No. 800,367. PATENTED SEPT. 26, 1905.

J. & C. F. FOSTER.

DITCHING MACHINE.

APPLICATION FILED JULY 19, 1904.

Fig. 1.

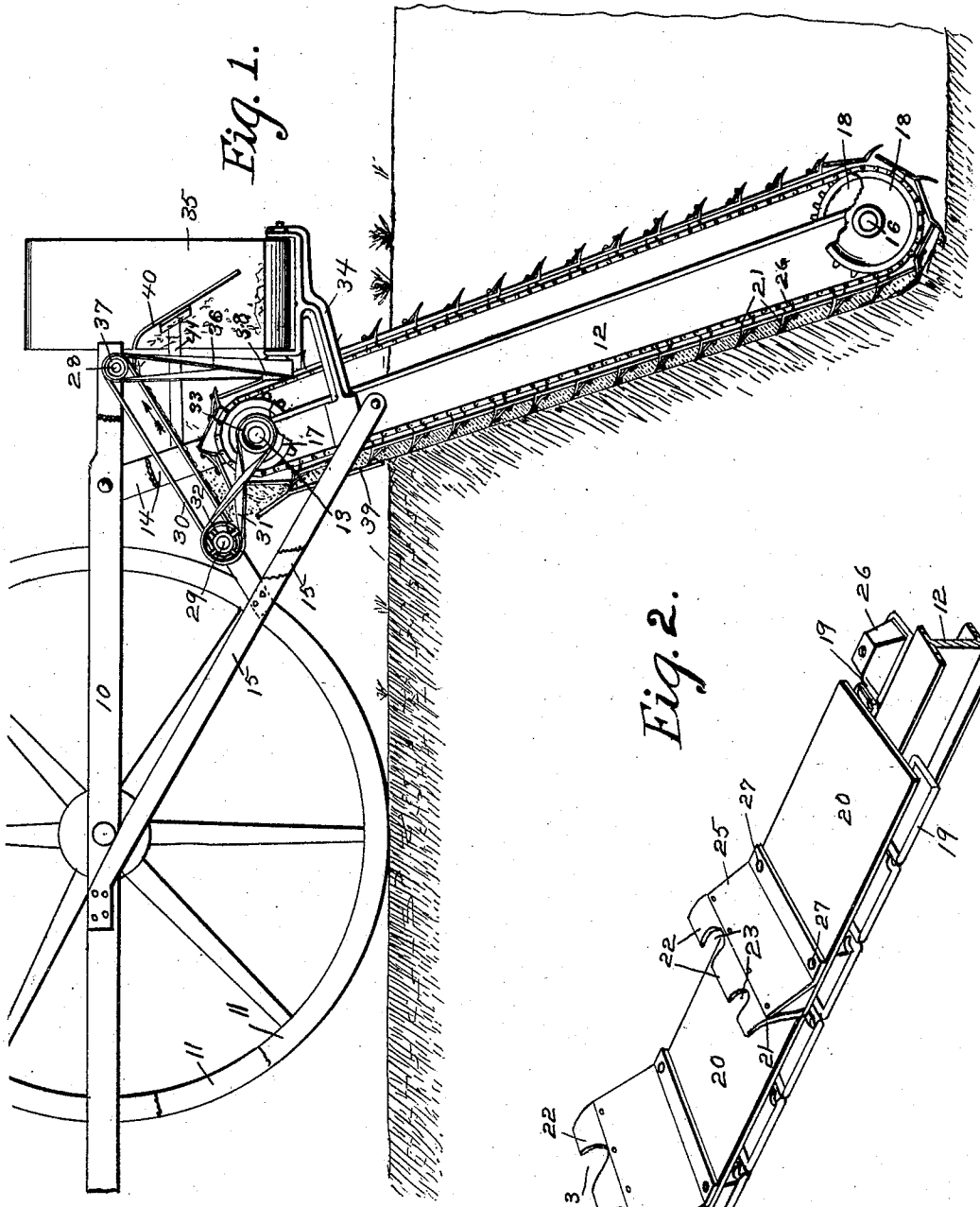


Fig. 2.

Witnesses
A. G. Hagner
S. F. Christy

Inventors John Foster and
Charles F. Foster
By Orwig & Lane Attys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN FOSTER AND CHARLES F. FOSTER, OF GUERNSEY, IOWA, ASSIGNORS OF ONE-THIRD TO O. A. VICKERY, OF GUERNSEY, IOWA.

DITCHING-MACHINE.

No. 800,367. Specification of Letters Patent. Patented Sept. 26, 1905.

Application filed July 19, 1904. Serial No. 217,183.

To all whom it may concern:

Be it known that we, JOHN FOSTER and CHARLES F. FOSTER, citizens of the United States, residing at Guernsey, in the county of Poweshiek and State of Iowa, have invented a certain new and useful Ditching-Machine, of which the following is a specification.

The objects of our invention are to provide a ditching-machine of simple, durable, and inexpense construction arranged to be operated at a relatively high rate of speed through wet and sticky earth and to automatically clean the cutting-blades and conveyer-pockets and to discharge the contents thereof at the top of the ditch being dug.

Our invention consists in certain details in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a side elevation of the complete machine with the ditching apparatus projecting into a ditch as in use, and Fig. 2 shows a detail perspective view of a portion of the digger and conveyer.

Referring to the accompanying drawings, the machine-frame is indicated by the numeral 10 and is mounted upon wheels 11. At the rear of the frame is a leg 12 of the ditching apparatus, formed of a straight piece of structural metal in the form of an **I** in cross-section. Mounted in the top of the leg 12 is a shaft 13, and the leg is supported by means of the brace-pieces 14, secured to the frame 10 and to the shaft 13. The leg is further supported to stand at an angle inclining downwardly and rearwardly from the machine-frame by means of the braces 15, secured to the frame 10 and to the leg 12 below the shaft 13. At the bottom of the leg 12 we have mounted a shaft 16. Fixed to the shaft 13 are two sprocket-wheels 17, and fixed to the shaft 16 are two sprocket-wheels 18. Two sprocket-chains 19 are passed around the sprocket-wheels 17 and 18, parallel with each other and spaced apart far enough to pass on opposite sides of the leg 12. The sprocket-wheels 17 and 18 are so arranged that the chains 19 will pass along the front portion of the leg 12 on opposite sides of and close to, but slightly in the rear of, the front face of the leg 12 for purposes hereinafter made clear. These chains provide a flexible traveling support for the combined cutting-blades and conveying-pockets. Each of the combined cutting-blades and conveying-pockets is composed of a flat plate 20 of a width to overlap both chains 19 and of a length somewhat greater than its width. The forward end of each plate 20 is curved outwardly away from the plate and forwardly in the direction of the line of chains of the plate at 21, and the extreme outer edge thereof is formed into cutting-blades 22, with notches 23 between them. We have provided a brace-plate 25, riveted to the outer end portion of each of the parts 21 and also riveted to the body portion of the part 20 to hold the cutting-blades firmly in position. We attach the plates 20 to the chain by means of the blocks 26, which blocks are formed in the links of the chain adjacent to the forward end of each plate, and each plate is firmly secured to one of the blocks 26 on each of the chains 19 by means of the rivets 27. The said plates 20 and the chains 19 are so arranged with relation to each other and to the leg 12 that during the upward movement of the chains 19 they will pass on opposite sides of the leg 12, and the plates 20 will rest against and slide along the front face of the leg 12. In this way the chains are prevented from sagging rearwardly on account of the cutting-blades being forced against the earth at the end of a ditch. The plates 20 are also so arranged with relation to the curved ends 21 that the rear end of one plate 20 will stand adjacent to the forward face of the part 21 of the adjacent plate, and when the chains 19 pass around the sprocket-wheels 17 at the top of the leg the rear ends of the plates 20 will scrape along and follow the contour of the forward faces of the adjacent parts 21, thus cleaning out the pockets formed by the parts 21 at this point of their travel. In this connection it is to be noted that the sprocket-wheels 18 at the bottom of the leg are of greater diameter than the sprocket-wheels 17 at the top of the leg. Hence it follows that if the rear ends of the plates 20 move to the position shown at the top of the leg in Fig. 1 when they pass over the sprocket-wheel 17 they will move to the position shown at the bottom of the leg when passing over the sprocket-wheels 18. Hence the outer portion

of the cutting-plates will project beyond the rear ends of the plates 20 when passing around the sprocket-wheels 18, so that the cutting-blade will in turn project far enough beyond the rear end of the adjacent plate 20 to cut through a relatively thin slice of earth in passing around the forward lower portion of the sprocket-wheels 18, and as the plates 20 approach a position in line with each other at the front of the leg more of the plates 22 will be exposed where they may engage relatively thicker slices of earth, and each blade as it moves upwardly will cut off a portion of the earth at the end of the ditch until the pocket formed by the blade 22, the curved portion 21, and the plate 20 above it is filled with earth.

We have provided means for driving the conveyer as follows: The numeral 28 indicates a shaft mounted in the machine-frame and designed to be rotated in any ordinary way. The numeral 29 indicates a shaft mounted in the machine-frame and in advance of the upper end of the leg 12, and these shafts are connected and driven in unison by means of a belt conveyer 30, the under surface of which moves rearwardly and upwardly, as shown by the arrow in Fig. 1, directly above the leg 12, and the advance chains 19 are driven by means of a belt 31, connecting the pulley 32 on the shaft 29 with the pulley 33 on the shaft 13. We have also provided means for conveying earth laterally from the machine as follows: The numeral 34 indicates a bracket supported upon the part of the leg 12 above the earth-level. This bracket supports a belt conveyer 35, which projects laterally and upwardly and is driven by means of a belt 36, connecting a pulley 37 on the shaft 28 with the pulley 38 of the conveyer 35.

The conveyer 30 is necessarily some distance above the earth-surface, and in order to hold earth in the pockets of the conveyer from the point where the conveyer passes out of the ditch to the point where the earth carried by the conveyer is thrown upwardly upon the under surface of the belt conveyer 30 it is necessary to provide some means for preventing the earth at this point from moving forwardly, and we have provided a guide-plate 39, supported by the arms 15 and shaped to stand close to the front ends of the blades 22 at the front of the leg, as shown in Fig. 1, and this guide-plate extends from a point adjacent to the earth-surface upwardly and then forwardly and upwardly to a point adjacent to the front end of the conveyer-belt 30.

We have also provided means for removing earth that may adhere to the conveyer-belt 30 and discharging it upon the lateral conveyer 35 as follows: The numeral 40 indicates a scraper-plate and deflector supported on the arms 41 and having its forward upper end in position to engage the under surface of the conveyer-belt 30 near the rear end thereof, and said plate inclines downwardly and rearwardly to a point above the lateral conveyer 35.

In practical use and assuming that the apparatus is in the position shown in Fig. 1 and assuming, further, that power is applied to the shaft 28 to drive the digging and conveying chains at a relatively high rate of speed, then the cutting-blades 22 of each plate 20 will, when passing around the sprocket-wheels 18, engage the earth at the lower forward portion of the sprocket-wheels 18 and cut into it a short distance. They are prevented from cutting into the earth beyond a limited amount because the rear ends of the adjacent plates 20 limit the distance they may enter the earth. Then as the plates 20 leave a position adjacent to the sprocket-wheels 18, their rear faces slide upon the front face of the leg 12 and are thereby held in line with each other during the upward portion of their movement. The pockets formed by the part 21 of one blade and the plate 20 above it are gradually filled during this upward movement. When the earth carried by the plates 20 passes above the earth-surface, it is held from moving forwardly by the guide-plate 39. The upper end of this guide-plate 39 is inclined forwardly, so that when the rear ends of the plates 20 begin to move forwardly on account of the chains traveling over the upper sprocket-wheels 17 they will not be interfered with and the earth contained in the pocket will be thrown upwardly on account of the speed of the conveyer and forwardly by the rear ends of the plates being forced forwardly and upwardly as they pass over the upper sprocket-wheels. The forward faces of the curved portion 21 are scraped and cleaned by the rear ends of the plates 20 as they pass over the upper sprocket-wheels. A conveyer-belt 30 is arranged in position so that earth thrown upwardly from the plates 20 will strike it and the earth will be given a rearward movement. Any earth that may adhere to the belt 30 will be scraped from it by the scraper-blade 40 and will be discharged downwardly and rearwardly and discharged upon the top of the lateral conveyer 35, where it is moved to a point at one side of the ditch. By the arrangement of the plates 20 with their curved ends 21 it is obvious that the ditching device may be used effectively in earth of a wet and sticky nature. We have found that by running the chains 19 at a relatively high rate of speed centrifugal force is sufficient to discharge wet and sticky earth from the flat portions of the plates 20, while the scraping movement of the rear plates 20 over the curved portions 21 serves to dislodge any of the earth that might otherwise adhere to this portion of the plates where it would not readily be thrown off by centrifugal force.

It is of material advantage to have the inner faces of the plates lying flat against a flat surface of the supporting-leg, because the leg

serves to hold the plates in their proper path and there is less wear on the parts and less friction than if the sprocket-chains themselves engaged the legs.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States therefor, is—

1. A flexible traveling support and a plate secured to the support with its body portion lying in the path of travel of the support and its forward end projected outwardly from the support.

2. A flexible traveling support and a number of plates secured to the support, each plate having its forward end projected outwardly from the support, the rear end of each plate arranged to move across the face of the outwardly-projecting end of the adjacent plate in the rear when the traveling support is traveling around a curve.

3. The combination with a flexible traveling support, of a plate secured thereto and formed with a flat body portion and an outwardly and forwardly inclined blade at its front end relative to its line of advance.

4. The combination with a flexible traveling support, of a number of plates secured thereto each comprising a body portion substantially parallel with the support and an outwardly and forwardly inclined blade at the front end of the body portion relative to its line of advance.

5. The combination of a flexible traveling support at one point moving in a straight line and at another point moving around a curve and a number of flat plates secured to the conveyer each formed with an outwardly and forwardly inclined blade and its front end relative to its line of advance, the rear end of one plate standing close to the forward end of the adjacent plate and automatically moved across the forward end of the adjacent plate when the conveyer moves around the curve.

6. The combination of a flexible support, means for supporting and driving the flexible support arranged to hold the support in a straight line at one point and on a curve at another point and a number of plates secured to the flexible support each formed with an outwardly and forwardly projecting blade at its front end relative to its line of advance, the flat plates coacting with the blades to form a carrying-pocket when traveling over the straight portion and the said plates serving as scrapers to automatically discharge the contents of the pocket when traveling around the curved portion.

7. The combination of a leg, a flexible traveling support, means for directing the support to travel around the leg and plates formed with cutting and carrying devices secured to said traveling support and sliding along the face of the leg at one point.

8. The combination of a flexible traveling support, means for directing the support at one point on a straight line and at another point on a curved line, a cutting-blade secured to the support and projected outwardly and forwardly relative to its line of advance and a plate secured to the support with its rear end adjacent to the blade, said parts proportioned so that the plate moves across the adjacent face of the blade toward its outer end when the support begins to travel around the curved portion of its path.

9. The combination of a flexible support, a relatively small wheel supporting it at one end, a relatively large wheel supporting it at its other end, a plate secured to the conveyer adjacent to the rear end of the plate and curved outwardly and forwardly relative to the line of advance of the conveyer.

10. The combination of two sprocket-wheels, a sprocket-chain traveling around them, a blade carried by the chain projecting outwardly and forwardly relative to its line of advance and a plate secured to the chain with its rear end adjacent to the front end of the following plate.

11. The combination of two sprocket-wheels, a sprocket-chain passing around them, a plate fixed near its forward end to a link of the chain, a blade carried by the forward end of the plate and projecting forwardly and outwardly and a second plate fixed to a link of the chain with its rear end adjacent to the front end of the blade.

12. The combination of a leg, two sprocket-wheels mounted at opposite ends of the leg, a sprocket-chain traveling around said wheels and adjacent to one face of the leg and a number of plates secured to the links of the chain, each formed with a blade at its front end, said plates engaging one face of the leg between the sprocket-wheels.

13. The combination of a sprocket-chain, sprocket-wheels for supporting said chain, a plate fixed to one link of the chain and projecting over the adjacent link thereof, a blade carried by the forward end of the plate and projecting outwardly and forwardly and a second plate secured to a link of the chain projecting over the adjacent link with its rear end extending across to the rear face of the blade.

14. The combination of two sprocket-chains side by side, a plate fixed to two adjacent side-by-side links of said chains and projected over two adjacent side-by-side links of the chains, a blade carried by the plate and projecting outwardly and forwardly from its front end, a second plate fixed to two adjacent side-by-side links of the chains projecting over two adjacent side-by-side links of the chains and having its rear end close to the front end of the blade.

15. The combination of a leg having a flat face, two sprocket-wheels on opposite sides of said flat face, sprocket-chains carried by said sprocket-wheels and ditching-blades secured to the chains and resting against said flat face.

16. The combination of a leg having a flat face, sprocket-wheels supported at the ends of the leg on opposite sides thereof, two sprocket-chains passing around said sprocket-wheels, a number of plates each secured to adjacent links of both chains and a blade projected outwardly and forwardly from the front end of each plate, said plates arranged to engage and be guided by one face of the leg.

17. The combination of a leg having a flat face, sprocket-wheels supported at the ends of the leg on opposite sides thereof, two sprocket-chains passing around said sprocket-wheels, a number of plates each secured to adjacent links of both chains and a blade projected outwardly and forwardly from the front end of each plate, said plates arranged to engage and be guided by one face of the leg, the sprocket-wheels at one end of the leg of materially larger diameter than those at the other end.

18. In a ditching-machine, the combination of a conveyer having pockets and designed to enter a ditch and extend out of the top of the ditch, means for driving the conveyer at a relatively high speed and a belt above the top of the conveyer designed to receive discharge from the pockets against its under portion, means for driving its under portion upwardly and rearwardly to a point of discharge.

19. In a ditching-machine, the combination of a conveyer having pockets and designed to enter a ditch and extend out of the top of the ditch, means for driving the conveyer at a relatively high speed and a belt above the top of the conveyer designed to receive discharge from the pockets against its under portion, means for driving its under portion upwardly and rearwardly to a point of discharge and a stationary cleaning-plate engaging the under surface of the said belt near its discharge end.

20. In a ditching-machine, the combination of a conveyer having pockets and designed to enter a ditch and extend out of the top of the ditch, means for driving the conveyer at a relatively high speed and a belt above the top of the conveyer designed to receive discharge from the pockets against its under portion, means for driving its under portion upwardly and rearwardly to a point of discharge, a stationary cleaning-plate engaging the under surface of the said belt near its discharge end and a lateral conveyer receiving the discharge from the cleaning-plate.

JOHN FOSTER.
CHARLES F. FOSTER.

Witnesses:
T. H. MINER,
ANTON DOLEZAL.