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H. S. HOY.

ELEVATING CONVEYER FOR GRADING AND DITCHING MACHINES.

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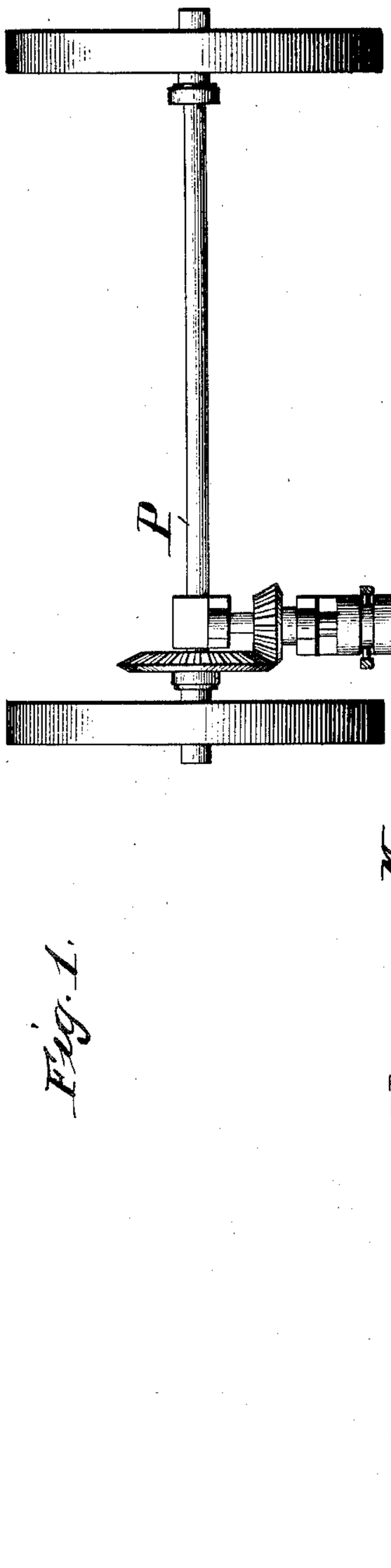

Fig. 1.

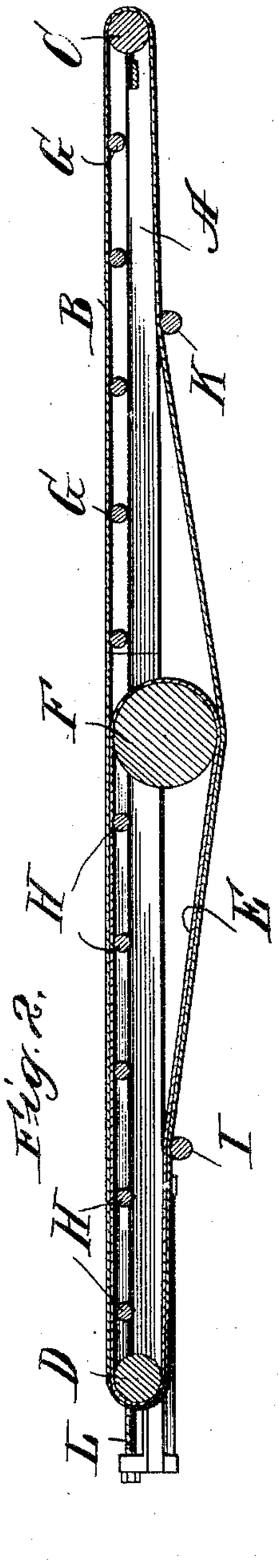

Fig. 2.

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ELEVATING-CONVEYER FOR GRADING AND DITCHING MACHINES.

No. 804,474. Specification of Letters Patent. Patented Nov. 14, 1905.

Application filed March 27, 1905. Serial No. 252,322.

To all whom it may concern:

Be it known that I, HENRY S. HOY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevating-Conveyers for Grading and Ditching Machines, of which the following is a specification.

My invention relates to elevating-conveyers for grading and ditching machines involving as a matter of general construction an elevating-conveyer constructed with an endless carrier or conveyer belt which is driven during the advancement of the machine and a plow which plows up the soil and delivers the resulting loosened earth to the receiving end of the elevating-conveyer. I have selected as showing a machine of such type Letters Patent to W. J. Edwards, No. 393,467, dated November 27, 1888, for grading and ditching machine. In the Edwards machine illustrated in said patent the frame of the elevating-conveyer is provided with belt-supporting rolls and an endless conveyer-belt, which at the receiving end of the elevating-conveyer passes about a relatively small idler-roll, while at the delivery end of the elevating-conveyer the said endless conveyer-belt passes about a relatively large supporting and operating roll having at one end a sprocket which, by means of an endless link belt or driving-chain, connects with a driving-sprocket substantially opposite a point midway of the two ends of the elevating-conveyer, the said last-mentioned driving-sprocket being supported upon the body-frame of the machine and gear, connected with the rear axle. In machines of such class the power-driven belt-roll, which operates to drive the conveyer-belt, is arranged at the upper delivery end of the elevating-conveyer, so as to place its sprocket and the driving-chain remote from the receiving end portion of the elevating-conveyer and out of the way of soil thrown up by the plow and also out of the way of bushes and the like over which the machine may pass. With such arrangement the idler-belt-supporting roll at the receiving end of the elevating-conveyer is preferably and usually comparatively small; but, on the other hand, it has been found necessary in such machines as constructed prior to my invention to make the belt-operating roll at the delivery end of the elevating-conveyer comparatively larger, as shown in said Edwards patent, so as to provide a proper area of contacting frictional surface between the driven endless conveyer-belt and the roll which serves to drive it.

Objects of my invention are to avoid arranging the belt-driving roll or drum at the delivery end of the elevating-conveyer and to permit the conveyer-belt to be supported at the delivery end of the elevating-conveyer by a comparatively small idler-roll, and thereby to reduce the diameter of the roll at the delivery end of the elevating-conveyer. By employing a small belt-supporting roll at the delivery end of the elevating-conveyer the said end of the elevating-carrier can be proportionally lowered, thereby reducing the height of said end from the ground and at the same time permitting the delivery elevating-conveyer to have all necessary inclination. In machines of this class certain kinds of earth or soil will frequently slide back and off the conveyer-belt during operation when the elevating-conveyer has the usual inclination necessary to discharge onto a bank or into a wagon, assuming that said machines have a large belt-driving drum or roll at the delivery end of the elevating-conveyer.

An object of my invention is to so decrease the diameter of the belt-supporting roll at the delivery end of the elevating-conveyer that I can lessen the angle or degree of inclination of the elevating-conveyer and still maintain its delivery end at a suitable height from the ground.

Further objects of my invention are to build up a higher bank of soil discharged from the elevating-conveyer with the latter at about the usual angle or degree of inclination, also to dispense with about three-quarters of the length of the sprocket driving-chain illustrated in said Edwards patent, and, further, to provide an arrangement whereby I can dispense with a sprocket-chain and employ only a simple arrangement of gearing, also to place the belt-driving drum or roll nearer the driving power, thereby reducing the extent of driving connection, also to dispense with the use of a sprocket at the delivery end of the elevating-conveyer, and thereby avoid providing such delivery end of the elevating-conveyer with a sprocket which in use is apt to catch upon

banks, wagons, and the like, it being understood that in using these machines it is a common practice to drive a wagon under the delivery end of the elevating-conveyer during operation.

In the accompanying drawings, Figure 1 is a top plan view of a portion of a grading and ditching machine embodying the principles of my invention, a portion of the conveyer-belt being broken away in order to illustrate an inner driving-belt. Fig. 2 is a section taken longitudinally and centrally through the elevating-conveyer.

The elevating-conveyer is constructed with a suitable frame A, upon which the belt-rolls are mounted. The endless conveyer or carrier belt B passes about an idler-roll C at the receiving end of the elevating-conveyer and about an idler-roll D at the delivery end thereof. The conveyer-belt B is driven by an endless driving band or belt E, arranged within the conveyer-belt—that is to say, the endless driving band or belt E is arranged between the upper and lower leaves of the conveyer-belt. The driving-belt E passes directly about the idler-roll D at the delivery end of the elevating-conveyer and is therefore interposed between said roll and the belt B, the latter being at such point upon the outer side of the driving-belt. The driving-belt therefore has its inner side in direct contact with the roll D, and the conveyer-belt has its inner side in frictional contact with the outer side of the driving-belt. With this arrangement the idler-roll D supports the two belts at the delivery end of the elevating-conveyer.

The driving-belt E is supported at a point back of the delivery end of the elevating-conveyer by a driving roll or drum F, which is relatively larger than either of the rolls C and D and also of sufficient diameter to insure suitable area of frictional contact between its periphery and the said driving-belt. As shown in Fig. 2, the axis of the driving roll or drum F is somewhat lower than a right line between the axes of the idler-rolls C and D, whereby the upper leaf of the conveyer-belt lies in a right line between the highest portions of the rolls C and D and at the same time bears upon and contacts with the portion of the driving-belt E which passes over the highest portion of the driving roll or drum F. The portion of the upper leaf of the conveyer-belt between the rolls F and C is supported or upheld as against sag by idler-rolls G, mounted upon the frame A, and like rolls H are also arranged in series between the rolls F and D for the purpose of supporting the upper leaf of the conveyer-belt between the rolls F and D and for the further purpose of upholding the upper leaf of the driving-belt E between said rolls F and D, and thereby increasing the area of frictional contact between the driving-belt and the conveyer-belt, it being observed that the inner side of the upper leaf of the driving-belt E bears upon the rolls H and that the upper leaf of the driving-belt and the conveyer-belt are also further maintained in frictional contact by means of these rolls H.

The idler-roll I (shown in Fig. 2) upholds the lower leaves of the two belts, and the idler-roll K upholds the lower leaf of the conveyer-belt at a point between the rolls F and C. These rolls I and K are mounted upon the frame A and can be multiplied as desired. It will also be seen that the rolls I and K engage the outer side of the conveyer-belt and that as arranged they are somewhat higher than the lowest point of the roll F, thereby further insuring frictional contact between the two belts. Any suitable belt-tightener device L L can be employed for adjusting the roll D so as to suitably tighten the two belts employed.

When the roll or drum F is operated so as to drive the belt E, the frictional contact between the belt portions passing about the idler-roll D will cause the belt E to drive the conveyer-belt. It will be observed, however, that the general arrangement of other rolls hereinbefore described increases frictional contact between the two belts, and thereby further insures positive driving engagement between the driving-belt E and the conveyer-belt B.

The roll or drum F is supported upon the frame A and is shown as being arranged at a point midway or substantially midway of the distance between the receiving and delivery ends of the elevating-conveyer. In Fig. 1 one of the journals of the roll or drum F is provided with a sprocket M, which is connected with a driving-sprocket N by means of a short endless link belt or sprocket-chain O. The sprocket N is gear-connected with and operated by the rear axle P of the machine by suitable gearing, such as illustrated, it being observed that as the gearing referred to is substantially the same as shown in said Edwards patent it need not be further specifically described. It may be observed, however, that as the distance between the axes of the sprockets M and N is comparatively short said gears can be gear-connected in any other suitable way.

With further reference to the mode of operating the elevating conveyer-belt it will be seen that the friction driving-belt E passes about an idler-belt-supporting roll at one end of the conveyer-frame and also about the power-driven roll F, which serves as a belt-supporting and belt-driving roll. The portion of the belt E which passes about an idler-roll at one end of the frame preferably rises from the straight cylindric surface of such roll, so that it can be made comparatively

wide and provide a broad bearing for the outer conveyer-belt B, which is driven by reason of frictional contact between the two belts.

In operating a ditching and grading machine of the class involved the soil discharged from the elevating-conveyer is in some kinds of work deposited alongside the excavation, and in others it is received in a wagon, which is maintained by its team in position under the delivery end of the elevating-conveyer while the machine is in motion. In either case the delivery end of the elevating-conveyer is elevated to a height sufficient to permit it to clear the banked-up soil or the wagon, and obviously where a comparatively large belt-driving roll is arranged at the delivery end of the elevating-conveyer, as in said Edwards patent, the angle of the belt must be greater than where the delivery end of the elevating-conveyer is merely provided with an idler-belt-supporting roll in accordance with my invention, it being seen that under such conditions I can decrease the inclination of the upper leaf of the conveyer-belt proportionally to the extent to which I reduce the diameter of the roll at the delivery end of the elevating-conveyer; also, that I avoid the presence of a sprocket at the delivery end of the elevating-conveyer and that where I employ a drive-chain, as illustrated, I materially reduce the length of such chain.

What I claim as my invention is—

1. In a ditching and grading machine, an elevating-conveyer constructed with a roll-supporting frame, an idler-belt roll at each end portion of the frame, an endless conveyer-belt extending between and passing about said two idler-rolls, and a series of idler-rolls arranged between said end rolls and upholding the upper leaf of the endless conveyer-belt; a power-driven belt roll or drum mounted upon the frame at a point between the two end idler-rolls; an endless driving-belt extending between the said belt-driving roll or drum and the idler-roll at one end of the elevating-conveyer and passing about said two rolls, the said driving-belt being operated by said driving-belt roll and being arranged within the endless conveyer-belt and in frictional contact therewith, whereby the endless conveyer-belt is operated by the driving-belt; means for operating the driving-belt roll; and idler-rolls engaging the under side of the lower leaf of the conveyer-belt, the lowest point of said rolls being higher than the lowest point of the belt-driving roll which is positioned between these two rolls.

2. In a ditching and grading machine, the elevating-conveyer having a roll-supported endless conveyer-belt; means for operating the conveyer-belt consisting of an endless belt in frictional contact with portions of the inner side of the conveyer-belt; a roll supporting the inner driving-belt and the outer conveyer-belt at one end of the elevating-conveyer and a driving roll or drum operating the driving-belt and arranged between the upper and lower leaves of the elevating conveyer-belt; the endless conveyer-belt being supported at one end of the elevating-conveyer by the portion of the inner driving-belt passing about the roll at such end of the elevating-conveyer, and the extent of frictional contact between the outer surface of the inner belt and the inner surface of the outer conveyer-belt being suitable and sufficient to cause the inner belt to drive the outer belt by frictional engagement therewith.

3. In a ditching and grading machine, the elevating-conveyer having an endless conveyer-belt; a power-driven belt-roll arranged within the space of the endless conveyer-belt and positioned between the receiving and delivery ends of the elevating-conveyer; an idler-belt-supporting roll at one end of the elevating-conveyer; an endless belt extending between and passing about the said two rolls and operated by the one which is power-driven, said driving-belt being within the conveyer-belt and maintained in frictional contact with inner surface portions of the upper and lower leaves of the conveyer-belt as a means for driving the latter, the driving-belt and the conveyer-belt being both supported by the idler-roll at one end of the elevating-conveyer, the driving-belt being in direct contact with such roll and the conveyer-belt being upon and against the outer surface of the driving-belt.

4. In a ditching and grading machine, the elevating-conveyer constructed with a suitable frame; a belt-driving roll mounted upon the frame at a point between the ends thereof, and driving-gearing connecting said driving-roll with the rear axle of the machine; an idler-roll mounted at one end of the elevating-conveyer; a driving-belt passing about said idler-roll and said driving-roll and operated by the latter, and an endless conveyer-belt passing over and under the driving-belt and in frictional engagement therewith, the conveyer-belt being driven by frictional contact with the said driving-belt, and the latter being in turn driven by the driving-roll.

5. In a ditching and grading machine, an endless carrier or conveyer belt, and a driving-belt therefor arranged within and engaging the said carrier or conveyer and means for operating said inner driving-belt; the outer conveyer-belt being driven by reason of the frictional engagement of its inner surface with the outer surface of the inner driving-belt during the operation of the latter.

6. The combination of the outer endless

conveyer-belt B; the inner driving-belt E in frictional engagement with the said outer belt; the frame; a roll for driving the belt E; a roll at one end of the frame supporting the two belts; and a roll arranged between the said end roll and the driving-roll and upholding the lower contacting leaves of the two belts at a point higher than the lowest portion of the driving-roll.

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