Oct. 30, 1945. J. S. BLACKIE 2,387,977

DITCHING MACHINE

Filed May 27, 1943 3 Sheets-Sheet 1

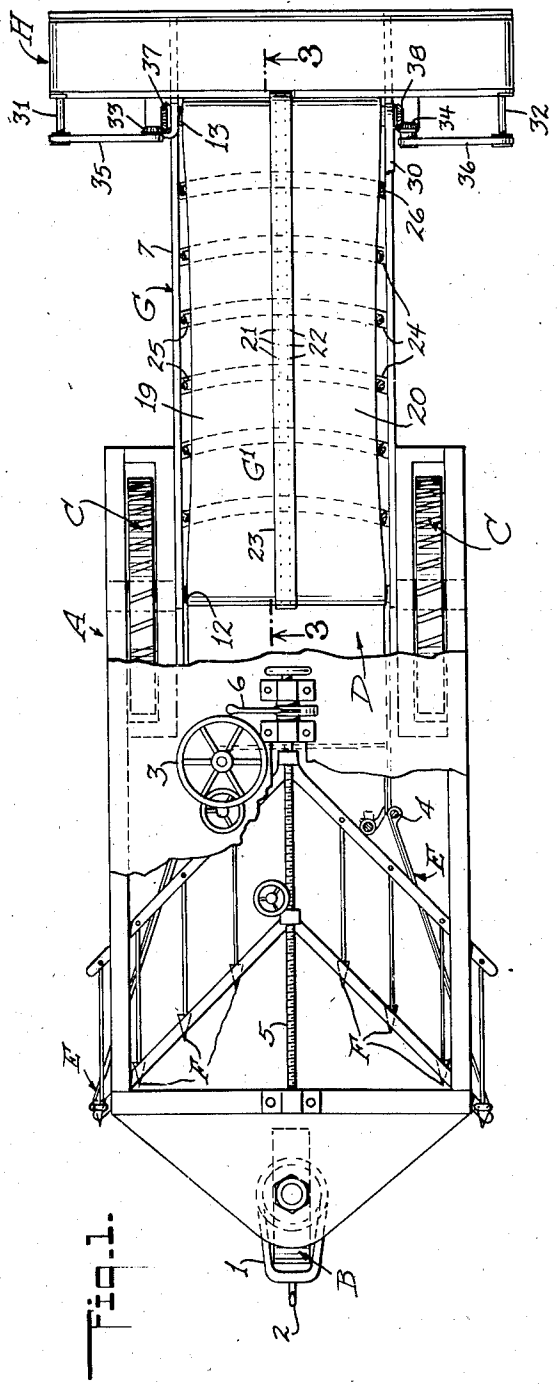


Fig. 1.

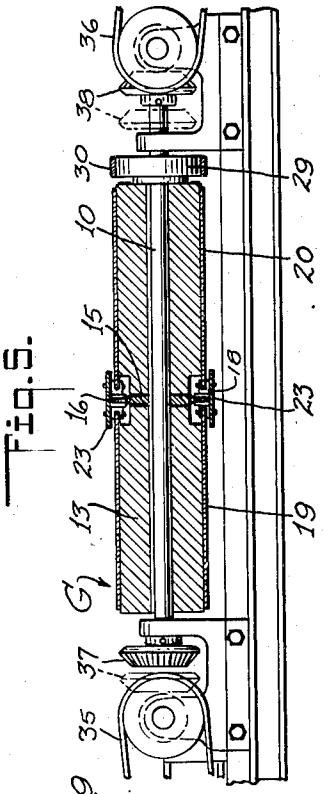


Fig. 5.

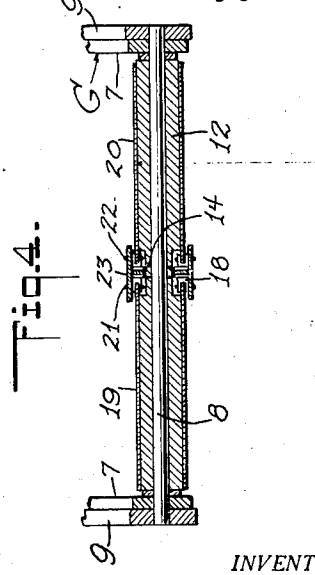


Fig. 4.

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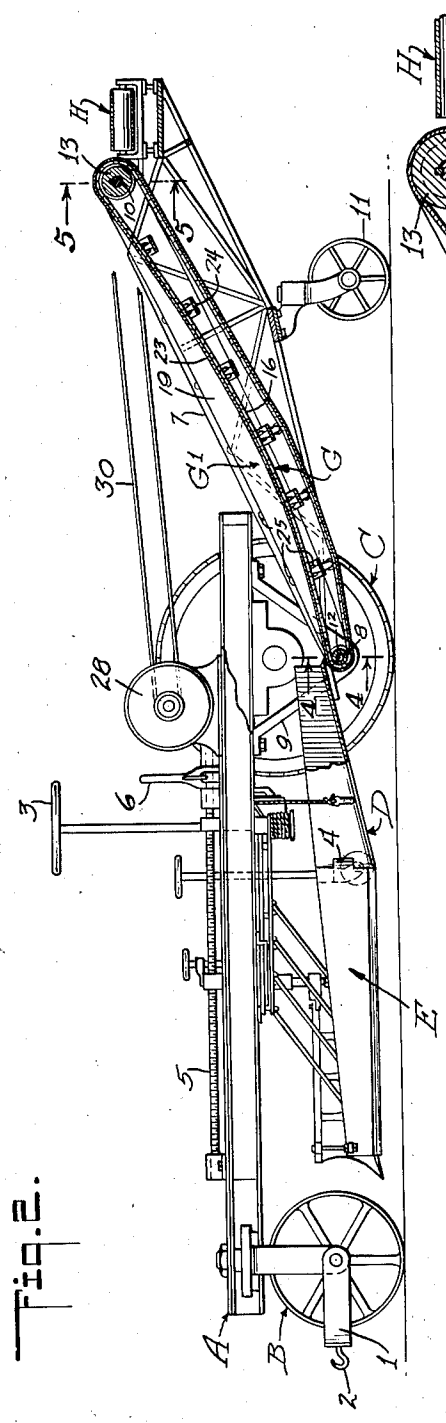


Fig. 2.

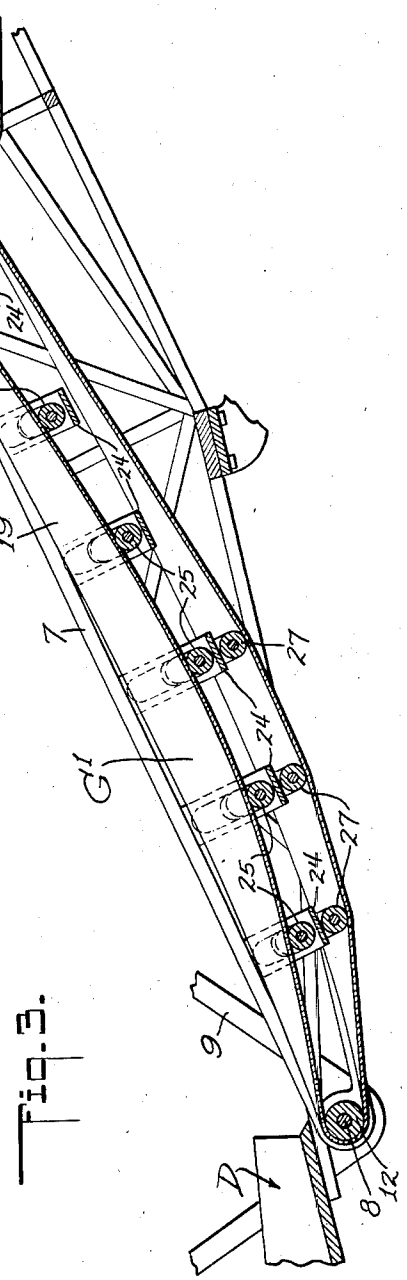


Fig. 3.

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Filed May 27, 1943 3 Sheets-Sheet 3

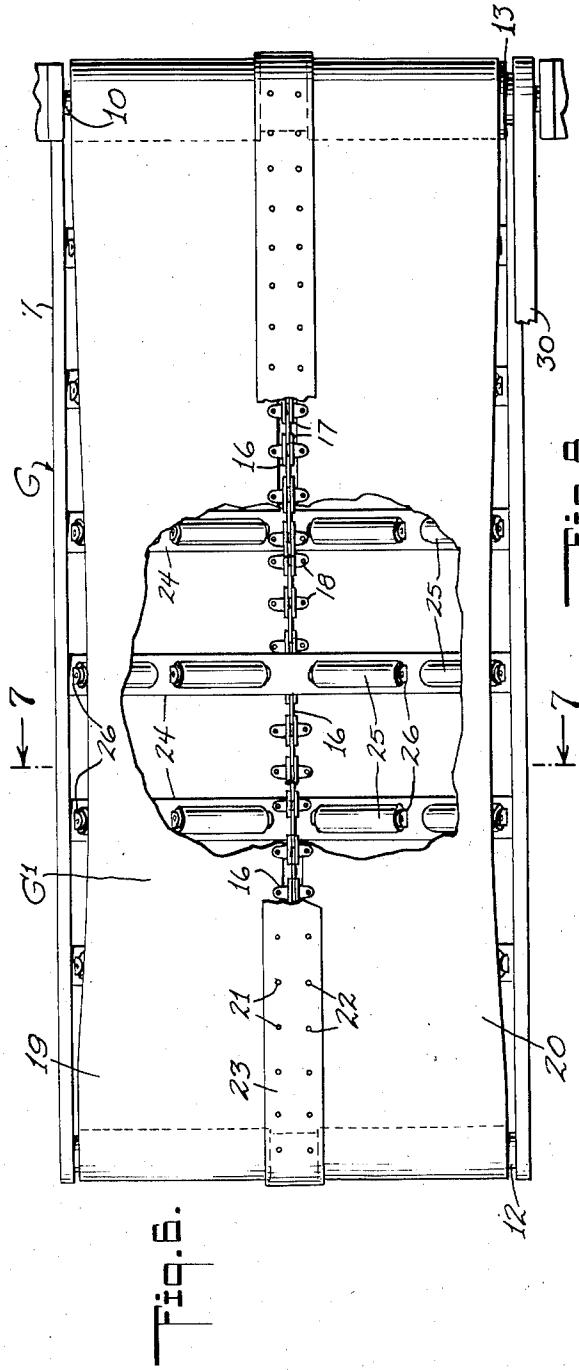


Fig. 6.

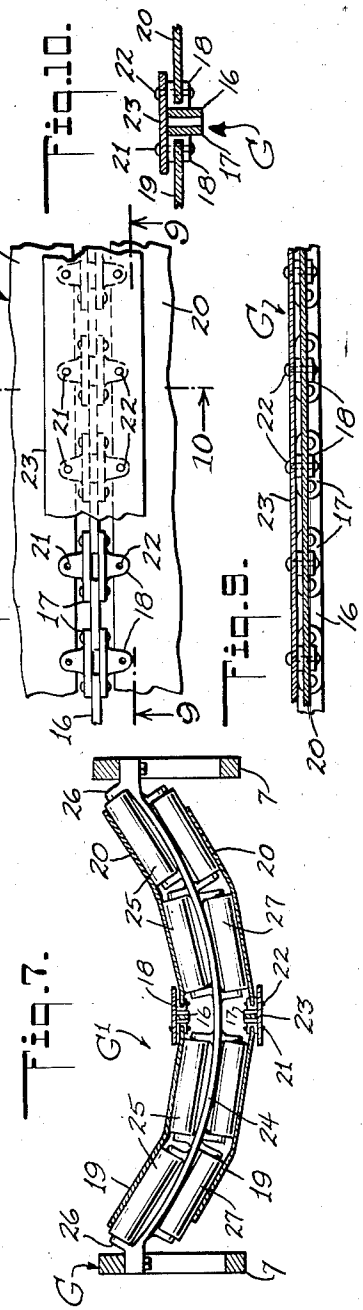


Fig. 10. Fig. 8. Fig. 9. Fig. 7.

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UNITED STATES PATENT OFFICE

2,387,977

DITCHING MACHINE

John Stephen Blackie, Santa Cruz, Calif.

Application May 27, 1943, Serial No. 488,769

2 Claims. (Cl. 198—191)

The present invention relates to improvements in a ditching machine, and it consists of the combination, constructions and arrangements hereinafter described and claimed.

An object of my invention is to provide a ditching machine which is an improvement over my Patent No. 1,586,940, issued June 1, 1926. In the patent I disclose a ditching machine in which the dirt digging scoop can be adjusted vertically to dig a ditch as the device is moved over the ground. Side scrapers are used in connection with the scoop for digging the sides of the ditch and conveying the dirt to the scoop. The side scrapers are adjustable for varying the width of the ditch walls so that these walls can be inclined at the desired angle.

The patented device discloses the scoop delivering the dirt to an endless conveyor that lifts the dirt out of the ditch and drops it onto a transverse conveyor which in turn, moves the dirt laterally to the desired side of the ditch and there deposits the dirt. The endless elevating conveyor disclosed in the patent has a flat surface for carrying the dirt and such a surface cannot convey as much dirt from the scoop as when the upper reach of the elevating conveyor is formed into a concave shape.

The principal object of my invention is to provide a ditching machine in which the endless dirt elevating conveyor has a concave shape in its upper reach so as to transport a greater quantity of dirt from the scoop to the transverse conveyor than is otherwise possible.

A further object of my invention is to provide a device of the type described which is relatively simple in construction and durable and efficient for the purpose intended.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming a part of this application, in which:

Figure 1 is a top plan view of the ditching machine shown with my improved dirt elevating endless conveyor in position;

Figure 2 is a side elevation of the device, the dirt elevating endless conveyor being shown in section for purpose of clarity;

Figure 3 is an enlarged longitudinal section through the elevating endless conveyor;

Figure 4 is a transverse section taken along the line 4—4 of Figure 2;

Figure 5 is a transverse section taken along the line 5—5 of Figure 2;

Figure 6 is a top plan view of the elevating endless conveyor shown on a larger scale with a portion broken away to disclose certain operating parts;

Figure 7 is a section taken along the line 7—7 of Figure 6;

Figure 8 is a plan view of a portion of the endless conveyor;

Figure 9 is a section taken along the line 9—9 of Figure 8; and

Figure 10 is a section taken along the line 10—10 of Figure 8;

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications may be made within the scope of the appended claims without departing from the spirit and scope of the invention.

In carrying out my invention I make use of the same ditching machine as shown in my patent No. 1,586,940 and the only change made in the machine is the new construction of the dirt elevating endless conveyor. A brief description of the ditching machine as set forth in the patent will therefore be given and then a detailed description of the improved endless conveyor will follow.

The ditching machine comprises a frame, indicated generally at A, and this frame is mounted upon a front wheel B and rear wheels C. The front wheel has a draft bar 1 with a hook 2 that may be connected to a power-driven device such as a tractor, not shown. The frame A carries a scoop D that may be raised and lowered by a hand operated wheel 3 through a mechanism disclosed in my patent. The scoop D has side scrapers E that may be swung laterally about hinges 4 so that the walls of the ditch may be cut at the desired angle. The means for changing the angle of the side scrapers E comprises a screw shaft 5, see Figure 1, and an operating handle 6 that has a ratchet connection with the screw shaft for rotating it and changing the angle of the side scrapers. The full detailed disclosure of this construction is set forth in my patent above mentioned.

Plow points F are carried by bars which in turn, form a part of the side scrapers E and these plow points break up the ground just prior to the scoop D digging into the ground. As the device moves forwardly and digs dirt, this dirt is deposited upon the scoop D and is forced back through the open rear of the scoop and

delivered to a dirt elevating endless conveyor indicated generally at G. The conveyor G, in turn, delivers the dirt to a transversely extending conveyor H, see Figure 1, and it is this latter conveyor that transfers the dirt to the desired side of the ditch and there deposits it.

I will now describe in detail the construction of the endless conveyor G. The conveyor is shown in detail in Figures 3 to 10 inclusive. A conveyor supporting frame 7 is pivoted on a shaft 8 that in turn is supported by a bracket 9, which is secured to the frame A. The conveyor frame 7 has a shaft 10 disposed at its free end and the frame is supported by a caster wheel 11, see Figure 2. An elongated roller 12 is rotatably mounted on the shaft 8 and an elongated roller 13 is keyed to the shaft 10. Figure 4 illustrates the roller 12 and shows the roller provided with a centrally disposed sprocket 14. Figure 5 shows the roller 13 provided with a centrally disposed sprocket 15 rigidly connected to the shaft 10. A sprocket chain 16 is passed around the two sprockets 14 and 15 as shown in Figures 4, 5 and 6.

The detailed construction of the chain is illustrated in Figures 8, 9, and 10. In Figure 8, chain links 17 are indicated and Figure 10 illustrates these links 17 as carrying pairs of lugs 18. Figure 6 shows the frame 7 as carrying two endless conveyor belts 19 and 20. These are placed on each side of the sprocket chain 16. The inner edge of the belt 19 is secured to the chain 16 by rivets 21 passed through the lugs and the belt edge. In like manner the inner edge of the belt 20 is secured to the chain links 17 by rivets 22 passed through the pairs of lugs 18.

A central cover belt 23 is placed at the center of the frame and overlies the sprocket chain 16. The cover belt also extends a slight distance over the inner edges of the side belts 19 and 20 so as to cover these edges, see Figure 10. The rivets 21 and 22 also extend through the cover belt and in this manner all three endless conveyor belts are secured to the sprocket chain and to each other so as to move as a unit.

The upper reaches of the three belts are permitted to form a concave portion of the shape shown in Figures 3 and 7. Transversely extending concave members 24 have their ends secured to the frame 7 and the members rotatably support idler rollers 25 which are carried by the tops of the members. Bearings 26 rotatably connect the idler rollers to the transverse members 24. Figure 7 illustrates how the belts 19 and 20 have their upper reaches resting against the idler rollers and the figure further illustrates how the cover belt 23 overlies the inner edges of the two side belts and also protects the sprocket chain 16. The curvature of the transverse member 24 is made different for each member so that the conveyor G will have its greatest concavity at the point G1 in its upper reach, see Figure 3. The construction is such that the two belts will form the concave portion and still the belts will straighten out as they pass over the elongated end rollers 12 and 13. If desired additional idler rollers 27 may be mounted beneath certain of the transverse members 24 so as to space the lower reaches of the endless belts from the members, see Figure 3. The three belts form the conveyor G and receive dirt from the scoop D and deliver it to the transverse conveyor H.

The construction of the transverse conveyor H is the same as that shown in my patent or it may be of the construction of the conveyor G. A detailed description need therefore not be given. The roller 13 is actuated by a motor 28, see Figure 2, that is connected to a pulley 29, mounted on the shaft 10, by a belt 30. The shaft 10 when rotated by the motor will rotate the roller 13 and the sprocket 15. In this way the endless belts on the conveyor G are actuated.

It will be noted from Figure 1 that the conveyor H has its end rollers mounted on shafts 31 and 32, which in turn are connected to bevel gears 33 and 34 by belts and pulleys indicated generally at 35 and 36. The shaft 10, see Figure 5, can be shifted longitudinally to bring either a bevel gear 37 into mesh with the bevel gear 33 or a bevel gear 38 into mesh with the bevel gear 34. In this way the direction of the movement of the transverse conveyor H can be changed at will so that the conveyor will deliver dirt to the desired side of the ditch.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

The operation of the ditch digger has been explained in my patent and only a brief explanation need be given in the present case. The device is pulled by a tractor and the scoop is lowered or raised by the hand-wheel 3. The side scrapers E are swung into the desired angular position by the operating handle 6. The motor 28 drives the dirt elevating conveyor G and also the transverse conveyor H. Dirt scooped up by the device is delivered to the conveyor G and the weight of the dirt will cause the three belts to rest upon the idler pulleys and thus the conveyor can carry and elevate a greater quantity of dirt than would be possible where the belt forms a flat surface. The dirt is raised by the conveyor G and dropped upon the transverse conveyor H. The latter conveyor will carry the dirt to the desired side of the ditch and there deposit it. The device is moved through the ditch through successive runs and will deepen the ditch for each run. At each run the side scrapers E can be moved toward each other a slight distance so that the sides of the ditch will be inclined at the proper angle.

I claim:

1. In a ditching machine, an endless conveyor comprising a frame, elongated rollers mounted at the ends of the frame, sprockets mounted midway between the ends of the rollers, a sprocket chain passed around the sprockets, a plurality of sets of idler rollers extending transversely across the frame, the sets being spaced apart and arranged to form a concave-shaped belt-supporting bed, an endless conveyor belt arranged on each side of the sprocket chain and extending from the chain to the side of the frame, the belts being passed around the elongated rollers and having their upper reaches supported by the idler rollers, a central endless cover belt overlying the chain and the inner edges of the first-mentioned belts, and means for securing the central belt and the inner edges of the other belts to the chain so as to be moved thereby.

2. In a ditching machine, an endless conveyor comprising a frame, elongated rollers mounted at the ends of the frame, sprockets mounted midway between the ends of the rollers, a sprocket chain passed around the sprockets, a plurality of sets of idler rollers extending transversely across the frame, the sets being spaced apart and arranged to form a concave-shaped belt-supporting bed, an endless conveyor belt arranged on each side of the sprocket chain and

extending from the chain to the side of the frame, the belts being passed around the elongated rollers and having their upper reaches supported by the idler rollers, a central endless cover belt overlying the chain and the inner edges of the first-mentioned belts, and means for securing the central belt and the inner edges of the other belts to the chain so as to be moved thereby, said means including lugs carried by the chain and receiving the inner edges of the first-mentioned belts, and rivets passed through the central belt and through the other belts for connecting them all to the chain.

JOHN STEPHEN BLACKIE.