(No Model.)

2 Sheets—Sheet 1.

F. X. LEMAY.

DITCHING MACHINE.

No. 330,909.

Patented Nov. 24, 1885.

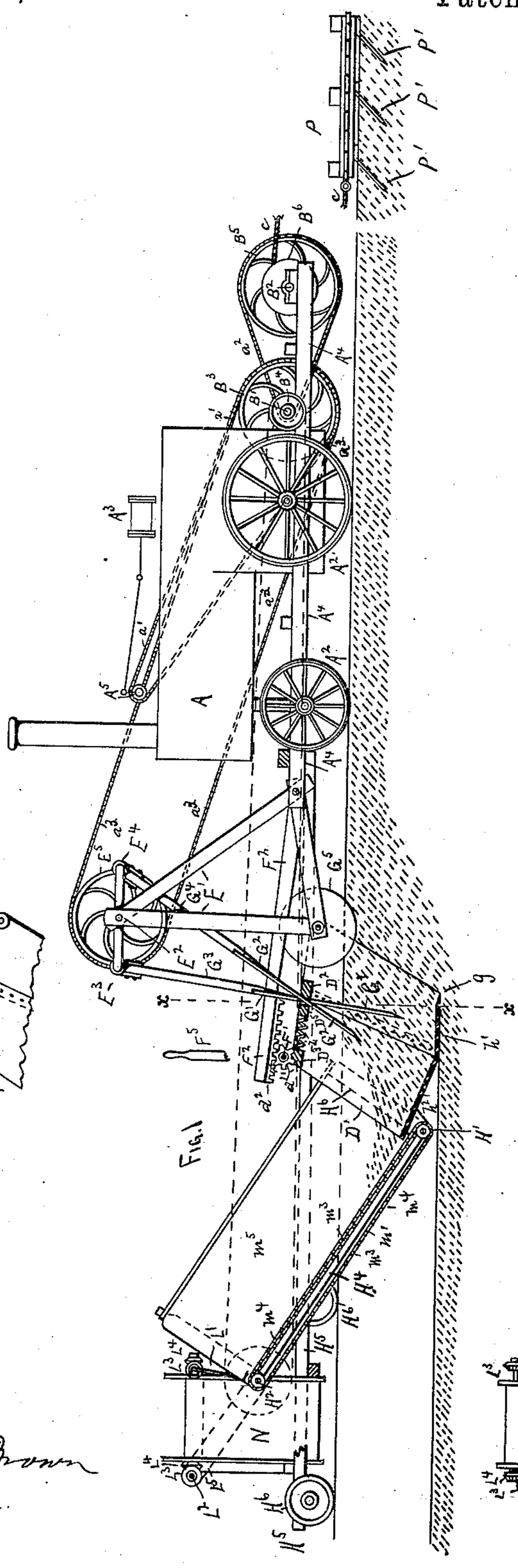

FIG. 1.

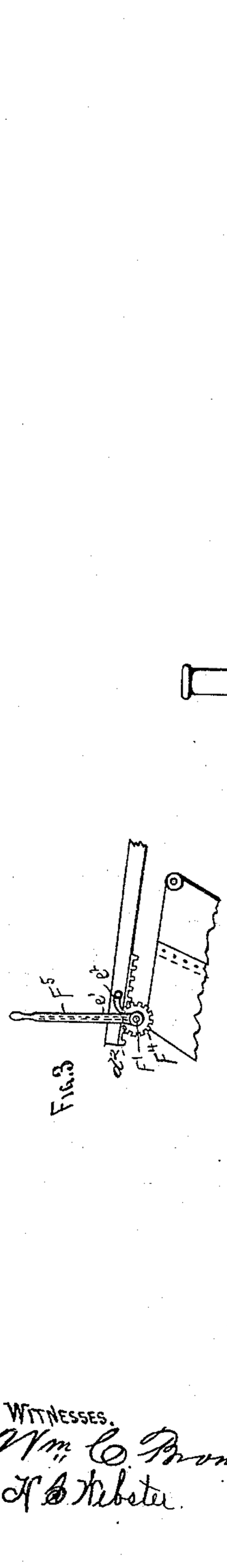

FIG. 3.

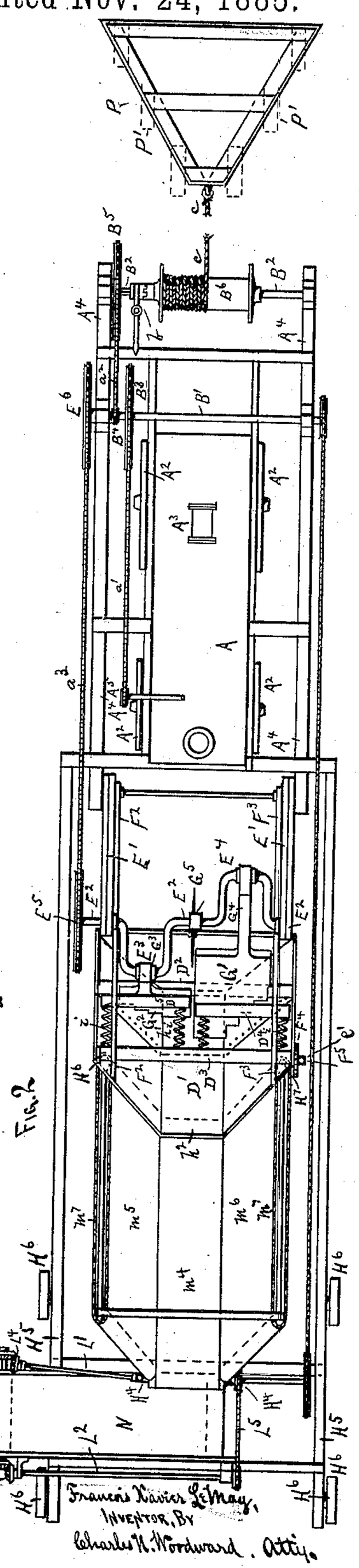

FIG. 2.

WITNESSES.

Wm. C. Brown

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Francis Xavier LeMay,
INVENTOR, BY
Charles N. Woodward. Atty.

(No Model.)

2 Sheets—Sheet 2.

F. X. LEMAY.

DITCHING MACHINE.

No. 330,909. Patented Nov. 24, 1885.

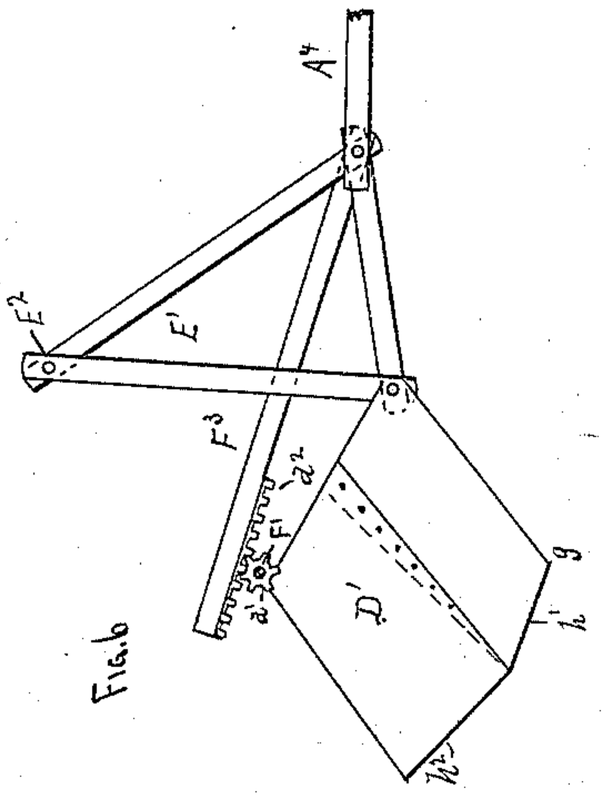

FIG. 6.

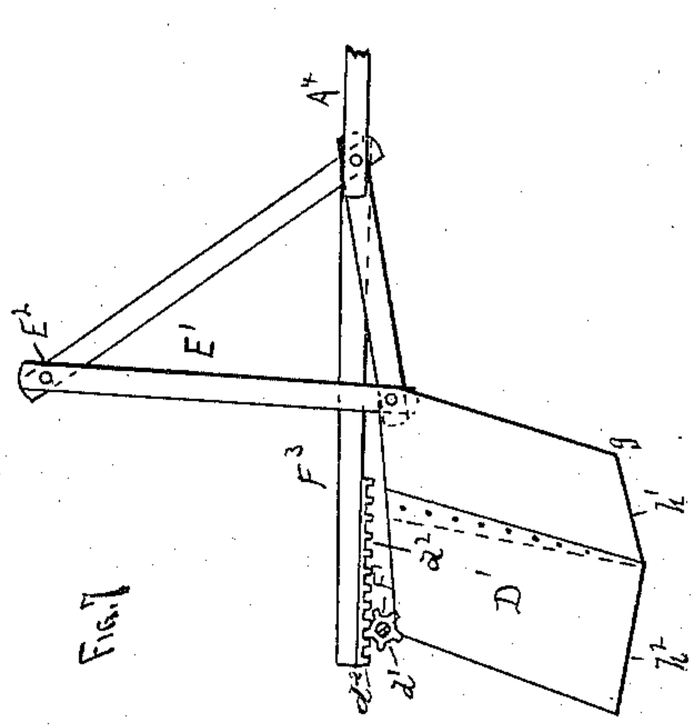

FIG. 7.

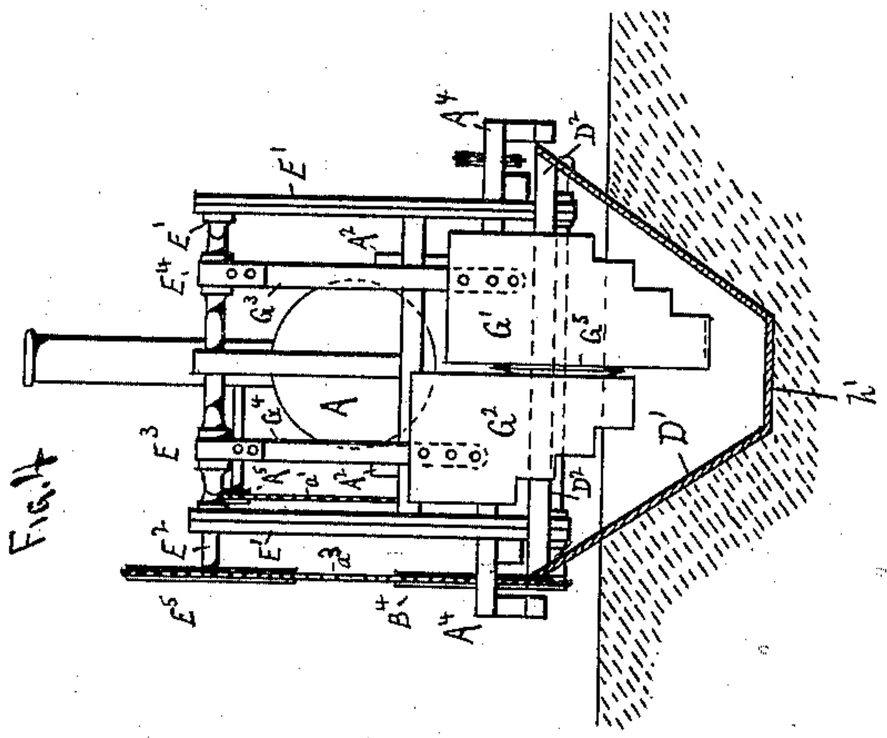

FIG. 4.

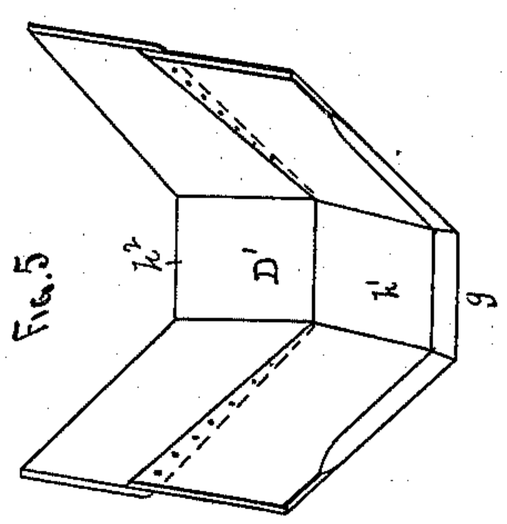

FIG. 5.

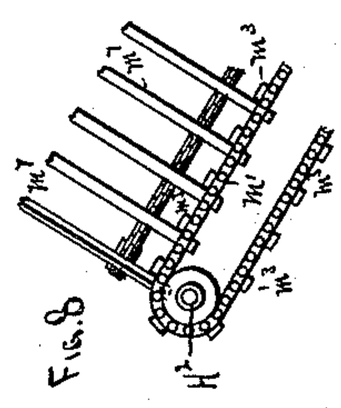

FIG. 8.

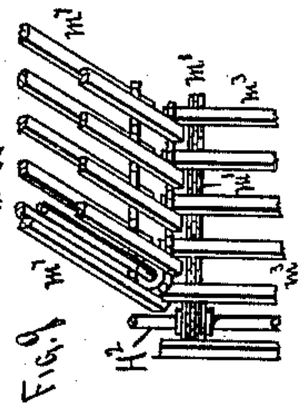

FIG. 9.

WITNESSES.
Wm. C. Brown
N. B. Webster.

Francois Xavier LeMay,
INVENTOR, BY
Charles N. Woodward, Atty.

UNITED STATES PATENT OFFICE.

FRANÇOIS XAVIER LEMAY, OF CROOKSTON, MINNESOTA.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 330,909, dated November 24, 1885.

Application filed June 17, 1885. Serial No. 168,990. (No model.)

To all whom it may concern:

Be it known that I, FRANÇOIS XAVIER LEMAY, a citizen of the United States, a resident of Crookston, in the county of Polk and State of Minnesota, have invented certain new and useful Improvements in Ditching-Machines, of which the following is a specification.

This invention relates to ditching-machines; and it consists in the construction, combination, and arrangement of parts, as hereinafter shown and described.

Figure 1 is a side elevation, and Fig. 2 is a plan view, of the machine complete. Fig. 3 is a detached detail of the mold-board-adjusting mechanism. Fig. 4 is a cross-sectional view on the line *x x* of Fig. 1. Fig. 5 is a perspective view of the mold-board detached. Figs. 6 and 7 are details of the mold-board-adjusting mechanism, showing more fully the manner of its operation. Figs. 8 and 9 are enlarged details of sections of the conveyers.

A represents a boiler mounted upon wheels A^2, and having an engine, A^3, upon its top, being an ordinary portable engine and boiler, such as are used in running thrashing-machines, &c.

Any of the many well-known forms of such portable engines and boilers may be employed; but the engine should be of a size sufficient to develop about twelve horse-power when run at two hundred revolutions per minute.

Attached to the boiler A, or to the running-gear of its supporting-wheels A^2, is a long frame, A^4, extending beyond the boiler at each end, and having two shafts, B' B^2, journaled across it in the rear of the boiler, as shown. The shaft B' has fast to it a chain-wheel, B^3, over which a chain, a', leads from a chain-pinion, A^5, on the engine-shaft, as shown, and on the same shaft, B', alongside the wheel B^3, is a chain-pinion, B^4, from which a chain, a^2, leads to a chain-wheel, B^5, on the shaft B^2. The shaft B^2 is provided with a roller or drum, B^6, the drum being loose upon the shaft, and adapted to be connected with or disconnected from the shaft by a clutch, *b*. A cable, *c*, will be attached by one end to the drum B^6, and led forward and secured to an anchor, P, at any point on the line of the ditch, usually about three hundred or four hundred feet ahead. The engine running at a speed of two hundred revolutions per minute, and the pinions A^5 and B^4 being each six inches in diameter, and the wheels B^3 and B^5 being each three feet in diameter, the shaft B^2 will revolve a little over five revolutions per minute, and the drum B^6 being one foot in diameter will wind up the rope and draw the boiler and engine and their attachments ahead about sixteen feet per minute, which is about as fast as the ditcher can be operated satisfactorily. I do not wish to be confined to this speed, however, as it may be varied as required. Neither do I wish to be confined to the arrangement and size of the gearing above described, as I am aware that any well-known mechanism may be used.

When the machine has been drawn by the rope up to the anchor P before mentioned, the clutch B will be opened, which will allow the drum B^6 to be turned backward and the rope unwound therefrom, and the anchor set at a new point, and so on throughout the length of the ditch.

D' is a "scoop" or mold-board formed of sheet-steel, and conforming in cross-section to the ditch to be cut. Usually the ditch will be formed about two feet across the bottom and six feet across the top, and three feet deep, and with slanting sides connecting the top and bottom, but this form and these dimensions may be varied when desired.

E' represents a triangular frame, suitably braced, and pivoted by one lower edge to the end of the frame A^4, and pivoted by the other lower edge to the upper forward corners of the mold-board D', while across its upper end is journaled a shaft, E^2, having two oppositely-bent cranks, E^3 E^4, as shown. On one end of the shaft E^2, outside the frame E', is a chain-wheel, E^5, adapted to be driven by a chain, a^3, from a chain-wheel, E^6, on the shaft B', the two wheels E^5 E^6 being the same size, so that the speed of the shafts E^2 will be the same as the shaft B', (in the construction shown about thirty-three revolutions per minute.)

Across the rear upper corners of the mold-board D' is journaled a shaft, F', on which are secured two pinions, d', adapted to engage with corresponding racks, d^2, on bars F^2 F^3, which lead backward and are pivoted to the frame A^4, as shown. On one end of the shaft F' is a wheel, F^4, provided with teeth in its rim, in

which a spring-pawl, e', on a lever, F^5, pivoted on the shaft F′, is adapted to catch. The wheel F^4 is also provided with a catch-pawl, e^2, whereby the shaft may be held at any desired point, as shown in Fig. 3. By means of this lever F^5 and its action on the shaft F′ the latter may be revolved in either direction, and the pinions d', acting on the rack-bars F^2 F^3, draw the rear end of the mold-board D′ nearer to or farther away from the frame A^4. If the shaft F′ be revolved to the left, the rear of the mold-board will be drawn nearer to the frame A^4, and thus elevate the rear end of the mold-board and cause its "nose" g to point downward at a greater angle to the surface of the ground, and thus cause the mold-board to cut deeper into the ground. (See Fig. 6.) Then if the shaft F′ be revolved to the right, the rear of the mold-board will be moved away from the frame A^4 and depress the rear end of the mold-board and cause its nose g to be elevated and run at a less angle to the surface of the ground, thus enabling the operator to easily and quickly alter the depth of cut of the mold-board. By revolving the shaft F′ far enough to the right to cause the nose g of the mold-board to point upward at an angle to the surface of the ground, the mold-board will run out of the ground, so that the ditcher may be easily removed from the ground when desired. (See Fig. 7.) The lower or bottom portion of the mold-board is formed with an angle in it, the forward portion, h', adapted to run in a nearly horizontal line, or nearly parallel with the surface of the ground, while the rear edge of the rear portion, h^2, is about ten inches from the bottom of the ditch.

Across the upper part of the sides of the mold-board D′ is secured a bar, D^2, against which the rear surfaces of two spades, G′ G^2, are adapted to move when raised and lowered by the revolutions of the cranks E^3 E^4 in the shaft E^2, to one of which cranks each of the spades G′ G^2 is connected by connecting rods or bars G^3 G^4. Across the mold-board D′, between its rear corners, is secured another bar, D^3, similar to and parallel with the bar D^2.

D^4 D^5 are two small bars, each adapted to be held against one of the spades G′ G^2 by springs i, to hold the spades pressed against the bar D^2. By this means the points of the spades will be drawn upward and thrust downward inside the mold-board, the cutting-edges of each of the spades moving downward into the mold-board and backward toward its rear edges and then upward again, each spade thus cutting off a slice of the soil within the mold-board and pressing said cut-off slice backward toward the rear of the mold-board, each spade acting in alternation and between the bars D^4, D^5, and D^2. These bars D^4 D^5 D^2 perform two functions—viz., they serve as a fulcrum to the lever-like movement of the spades, and also serve as scrapers to remove any adhering earth from the spades.

G^5 is a sharp-edged wheel, similar to the rolling colter of a plow, set on a shaft on the center of the lower part of the frame E′, and adapted to cut a crease down into the soil in advance of the mold-board, to assist the spades G′ G^2 in their work. Journaled across beneath the rear edge of the mold-board is a shaft, H′, carrying chain-pinions on both its ends, over which chains m' m' run to similar chain-pinions on the ends of a shaft, H^2, the two shafts H′ H^2 being connected by side bars, H^4, and the latter connected to a frame, H^5, mounted on wheels H^6, by which it runs on the surface of the ground. The chains m' are connected by cross-slats m^3, and over the cross-slats is an endless canvas belt, m^4, the whole forming a conveyer adapted to receive the earth from the mold-board and convey it backward and upward and deliver it over its rear edge upon another similar conveyer-belt, N, at right angles to the belt m^4, the latter being suitably mounted by chains, shafts, &c., in the frame H^5, and adapted to be revolved by shafting L′ L^2, gears L^3 L^4, and chains L^5 from the shaft H^4.

Journaled outside of the rear edges of the mold-board D′ on each side are two shafts, H^6 H^7, carrying chain-pinions on their ends, over which chains run, the chains being connected by slats m^7, and the slats being covered with endless canvas belts m^6 m^5 similar to the other belts, the three belts m^4 m^5 m^6 forming a constantly-moving trough-shaped conveyer. The lower ends of the slats m^7 project down between the slats m^3 of the lower belt, m^4, so that the slats m^3 will carry the slats m^7 along with them, and thus transmit the motion of the lower belt to the side belts, so that they will all move together. By this means the earth after being cut loose by the combined action of the spades and mold-board will be conveyed backward and upward and off to one side by the conveyers, and delivered alongside the ditch. An additional belt or a chute may be attached to or connected with the belt N, so that the earth may be conveyed to a greater distance from the edge of the ditch, or dumped into a car or wagon.

The cutting-edges of the spades will be formed with serrations or teeth, so that the cutting-edges do not all act at once, but a little at a time, to render the action more easy, and requiring less power to force them into the soil.

The anchor above mentioned is formed of a frame, P, having blades P′ projecting downward and backward toward the ditcher, so that the strains of the cable C will sink the blades into the soil and prevent the anchor from being drawn toward the ditcher.

I am aware that in ditching-machines rising and falling spades have been used in connection with a mold-board, said spades having a backward movement to throw the earth into such mold-board, but in such previous machines the spades have been arranged to cut the earth in advance of the mold-board, whereas in my machine the spades cut within the mold-board. By this latter arrangement the earth is cut off sharply and exactly, leaving

the sides and bottom of the ditch clean cut and smooth.

I claim as my invention—

1. In a ditching-machine, a scoop or mold-board adapted to be drawn through the ground, in combination with one or more rising and falling spades which cut the soil within said scoop, and have a backward movement within the same, substantially as set forth.

2. The combination of frame A^4, carrying the motive power of the ditcher, and adapted to be moved in the line of the ditch in advance of the cutting apparatus, a scoop or mold-board, D′, connected to said frame A^4 by a triangular frame, E′, and having a shaft, F′, carrying pinions d' d^2, journaled thereon, rack bar or bars F^2 F^3, connecting said pinions with said frame A^4, shaft E^2, having cranks E^3 E^4, spades G′ G^2, connected to said cranks by rods G^3 G^3, means for revolving said shaft E^2 to operate said spades, and means for revolving said shaft F′ to regulate the pitch of said mold-board D′, substantially as and for the purpose set forth.

3. In a ditching-machine, a scoop or mold-board, D′, adapted to be drawn through the ground, in combination with one or more rising and falling spades, G′ G^2, adapted to cut the soil within or in advance of said mold-board, and a cutting-wheel or colter, G^5, adapted to cut the soil in advance of said spades and mold-board, substantially as set forth.

4. In a ditching-machine, a scoop or mold-board, D′, adapted to be drawn through the ground, in combination with one or more rising and falling spades, G′ G^2, within or in advance of said mold-board, and revolving endless conveyer-belts m^4 m^5 m^6 N, adapted to receive the loosened soil from said mold-board, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANÇOIS XAVIER LEMAY.

Witnesses:

NÖEL LEMAY,

C. N. WOODWARD.