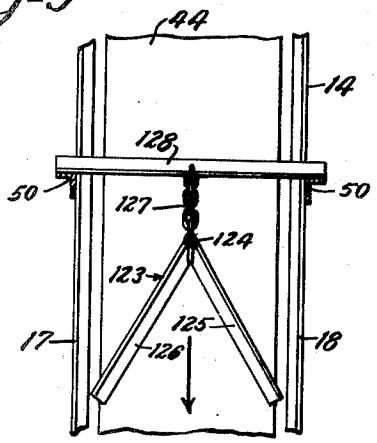


Fig. 9



INVENTOR.
Eugene J. Miller
BY
Robert H. Vendt
Atty.

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CONVEYORS FOR SAND, GRAVEL, AND THE LIKE

Eugene J. Miller, McHenry, Ill.

Application June 9, 1954, Serial No. 435,537

10 Claims. (Cl. 198—121)

The present invention relates to conveyors for sand, gravel and the like, and is particularly concerned with conveyors of the type utilizing an endless belt for conveying sand, gravel, cement mix or other commodities.

In the conveyors of the prior art with which I am familiar the conveyor frame is usually supported at one end on the ground, and is held in an elevated position at the other end by means of upwardly extending columns and block and tackle arrangements which are actuated by means of a hand winch.

In the moving of sand and gravel, as the material conveyed drops off the upper end of the conveyor it becomes necessary to actuate this winch by hand to lift the conveyor to a higher angle, and the weight of all of the parts is such that this becomes a very arduous and difficult task.

The difficulties are augmented by the fact that the conveyors of the prior art with which I am familiar are driven by motors or internal combustion engines which are located near the upper end of the conveyor which places a considerable amount of weight, to be lifted by the winch, at the end of the conveyor in a disadvantageous position; and this has resulted in the use of small engines or motors for the purpose of reducing the weight, which, in turn, has caused these engines and motors to be overloaded so that they may last only a single season.

One of the objects of the invention is the provision of an improved conveyor of the self-raising type in which the prime mover which drives the belt is also used for lifting the boom at the will of the operator or for the lowering of the boom by merely pulling upon a lever which is provided for controlling these motions.

Another object of the invention is the provision of an improved conveyor in which the conveyor belt forms a part of the system for lifting the boom, and in which the conveyor belt is driven by means of an internal combustion engine which is mounted near the lower end of the conveyor frame, where it is adapted to counterbalance the weight of the longer and upwardly projecting and overhanging end of the conveyor, and where the belt is driven by means of tension exerted in the lower stretch of the belt, pulling downward and thus driving the upper part of the belt upward.

Another object of the invention is the provision of an improved conveyor of the class described in which the conveyor, when in substantially horizontal position, is substantially balanced so that a single man may lift the lower end of the conveyor and attach it to the trailer hitch of a truck or the like for transporting the trailer from one place to another.

Another object of the invention is the provision of an improved actuating mechanism for raising and lowering the conveyor frame, and which has the advantage that the leverage of the mechanism on the frame increases as the boom gets higher.

Another object of the invention is the provision of an improved conveyor structure of the type having a

hopper at the bottom in which the hopper is so constructed that it lets the load spread on the belt as it progresses upwardly without the load forcing the flashing, which is located between the hopper and the belt.

Another object of the invention is the provision of an improved conveyor in which the wheels may be set back farther toward the base of the boom, thus keeping the wheels out of the pile and permitting the higher stock pile because the motor is used to counterbalance the boom.

Another object of the invention is the provision of an improved conveyor in which the belt is roller supported, and in which the conveyor may be used to run up higher piles of material because the belt is permitted a certain amount of slack between the rollers, tending to retain the material in place on the belt and to cause it to climb over the rollers like steps.

Another object of the invention is the elimination of the upper gear boxes of the prior art conveyors which tend to twist the boom and to cause the belt to run to one side of the conveyor.

Another object of the invention is the provision of an improved assembly including an oversized internal combustion engine which may last for a number of years, since it is never overloaded, and in which the engine is used for lifting the boom or for lowering it.

Another object of the invention is the elimination of long line shafts used in the devices of the prior art, and the provision of an improved automatic mechanism for lifting, lowering and automatically holding the boom at any desired elevation, and the provision of an improved wiper member engaging the lower loop of the belt for removing rocks and sand from the belt just before it engages the lower driving drum.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are four sheets, accompanying the specification,

Fig. 1 is a side elevational view of an improved conveyor embodying my invention;

Fig. 2 is a fragmentary, longitudinal vertical section on a larger scale showing the details of construction of the mechanism for lifting and lowering of the boom;

Fig. 3 is a fragmentary, sectional view illustrating operation of the boom raising mechanism in position to lift the boom;

Fig. 4 is a fragmentary sectional view taken on the plane of the line 4—4 of Fig. 3, looking in the direction of the arrows;

Fig. 5 is a fragmentary sectional view taken on the plane of the line 5—5 of Fig. 3, looking in the direction of the arrows;

Fig. 6 is a fragmentary sectional view taken on the plane of the line 6—6 of Fig. 2, looking in the direction of the arrows;

Fig. 7 is a top plan view of the conveyor;

Fig. 8 is a sectional view taken on the plane of the line 8—8 of Fig. 1, looking in the direction of the arrows;

Fig. 9 is a fragmentary top plan view of the belt and wiper;

Fig. 10 is a fragmentary view in perspective and sections showing the hopper construction;

Referring to Fig. 1, 10 indicates in its entirety an improved conveyor embodying the invention.

The conveyor is preferably supported on the ground at its lower right end by means of the stable lower surface 11 of a hitch member 12, which is adapted to be secured to a draw bar on a truck or the like in transporting the conveyor from one place to another.

The unit is supported on a pair of rubber tired wheels 13, located substantially midway between the ends of the boom 14. The boom 14 preferably comprises an elongated truss frame having a pair of upper angle-iron frame members 15, 16, Fig. 6, and a pair of lower angle-iron frame members 17 and 18 joined together at intermediate points by a multiplicity of diagonally extending struts 19, after the manner of a truss or a built up beam.

At its upper end the frame members 15, 17, are provided with a bearing plate 20, joining the upper and lower parts of the frame, and the lower frame member 17 or 18 has an extension 21 in each case which extends diagonally toward the bearing plate 20, causing the frame of the boom to taper toward the upper end.

The upper frame members 15 and 16, and the lower frame members 17 and 18 are joined, as shown in Fig. 6, by a multiplicity of transversely extending angle-irons 22, 23, and all of these parts mentioned may be welded or riveted together, forming a boom which is substantially rectangular in plan.

Wheels 13 pivot from the position shown in full lines in Fig. 1, where they are used to make an elongated arcuate pile, to the dotted line position of Fig. 1, where they are used in transporting the conveyor. Wheel brackets 132 are secured in adjusted position by pins in apertures 13*b*.

At its lower end the side frames which comprise frame members 15, 17 and struts 19 are joined by the bearing plates 24, one on each side, to which the hitch fitting 12 is attached.

The hitch fitting 12 comprises a substantially U-shaped or V-shaped angle-iron member with a rounded apex having its ends welded, riveted or otherwise secured to the sides of the boom at the bottom and to the side plates 24.

The lower frame members 17 and 18 may be of T-shape or they may be strengthened by being provided with a second pair of angle-irons 25, 26, Fig. 6, riveted or welded to the angle irons 17 and 18, with one flange depending in each case to provide a track for certain lifting rollers further to be described.

At regularly spaced points throughout the full length of the upper frame members 15 and 16, these frame members support roller assemblies 27, comprising in each case a pair of end bearing brackets 28, 29, and a pair of intermediate bearing brackets 30, 31.

The brackets 28–31 are provided with suitable attaching flanges and are secured to a transverse frame member 32, which may be located above the transverse frame members 22.

Rollers 33, 34 and 35 are supported between the brackets 28, 30, and between 30, 31 and brackets 31, 29.

The brackets 30 and 31 are shorter than the brackets 28 and 29, and the roller 34 is located in horizontal position under the central part of the belt 36. The rollers 33 and 35 slope upward and outward and support the outer portions of the belt 36 in such manner as to form the belt into a continuous trough.

Rollers 33, 34 and 35 may be provided with bearing bores mounted on trunnion rods extending from bracket to bracket, as shown, and the trunnion rods may support antifriction ball bearings, the outer race of each of which is mounted in one end of a roller.

The roller assemblies 27 are preferably spaced by equal amounts and extend substantially the full length of the boom, being provided with a little closer spacing at the lower end under the hopper 37, and the last roller is spaced from each end of the boom.

At its upper end the boom carries an enlarged roller or drum 38, comprising a substantially cylindrical member provided with a slight crown at its center for causing the belt to be centered on this drum, and the drum 38 is rotatably mounted by means of trunnions 39 in bearings 40, carried by the bearing plates 20.

In every case where bearings are used on rollers or drums my invention includes the use of any suitable form

of ball or roller bearings or oilless bearings of the self-lubricating type.

At the lower end of the boom the bearing plates 24 carry suitable bearings for rotatably supporting the lower drum 41, which comprises a substantially cylindrical member provided with a crown at the center to center the belt.

The drum 41 is mounted in bearings carried by bearing plates 24 and rotates on shaft 42. The diameter of the drum 41 is such that it is spaced from the lower supporting surface 11.

The belt 36 comprises one continuous or endless belt member made of suitable leather, rubber or fabric having sufficient flexibility to curve about the drums and to be shaped into a trough by the upper rollers, and sufficient tensile strength to maintain its length without undue stretching.

The belt 36 may be considered with respect to its upper portion 43, resting on the rollers 33—35 and its lower portion 44, which may be supported by a few intermediate rollers 45, located below the lower stretch of the belt and carried by longitudinally extending frame members 46, having bearings for the trunnions of rollers 45.

The belt is preferably provided with sufficient slack so that it may dip downward between successive roller assemblies 36, as shown in Fig. 3, for the purpose of supporting a larger amount of material as a load, as I have found that such slack enables the conveyor to lift a larger volume of material, the successive roller assemblies acting as steps over which the load passes into the dipped portions 47 of the upper stretch 43.

At its lower end the boom 14 is preferably provided on each side with an upwardly extending frame 48, comprising a pair of angle-irons 49 and 50, welded to the side frame members 15, 17, or 16, 18, and joined at the top by a transverse angle iron 51.

These side frames 48 are joined at the top by means of a metal plate 52 or suitable transverse frame members located close enough together to engage the bottom of the base 53 of the prime mover unit 54.

Any type of prime mover may be employed including electric motors, but I prefer to employ an internal combustion engine which may be oversize for the expected load, since the engine is located on the lower end of the boom and is counterbalanced by the free overhanging end of the boom.

The engine is provided with a multiple sheave driving pulley 55, for engaging a plurality of V-belts 56 for driving a pinion 57 of the same type carried by shaft 58. Shaft 58 is the driven shaft of a fifteen to one gear reduction unit which drives the shaft 42 of the lower drum 41, the drum being fixedly secured to shaft 42.

Various forms of driving connections may be employed for producing the same result, and the belt 36 is driven by tension applied to its lower stretch 44, pulling the belt over the upper drum 38, and causing the belt to move upward at its upper stretch 43 over the roller assemblies 27.

The side frame members 15, 17 and 16, 18 provide support on each side for upwardly extending frame members 59 and 60 of angle iron, carrying the hopper 37.

Hopper 37 is substantially rectangular in shape and comprises a box open at the top and open at the bottom, the top opening being larger than the bottom by virtue of the elongated diagonal side 61, which extends backward over the lower drum 41.

The bottom of the hopper 37 slidably engages the top of the belt by means of rubber flashing, and the hopper 37 preferably becomes a few inches wider toward its upper end to permit the load to spread, placing less strain on the flashing.

The wheels 13 are rotatably supported on shafts 62, which are pivotally mounted on the lower end of a pair of vertical columns 63.

By virtue of the pivotal mounting of the shafts 62

the wheels may extend from front to back when the conveyor is being transported from place to place with a truck or the wheels may be turned to another position extending transversely to the boom, so that the conveyor is adapted to rotate on an axis located at the lower end surface 11, to pile the material which is being conveyed in an arcuate mound.

Column 63 may comprise channeled members fixedly secured to lower angle-iron frame members 64, which extend backwardly, and are secured to the boom frame at 65 by riveting or by means of bolts.

The columns 63 are held in substantially vertical position by the diagonal braces 66 on each side, fixedly secured at 67 to the lower frame member 64, and at 68 to each column.

At their upper ends the columns 63 are joined by suitable transverse frame members and they are provided with bearings for rotatably supporting the sheaves 69 of a block and tackle arrangement, there being a block and tackle on each side of the boom.

In order to lift or lower the boom or hold it in place, the columns 63 and lower frame members 64 carry a pair of forwardly extending angle-iron members 70, each of which is pivotally mounted at 71 on the triangular frame, which comprises members 63, 64 and 66.

At their ends the diagonal lifting levers 70 each carry a bearing block 72, provided with a shaft 73, rotatably supporting a roller 74, fixed spacing sleeve 75 and a rotatable sheave 76.

A cable 77 on each side has one end portion attached at 78 to the fixed spacer member 75 from which the cable extends upward about one of the sheaves 69, and backward about the sheave 76, and thereafter upward again over another sheave 69 and downward at 79, to be wrapped around a winch drum 80, Fig. 4.

Thus both sides of the conveyor are provided with a block and tackle and winch arrangement for raising, lowering or holding the lifting levers 70, which are joined by suitable transverse frame members 81 to provide a rigid rectangular frame.

The rollers 74 engage the horizontal flanges of the angle-irons 25 and 26 under the boom; and the depending flanges of these angle-irons serve as guides to prevent the boom tracks 25 and 26 from getting off the rollers 74.

The winches 80 are in the nature of a pair of drums 82, about which the cable 77 is wrapped and guided between discs 83, 84 on each side of the drums.

Winches 80 are fixedly mounted on shaft 85, which is rotatably mounted in bearings 86 and 87, carried by the lower side frame members 17 and 18 of the boom.

The shaft 85 carries a relatively large sprocket wheel 88, fixedly pinned to the shaft and driven by a chain 89, meshing with the teeth of the sprocket wheel 88. Chain 89 is driven by a smaller sprocket pinion 90, carried by shaft 91, which is rotatably mounted in bearings 92, 93.

Shaft 91 also carries a brake wheel 94, fixedly secured to the shaft and rotating with it, and the brake wheel 94 has a peripheral brake lining on its outer cylindrical surface 95, being widened to provide a larger friction area of contact with the lower stretch 44 of the belt.

The bearings 92, 93 for shaft 91 may be carried by longitudinally extending angle-iron frame members 96 and 97, which in turn are supported by clamping assemblies 98, at the left end of the angle irons 97 and 96 in Fig. 4, which are clamped about the shaft 85, acts as bearings but support the angle-irons 96, 97 at that end.

At the other end the angle-irons 96, 97 are joined by a fixed rod 99, which has its end riveted at 100 and 101 to the frame members 96, 97.

The rod 99 is supported between the forked end 102 of an actuating lever 103, which in turn is supported on shaft 104. Shaft 104 carries a crank arm 105 at one end and the shaft is rotatably supported in bearings 106, 107, in the lower portion of the side frames 16, 15, 17 and 18.

The shaft 104 may be rotated in its bearings by means of a crank 105, which is pivotally secured by a connecting rod 109 to the lower end of a hand lever 110 at 111. Hand lever 110 is pivotally mounted at 112, on one of the side frames, which may be the right-hand side frame member 16.

The brake wheel 94 has a curved brake shoe 113 of complementary shape fixedly mounted on a transverse channeled frame member 114, the ends of which are carried by vertical frame members 115 on each side, and secured to the side frame members 17 and 18 of the boom.

The brake shoe is located to engage the brake wheel or brake drum 94 when the frame 96, 97 is pivoted downward on shaft 85.

The upper frame members 15 and 16 carry a pair of depending bearing brackets 117, Fig. 3, for rotatably supporting an elongated cylindrical roller 118 upon a shaft 119.

Roller 118 is in the nature of an idler located above the lower stretch 44 of the belt 36, and adapted to give the belt support just above the brake wheel 94, when the brake wheel 94 engages the belt to be rotated by the belt.

The brake shoe frame member 114 may support a depending fixed lug 120 for securing one end of a tension spring 121, the other end being secured to an angle bracket 122, carried by the frame member 97.

The frame comprising members 96 and 97, and brake wheel 94, tends to drop by gravity until the brake drum 94 is against the brake shoe 113, but the force of gravity is preferably augmented by the pull of spring 121, which assures fixed engagement of the brake wheel with the shoe for holding the brake wheel 94 and the winches 80 in fixed position to hold the boom in any desired position.

The lower stretch 44 of the belt is preferably provided near the lower roller 41 with a V-shaped wiper 123, having its apex 124 pointing upward, and its two sides 125 and 126 extending diagonally outward in the direction of movement of the belt. The wiper may be carried by a chain 127, attached to its apex and to a transverse frame member 128.

Any gravel, sand or other foreign material which may fall on the lower stretch 44 of the belt is thus adapted to be deflected off the belt just before the belt reaches the lower roller 41.

The operation of my conveyor is as follows:

The boom with all of its equipment is in substantial balance or near balance with just sufficient weight on the forward end, so that one man can lift the hitch fitting 12, when the boom is horizontal, to attach the conveyor to the draw bar of a truck.

The prime mover 54 drives the lower roller 41 through the belt 56 and reduction gears in a counterclockwise direction in Fig. 1, producing a tension in the lower stretch 44 of the belt, causing the upper portion of the belt to ride upward on the roller assemblies 27.

The material to be conveyed is deposited in the hopper 37, which permits it to spread as the belt conveys the material forward in the hopper toward the left, while the hopper flashing engages the belt and is subjected to less strain by the fact that the load is permitted to spread.

The belt in the form of a moving trough, preferably having a sag between each roller assembly, carries the material up and over the top roller 38, where it is deposited, forming a pile; and the piles of material may be made in arcuate form by causing the conveyor to move laterally on its wheels 13, about the hitch end 12 as a center.

As the pile reaches a height which is near to the upper end of the boom the boom is preferably lifted. It is not

lifted before it is necessary because it takes more power to lift the material to a higher level than necessary.

When the boom is to be lifted the operator moves the hand lever 110 in a counterclockwise direction in Fig. 1. This causes the connecting rod 109 to pull on the crank 105, rotating shaft 104 clockwise in Fig. 3, and rotating the forked member 102 upward in Fig. 3.

In this figure the forked lever is shown in its uppermost position, bringing the brake wheel 94, which is also a drive wheel, into engagement with the lower stretch 44 of belt 36 against the reaction of roller 113.

The belt 36, moving downward at this point, drives the wheel 94 clockwise, which rotates sprocket pinion 90 clockwise and sprocket 88 and winches 80 clockwise.

Thus a pull on the lever 110 to the left in Fig. 1 causes the belt to drive the winches 80, wrapping the cable 77 on the two winches and lifting the lifting levers 70, by acting on their ends at the sheave 76.

The rollers 74 then roll to the right in Fig. 1 upon the tracks 25 and 26, lifting the boom. The boom may be lifted until the sheave 76 reaches a position adjacent sheaves 69, and as this lifting goes on the leverage of the block and tackle on the boom is decreasing as the boom rises to a higher position, because the rollers 74 will engage the boom closer and closer to its lower pivotal point 11.

By moving the handle back in a clockwise direction in Fig. 1 the forked lever 102 may be caused to move the frame 96, 97, downward in Fig. 3, into engagement with the brake shoe, and this is assisted by the spring 121.

The wheel 94 thus moves from driving position against the belt 36 into holding position against the shoe 113, where it is held by gravity and by the spring.

When the boom is to be lowered the lever 110 is manipulated in an intermediate position, engaging the shoe 113 loosely so that the weight of the boom tends to pull downward on the block and tackle and to rotate the winches, sprockets and brake wheel 94 under the control of the friction of the brake shoe.

The present conveyor is thus adapted to have its boom raised or lowered at will; and the boom being supported at both sides by a winch on each side, there is no tendency for the boom to twist, which would cause a lateral displacement of the belt.

The arduous labor previously involved in raising the boom by hand with a winch is eliminated and much time is saved on the part of the operator, as the conveyor may be conveying material at the same time that it is lifting or lowering the boom.

Higher stock piles may be made and the wheels may be kept out of the pile, which is desirable, as the base of the pile widens when the pile becomes higher.

The engine is so located that it counterbalances the boom and is in a position to be accessible to the operator for repairs or operation.

The present conveyor may be operated at all times by one man and may be transported from place to place by one man, who can connect it to the truck or unhitch it for this purpose.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a conveyor for sand, gravel, and the like, a mechanism for elevating and lowering the boom, comprising a conveyor boom having a driven endless belt, said boom being provided with a stable lower support for one end of the boom, a frame having an upwardly extending column intermediate the ends of said boom, a hoist acting from an upper part of said column for lifting said boom, and means for driving the hoist from said driven belt, comprising a drive wheel for drivably engaging the belt, and operative driving connections between said wheel and a winch forming a part of said hoist, said drive wheel being rotatably mounted on a movable frame, and manual means for controlling the movement of said frame to move the drive wheel into and out of engagement with said belt, said boom supporting a brake shoe in fixed position on the side of said wheel opposite to said belt, the wheel engaging said brake shoe when moved out of engagement with the belt, and holding the drive wheel, hoist, and boom at fixed elevation.

2. In a conveyor for sand, gravel, and the like, a mechanism for elevating and lowering the boom, comprising a conveyor boom having a driven endless belt, said boom being provided with a stable lower support for one end of the boom, a frame having an upwardly extending column intermediate the ends of said boom, a hoist acting from an upper part of said column for lifting said boom, and means for driving the hoist from said driven belt, comprising a drive wheel for drivably engaging the belt, and operative driving connections between said wheel and a winch forming a part of said hoist, said drive wheel being rotatably mounted on a movable frame, and manual means for controlling the movement of said frame to move the drive wheel into and out of engagement with said belt, said boom supporting a brake shoe in fixed position on the side of said wheel opposite to said belt, the wheel engaging said brake shoe when moved out of engagement with the belt, and holding the drive wheel, hoist, and boom at fixed elevation, the weight of said boom and driving connections being such that the boom is adapted to drive said wheel through said hoist when the drive wheel is litfed by said manual means from said brake shoe for controllably lowering the boom.

3. A balanced construction for a conveyor, comprising an elongated boom having a belt roller at each end, an endless belt carried by said rollers, a stable supporting base for the lower end of said boom, a supporting framework for the portion of said boom intermediate its ends, and a prime mover carried by the boom framework adjacent its lower end, and driving the lower roller to draw the belt downward on the lower side of the boom and cause it to move upward on the upper side of the boom, said intermediate supporting means including a pair of wheels, and the boom assembly being substantially balanced on said wheels when the boom is in its lowermost position so that its lower end may be readily lifted and attached to the draw bar of a vehicle for transportation from place to place, said intermediate framework including a pair of upwardly extending triangular frames, one one each side of the boom, and the frames being pivotally attached to the boom adjacent the lower end of the boom, and including upwardly extending columns on both sides of the boom, and joined together at their tops and bottoms, a pair of block and tackle assemblies, including one for each side, acting from the top of said column to elevate said boom, and including a cable adapted to be wrapped about a winch in each case, and means for driving said winches from said belt, comprising a driving wheel rotatably mounted on a frame pivotally carried by said boom and supporting said winches, driving connections between said latter wheel and said winches, and manual means for moving said frame to cause said wheel to engage the belt to drive the winches and lift the boom, said boom supporting a brake shoe on the side of said wheel opposite to said belt, said pivoted frame moving said wheel into engagement with said brake shoe when the wheel moves out of engagement with said belt to hold the wheel in fixed position with the boom at predetermined elevation.

4. In a conveyor for sand, gravel, and the like, a mechanism for elevating and lowering the boom, comprising a conveyor boom having a driven endless belt,

said boom being provided with a stable lower support for one end of the boom, a frame having an upwardly extending column intermediate the ends of said boom, a hoist acting from an upper part of said column for lifting said boom, and means for driving the hoist from said driven belt, comprising a drive wheel for drivably engaging the belt, and operative driving connections between said wheel and a winch forming a part of said hoist, said drive wheel being rotatably mounted on a movable frame, and manual means for controlling the movement of said frame to move the drive wheel into and out of engagement with said belt, said boom supporting a brake shoe in fixed position on the side of said wheel opposite to said belt, the wheel engaging said brake shoe when moved out of engagement with the belt, and holding the drive wheel, hoist, and boom at fixed elevation, said hoist including a pair of cable drums mounted upon a shaft, the drums being located adjacent the lateral edges of said boom, driving connections between said drive wheel and said shaft, a cable wound on each of said drums and extending upwardly over pulleys carried by said frame, each of said cables acting on a part of said boom located outwardly of said frame.

5. In a conveyor for sand, gravel, and the like, a mechanism for elevating and lowering the boom, comprising a conveyor boom having a driven endless belt, said boom being provided with a stable lower support for one end of the boom, a frame having an upwardly extending column intermediate the ends of said boom, a hoist acting from an upper part of said column for lifting said boom, and means for driving the hoist from said driven belt, comprising a drive wheel for drivably engaging the belt, and operative driving connections between said wheel and a winch forming a part of said hoist, said drive wheel being rotatably mounted on a movable frame, and manual means for controlling the movement of said frame to move the drive wheel into and out of engagement with said belt, said boom supporting a brake shoe in fixed position on the side of said wheel opposite to said belt, the wheel engaging said brake shoe when moved out of engagement with the belt, and holding the drive wheel, hoist, and boom at fixed elevation, said hoist including a pair of cable drums mounted upon a shaft, the drums being located adjacent the lateral edges of said boom, driving connections between said drive wheel and said shaft, a cable wound on each of said drums and extending upwardly over pulleys carried by said frame, each of said cables acting on a part of said boom located outwardly of said frame, a second frame pivotally mounted below said boom on said first frame and extending forwardly under said boom, said second frame being provided with a pair of flanged rollers rolling under said boom and supporting the boom, each of said cables acting on the ends of said second frame.

6. In a conveyor for sand, gravel, and the like, a mechanism for conveying and discharging materials at predetermined elevations, comprising a conveyor boom provided at one end with a U-shaped frame member extending horizontally and adapted to act as a hitch or a support, said boom comprising an elongated truss like frame provided with a belt drum at each of its end, rollers carried by the upper side of said boom frame, an endless belt extending over said belt drums and resting on said rollers, said rollers comprising a central roller holding a flat portion of the belt and two lateral rollers in each instance, forming the side of the belt into a trough, a substantially horizontally extending pair of frame members carried by said boom frame and having a pair of upwardly extending columns and braces, forming a triangular frame on each side, wheels mounted for rotation on a horizontal axis on said triangular frame at the forward corners thereof and mounted to pivot on a vertical axis into a position transverse to said boom, a prime mover for driving the lower of the two belt rollers in such manner as to tension the lower side of the belt and to pull the upper side of the belt upward over the higher end of the boom and drive means engaged by the lower side of said belt for driving a winch having a cable extending over the upper end of said column, said cable acting on said boom to lift the boom when the drive means is brought into engagement with the lower side of the belt.

7. In a conveyor for sand, gravel, and the like, a mechanism for conveying and discharging materials at predetermined elevations, comprising a conveyor boom provided at one end with a U-shaped frame member extending horizontally and adapted to act as a hitch or a support, said boom comprising an elongated truss like frame provided with a belt drum at each of its ends, rollers carried by the upper side of said boom frame, an endless belt extending over said belt drums and resting on said rollers, said rollers comprising a central roller holding a flat portion of the belt and two lateral rollers in each instance, forming the side of the belt into a trough, a substantially horizontally extending pair of frame members carried by said boom frame and having a pair of upwardly extending columns and braces, forming a triangular frame on each side, wheels mounted for rotation on a horizontal axis on said triangular frame at the forward corners thereof and mounted to pivot on a vertical axis into a position transverse to said boom, a prime mover for driving the lower of the two belt rollers in such manner as to tension the lower side of the belt and to pull the upper side of the belt upward over the higher end of the boom and drive means engaged by the lower side of said belt for driving a winch having a cable extending over the upper end of said column, said cable acting on said boom to lift the boom when the drive means is brought into engagement with the lower side of the belt, said drive means comprising a driven wheel having its periphery arranged to engage either the belt or a brake shoe located oppositely to the belt, the brake shoe holding the wheel against rotation and holding the boom at a predetermined elevation.

8. In a conveyor for sand, gravel, and the like, a mechanism for conveying and discharging materials at predetermined elevations, comprising a conveyor boom provided at one end with a U-shaped frame member extending horizontally and adapted to act as a hitch or a support, said boom comprising an elongated truss like frame provided with a belt drum at each of its ends, rollers carried by the upper side of said boom frame, an endless belt extending over said belt drums and resting on said rollers, said rollers comprising a central roller holding a flat portion of the belt and two lateral rollers in each instance, forming the side of the belt into a trough, a substantially horizontally extending pair of frame members carried by said boom frame and having a pair of upwardly extending columns and braces, forming a triangular frame on each side, wheels mounted for rotation on a horizontal axis on said triangular frame at the forward corners thereof and mounted to pivot on a vertical axis into a position transverse to said boom, a prime mover for driving the lower of the two belt rollers in such manner as to tension the lower side of the belt and to pull the upper side of the belt upward over the higher end of the boom and drive means engaged by the lower side of said belt for driving a winch having a cable extending over the upper end of said column, said cable acting on said boom to lift the boom when the drive means is brought into engagement with the lower side of the belt, said drive means comprising a driven wheel having its periphery arranged to engage either the belt or a brake shoe located oppositely to the belt, the brake shoe holding the wheel against rotation and holding the boom at a predetermined elevation, said driven wheel being rotatably mounted on a pivoted lever for moving the driven wheel toward or from the belt.

9. In a conveyor for sand, gravel, and the like, a mechanism for conveying and discharging materials at pre-

determined elevations, comprising a conveyor boom provided at one end with a U-shaped frame member extending horizontally and adapted to act as a hitch or a support, said boom comprising an elongated truss like frame provided with a belt drum at each of its ends, rollers carried by the upper side of said boom frame, an endless belt extending over said belt drums and resting on said rollers, said rollers comprising a central roller holding a flat portion of the belt and two lateral rollers in each instance, forming the side of the belt into a trough, a substantially horizontally extending pair of frame members carried by said boom frame and having a pair of upwardly extending columns and braces, forming a triangular frame on each side, wheels mounted for rotation on a horizontal axis on said triangular frame at the forward corners thereof and mounted to pivot on a vertical axis into a position transverse to said boom, a prime mover for driving the lower of the two belt rollers in such manner as to tension the lower side of the belt and to pull the upper side of the belt upward over the higher end of the boom and drive means engaged by the lower side of said belt for driving a winch having a cable extending over the upper end of said column, said cable acting on said boom to lift the boom when the drive means is brought into engagement with the lower side of the belt, said drive means comprising a driven wheel having its periphery arranged to engage either the belt or a brake shoe located oppositely to the belt, the brake shoe holding the wheel against rotation and holding the boom at a predetermined elevation, said driven wheel being rotatably mounted on a pivoted lever for moving the driven wheel toward or from the belt, and said boom being provided

with a roller on the inside of said belt for engaging the belt and resisting the action of the driven wheel on the belt.

10. A driving and holding mechanism for a conveyor belt, comprising a supporting boom provided with a belt drum at each end and having an endless belt extending about said drums, said boom being provided with a transverse shaft and a pair of levers pivotally mounted on said shaft and supporting a driven wheel located to be driven by engagement with the lower side of the belt, said driven wheel being mounted on a shaft and said shaft having a driving connection extending to a winch drum shaft, a pair of winch drums on said lateral shaft, each having a cable adapted to lift or lower said boom at one end, a brake shoe mounted opposite said driven wheel to be engaged when the wheel is moved away from the belt, said pivoted levers being provided with a manual lever for moving them into and out of engagement with the belt or the brake shoe to actuate the winch drums to pull up the cables and elevate the boom, or to hold the boom in any predetermined position by means of the brake shoe.

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