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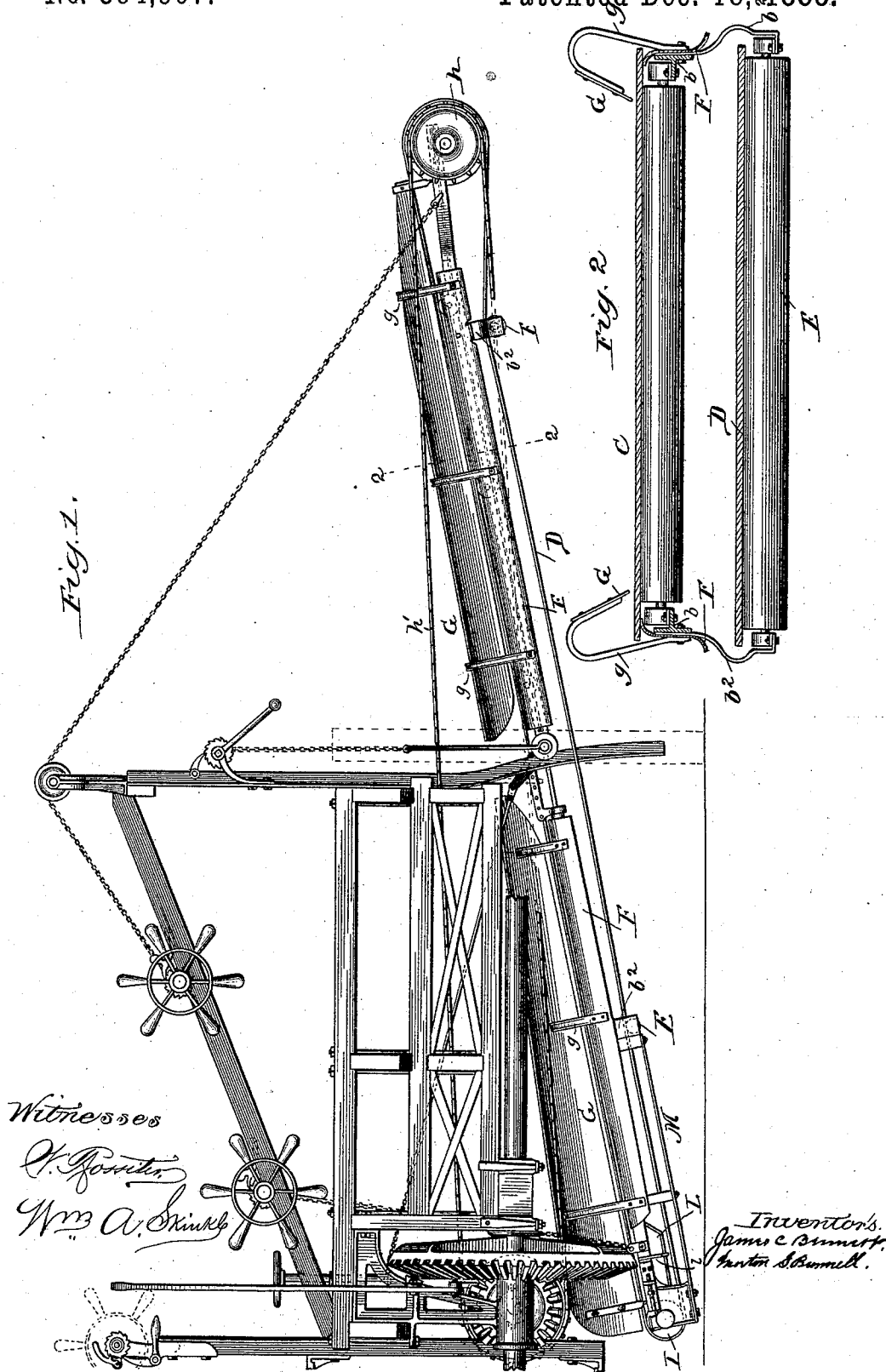
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J. C. BENNETT & M. G. BUNNELL.

GRADING AND DITCHING MACHINE.

No. 394,907.

Patented Dec. 18, 1888.



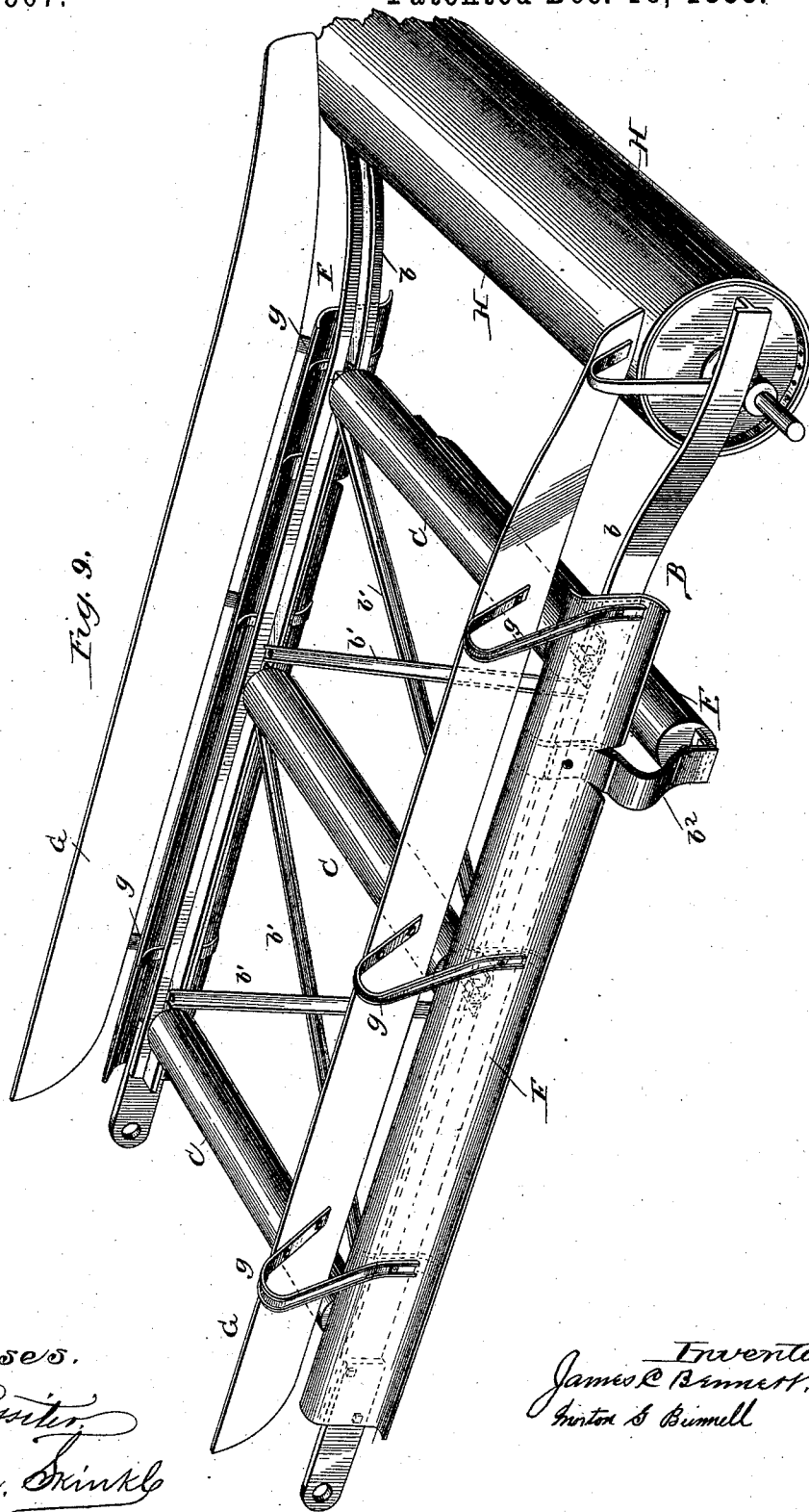
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Witnesses.

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UNITED STATES PATENT OFFICE.

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GRADING AND DITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 394,907, dated December 18, 1888.

Application filed April 24, 1888. Serial No. 271,724. (No model.)

To all whom it may concern:

Be it known that we, JAMES C. BENNETT and MORTON G. BUNNELL, both citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grading and Ditching Machines, of which the following is a specification.

This invention relates to the construction of elevators employed in grading and ditching machines for conveying the soil from a plow or the like to a point proper for discharging such soil, and is particularly designed as an improvement in elevators for ditching and grading machines of that class in which a portion of the elevator is suspended below the main body-frame of the machine and the remaining portion of the elevator extended out from one side of the machine, so that in road-making the distance from the plow to the discharge end of the elevator can be adapted to the required width of road. Owing to the great size of these machines and the power required to propel or draw the same over the ground, it is desirable to provide as light a construction of elevator as may be compatible with necessary strength and rigidity, and this is particularly desirable with regard to the extension portion of the elevator that extends from one side of the machine, since the weight of such portion of the elevator necessarily tends to pull the machine over to one side, and hence must be resisted by a proportionally heavy and strong construction of wheeled body-frame. It is also desirable to prevent the dirt from getting onto the lower fold or leaf of the endless conveyer-belt.

The objects of our invention are to provide a light, strong, and simplified construction of elevator; to provide improved means for supporting rolls that are employed for upholding the upper and lower leaves of the endless conveyer-belt; to provide simplified and efficient means for preventing the deposit of loose soil upon the lower leaf of the conveyer-belt, and to provide certain improved details all tending to simplify and otherwise improve the construction and general serviceability of the elevator.

To the attainment of the foregoing and other useful ends our invention consists in mat-

ters hereinafter described, and particularly pointed out in the claims.

In the drawings, Figure 1 is a rear end elevation of so much of a grading and ditching machine as is necessary to illustrate our invention, the rear supporting-wheels being, for convenience of illustration, omitted. Fig. 2 represents a section taken transversely through the elevator on the line 2 2, Fig. 1. Fig. 3 is a top plan view of the elevator with the belt removed. Fig. 4 is a section on line 4 4, Fig. 3. Fig. 5 is a cross-section on line 5 5, Fig. 3. Fig. 6 represents in perspective a portion of the conveyer-belt, and illustrates a construction of separable joint or fastening device by which the meeting ends of such lengths as the belt may comprise can be temporarily fastened together. Fig. 7 represents a section taken through Fig. 6 on the line 7 7. Fig. 8 represents a portion of one of the hook-plates of the belt-fastening device. Fig. 9 represents in perspective, on a somewhat larger scale than the preceding figures, the upper or delivery-end portion of the elevator with the belt removed.

The elevator comprises in its structure a frame, which is made of appropriate length and provided at desired points with bearings for the journals of such rolls as may be required for supporting and driving an endless elevator belt or apron arranged to receive the plowed-up soil at the receiving end of the elevator and carry the same to the delivery end of the elevator, which may be raised, as usual, to a proper height.

The elevator-frame is preferably divided transversely into two or more sections, the elevator herein shown being provided with a frame which is divided into a couple of lengths or sections that are hinged together, in order that the first or lower section may be suspended under the body-frame of a grading and ditching machine in proper relationship to a plow, while the upper or next higher section may be extended out from either the rear end or one side of the machine and tilted so as to raise and lower the delivery end of the elevator.

The elevator-frame B, considered as a whole, is formed by two parallel bars, *b*, which are firmly connected together and likewise rigidly

held at a proper distance apart by any suitable arrangement of cross-bars—such, for example, as the diagonally-arranged bars *b'*—whereby the elevator may be said to comprise a single frame in contradistinction to a construction involving two parallel frames.

The side bars of the elevator-frame B are herein shown divided into lengths in correspondence with the required lengths of the sections which are connected together at their meeting ends to provide a suitably-jointed frame. It is understood, however, that the frame is not necessarily thus divided and jointed, since for smaller machines, for example, the elevator-frame may be composed of a single length, whereby the jointing of such frame can be dispensed with. For the purposes of our invention, therefore, the side bars of the elevator-frame may be regarded either as divided into lengths and jointed together at their ends or as single bars extending from end to end of the elevator.

The rolls E, for upholding the lower leaf of the conveyer-belt, are supported by hangers *b*², which depend from the frame B and afford or are provided with bearings for the journals of such rolls, in which way the necessity for a couple of side bars arranged below the bars *b* as a support for the rolls E is obviated. As a further feature of improvement in this direction, the hangers *b*² are bent outwardly at points opposite the edges of the lower leaf of the conveyer-belt in order to provide space for the edge portions of the lower leaf of the belt and avoid widening the frame B. In elevators of the class to which this relates it is common to permit the edge portions of the upper leaf of the belt to extend somewhat beyond the ends of its supporting-rolls C and to overlap the bars in which the upper rolls are journaled in order to prevent such loose soil as may work its way over the edges of the upper leaf of the belt from getting into the boxes or bearings for such rolls. This arrangement has therefore necessitated the employment of a second lower frame made considerably wider than the upper frame and arranged below such upper frame so as to support the rolls that serve to uphold the lower leaf of the conveyer-belt; but by our arrangement of hangers the presence and weight of such lower frame and the braces required to connect it with the upper frame are avoided, and at the same time ample width of space afforded for the lower leaf of the belt without necessitating an undesirable increase of width on the part of the frame B. To the sides of the elevator-frame are attached the guard-plates F, which have their upper edge portions bent over toward the middle line of the elevator, so as to overhang the boxes for the belt-rolls C, and hence receive such loose earth as might find its way over the side edges of the belt. The lower edge portions of these guards are bent outwardly, so as to effectively prevent such soil as may fall upon

the guards from getting onto the lower leaf of the belt, it being observed that by such arrangement it is not necessary to extend the guards down to the level of the lower rolls, E. The side boards, G, which are, as usual, arranged over the conveyer-belt so as to form the sides of a conveyer-trough, are supported from the elevator-frame by the bent stands or arms *g*. As a simple arrangement of hangers, guards, and arms or stands, said members can be fitted together substantially as shown in Fig. 2, wherein the arms or stands *g* are arranged against the outer sides of the guards and the upper ends of the hangers arranged between the guards and the sides of the frame, to which said members can be secured and held together by bolts or rivets passing through the lower ends of the arms *g*, the middle line of the guard, and the upper end portions of the hangers. We do not, however, confine ourselves to this precise order of securement of said parts, since such order can obviously be reversed or otherwise varied.

The side bars, *b*, of the elevator-frame preferably diverge somewhat at the upper end of the elevator, so as to widen the space between their ends to an extent proper for the required length of a large belt-driving roll, H, having one of its journals provided with a sprocket, *h*, for the endless driving-chain *h'*, that is to be driven in any desired way. At the receiving end of the elevator the side bars, *b*, of the elevator-frame also preferably diverge somewhat, so as to provide between them ample space for a belt-roll, I, and also widen the frame at its receiving end.

The widening of the frame at its delivery end adapts it to receive a belt-roll, H, of suitable length to support the entire width of conveyer-belt, which, as heretofore observed, has its edge portions desirably extended beyond the ends of the idler-rolls C, it being, however, desirable that the driving-roll H should be of such length as to engage the belt across the entire width of the same. By thus laterally deflecting the end portions of the side bars of the frame at the delivery end of the elevator, space is provided for the roll H, as aforesaid, while at the same time the bars can along their main lengths be set apart at a distance that is but little more than the length of any one of the rolls C. This saving in width of the single frame, comprising but two long side bars or stringers, also involves strength and permits an efficient arrangement of parts. The foregoing statements are also applicable to the widening of the elevator at its receiving end, where the idler-belt roll I is arranged, and in addition to such it will be seen that said arrangement also better adapts the elevator to the usual lateral deflection of one or both of the boards G at the receiving end of the elevator, whereby soil and other matters may readily enter the conveyer-trough.

The boxes *i* for the journals of roll I are secured to the bars *b*, and can be braced by a

bar, b^3 , Fig. 5, underneath or in any other suitable way, and, being at the ends of the bars that are thus spread apart, said boxes will be out of the way of the soil that is being delivered from the plow to the conveyer-belt. In older constructions of elevators a scraper for relieving the roll from any soil which might get onto the same has been hung substantially in a plane parallel with the plane of the conveyer-belt. Such arrangement, however, permitted the earth scraped from the roll to accumulate upon the scraper, and hence involved a loss of time in removing the deposit. As an improvement in this part of the elevator, a scraper, K, Fig. 4, is so hung at its ends upon the side bars or bearings attached to the side bars that it will lie in an inclined plane, and from its scraping edge, that is next to the roll I, incline downwardly to discharge the scraped-off earth into a tray or pan, L. This pan is removably held in position, so that without loss of time it can be removed and emptied of its contents.

As a means for protecting the lower leaf of the conveyer-belt at the receiving end of the elevator, a shield, M, is arranged under the lower leaf of the belt and secured to the elevator-frame. This shield M herein consists of a broad sheet-metal plate curled up along its edge that is understood to be along the side of the elevator that is nearest the front end of the machine, in which way its curled-up edge portion m serves to prevent stalks and the like from getting in between the leaves of the belt. The curled-up edge portion of the shield M can be secured to one of the side bars b of the frame, while its rear edge can be secured to any blocks or bar attached to the opposite side bar of the frame, or held in any other proper mechanical way.

The removable pan can be temporarily locked in place in any suitable way, the device herein shown for such purpose being simply a hook, l , hung from one of the side bars and adapted to engage one side of the removable pan, which at its opposite side can be upheld by any suitable rest, as at m' .

The side bars, b , of the elevator-frame may be T-rails or other suitable flanged or unflanged bars, it being understood that, while the employment of T-rails for the side of the elevator-frame is desirable, any other form of bars can be substituted for the T-rails, which, however, when employed afford exceedingly convenient ledges, both for the boxes for rolls C and for the ends of the brace-bars b' .

In grading and ditching machines it is common to divide the elevator-frame into a plurality of sections detachably connected together to form an elevator, which can be shortened with reference to the width of the road by removing one or more of the said sections. Where one or more of such sections are removed, it becomes necessary to proportionally shorten up the endless conveyer-belt. As a means for permitting the belt to be readily shortened, it is composed of suitable

lengths, which at their ends are simply connected together by interlocking fasteners P. These fastening devices may consist of metal plates riveted or otherwise secured to the belt and provided with bent edge portions, which serve to form hooks. To prevent any independent side shift of the ends of the belt lengths at these temporary joints, one of the plates can be provided with cheeks or stops p at the corners of its hook-shaped edge portion p' , Fig. 8, while the hook portion p^2 of the other plate can be proportioned in width to engage the hook p' between said stops, which latter therefore prevent any side slip and cause the belt-sections to be held in perfect alignment. With such arrangement it will be obvious that much time can be saved in either shortening or lengthening the belt. It is herein understood that, while the belt-fastening devices are particularly designed for what is known as a "rubber" or "rubber-cloth" belt, the conveyer-belt may for various other purposes of our invention involve other common equivalent constructions—such, for example, as a slatted belt—and that the hangers could in such case serve as bearings for such chain-wheels as might be substituted as equivalents for the belt-rolls.

With regard to devices herein illustrated for connecting together the two sections of the elevator and for raising and lowering the elevator at such point, no special description of such matters is herein necessary, since the same form the subject-matter of certain claims of application, Serial No. 276,743, for Letters Patent of the United States, filed by Morton G. Bunnell, one of the present applicants, and are herein shown merely to illustrate an elevator embodying our improvements put up for actual service. It is understood, therefore, that no limitation is herein placed upon the means whereby the elevator can be raised or lowered at such point.

What we claim as our invention is—

1. In a grading and ditching machine, the combination of the elevator-frame, comprising a couple of oppositely-arranged parallel side bars connected to form a frame, the upper belt-rolls, C, mounted upon said frame, the endless conveyer-belt having its upper leaf supported by said rolls and being throughout its length of a width to extend at its edge portions beyond the upper rolls, so as to cover their journal-bearings, and the hangers depending from said frame and supporting the lower rolls, E, by which the lower leaf of the belt is sustained, said hangers being bent outwardly opposite the edges of the lower leaf of the belt, substantially as and for the purpose described.

2. The combination, substantially as hereinbefore set forth, with the elevator-frame, constructed with a single pair of parallel side bars and carrying rolls or the like for upholding the upper leaf of the conveyer-belt, of the guard-plate F, secured to sides of said frame, for the purpose described.

3. The combination, substantially as here-
inbefore set forth, with the elevator-frame
carrying a set of rolls or the like which sup-
port the upper leaf of the endless conveyer-
5 belt, of the guard-plates F, secured to said
frame, and the hangers *b*², provided with bear-
ings wherein the journals of rolls or like de-
vices that sustain the lower leaf of the belt
are mounted.
- 10 4. The combination, substantially as here-
inbefore set forth, with the endless conveyer-
belt, of the shield M, supported below the lower
leaf of the conveyer-belt at the receiving end
of the elevator, and having an upturned por-
15 tion, *m*, arranged to prevent trash and the
like from getting in between the leaves of the
conveyer-belt.
5. The combination of the elevator-frame B,
consisting of bars *b*, connected together by
20 suitable braces, the rolls C, journaled in bear-
ings upon said bars, the rolls E, journaled in
bearings upon hangers depending from the
bars, the guards F, and the arms *g*, support-
ing the sides G of the elevator-trough, all con-
25 structed and organized substantially as de-
scribed.
6. The elevator provided with an endless
conveyer-belt and having the side bars of its
frame portion arranged to diverge at the de-
30 livery end of the elevator, so as to afford
space for a belt-driving roll of suitable length,
substantially as and for the purpose described.
7. The elevator provided with an endless
conveyer-belt and having the side bars of its
35 frame portion arranged to diverge at the re-
ceiving end of the elevator, substantially as
and for the purpose described.

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