(No Model.) 5 Sheets—Sheet 1.

L. A. DÉSY.

DITCHING MACHINE.

No. 470,107. Patented Mar. 1, 1892.

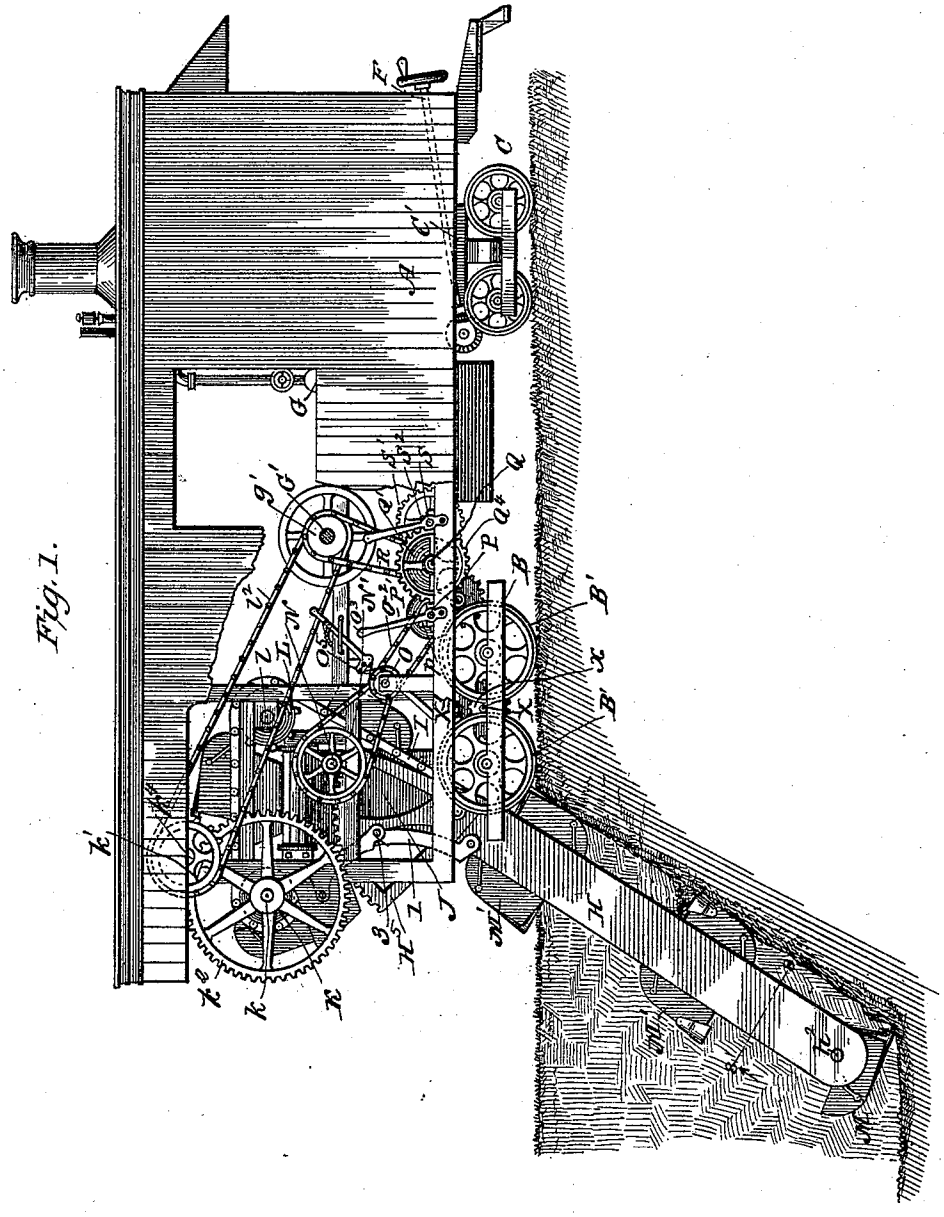

Fig. 1.

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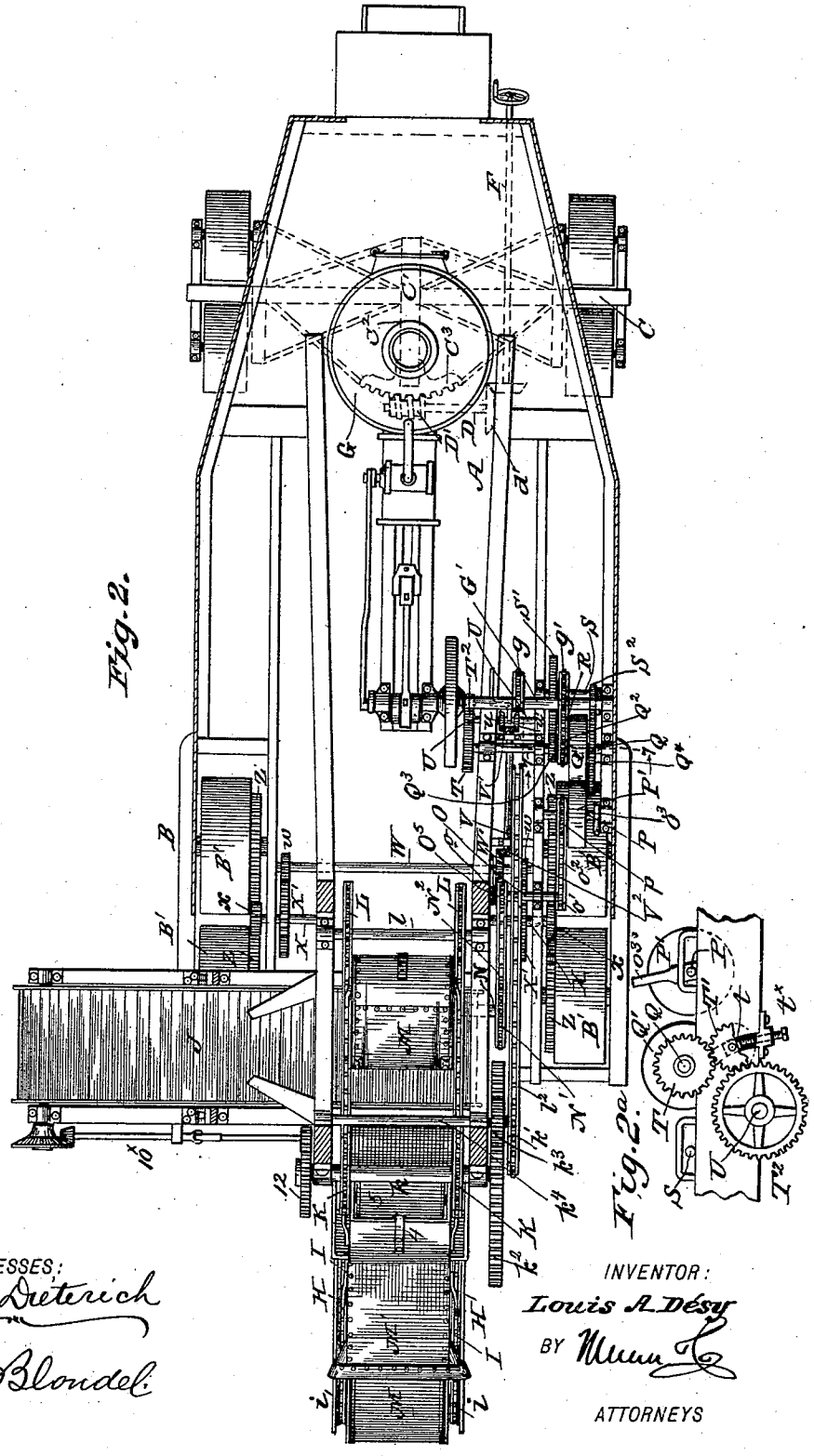

Fig. 2.

Fig. 2a.

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Fig. 3.

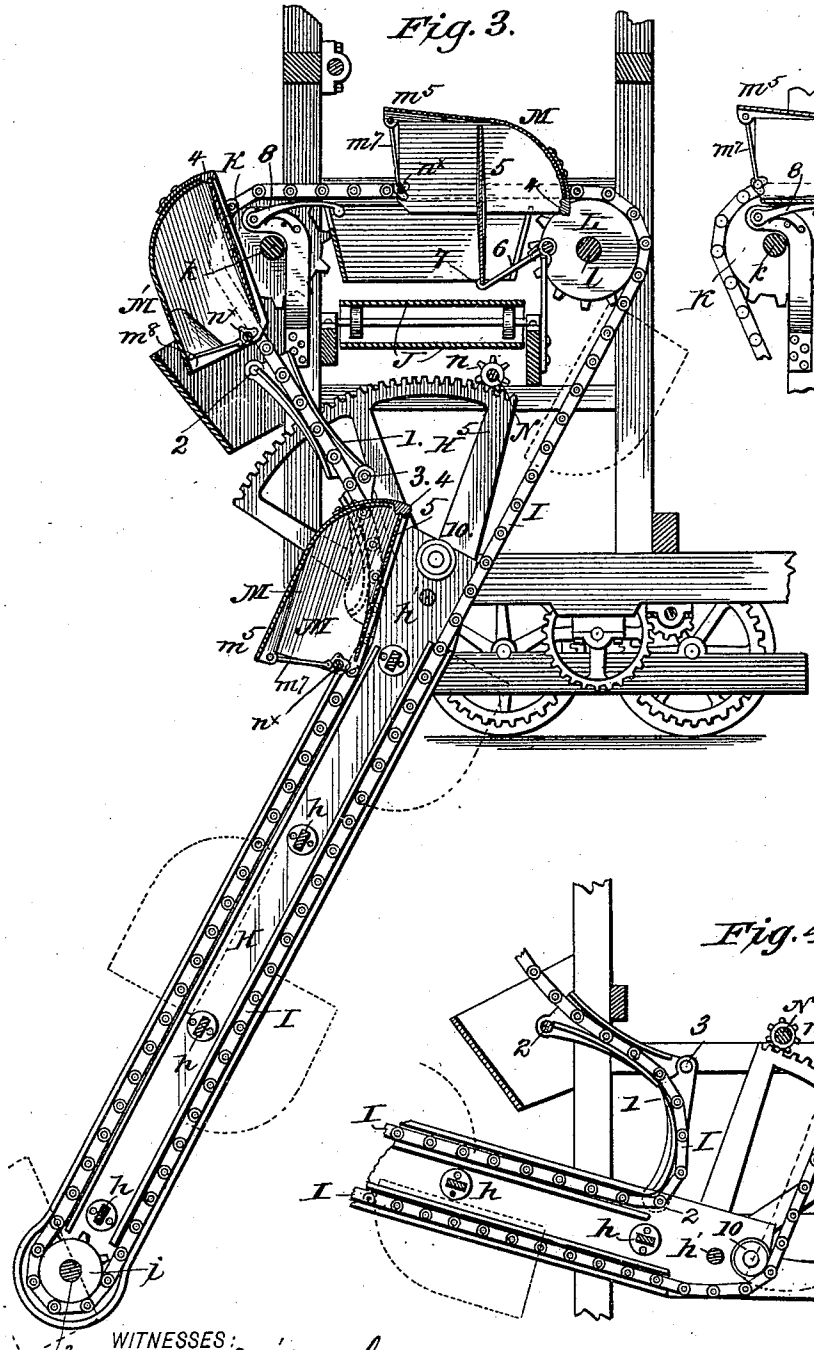

Fig. 3a

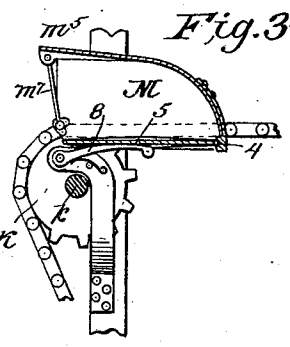

Fig. 4.

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Fig. 5.

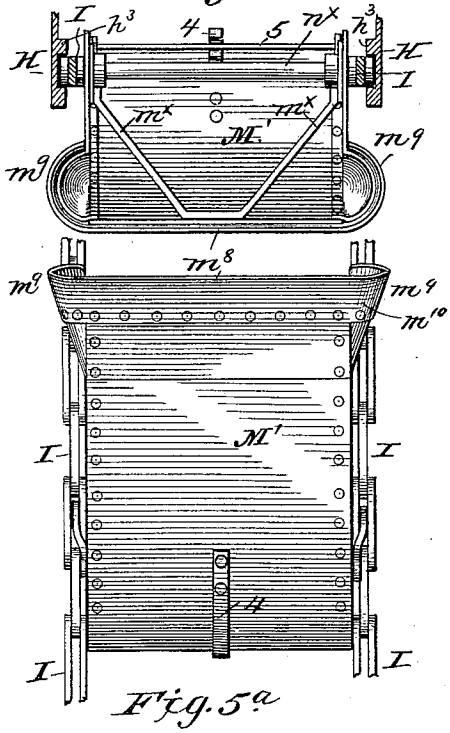


Fig. 5a

Fig. 6.

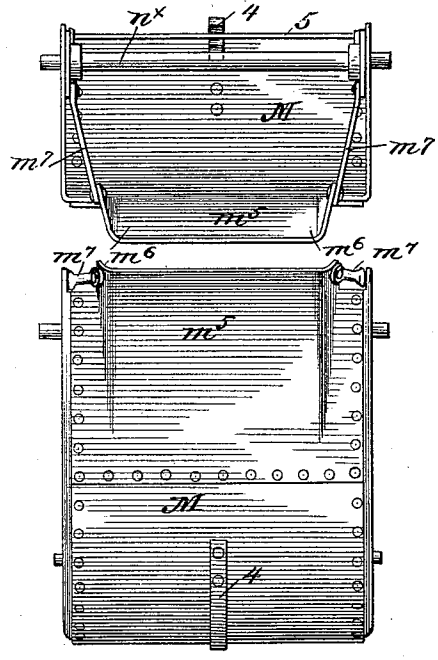


Fig. 6a

Fig. 7.

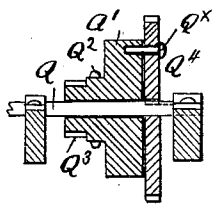
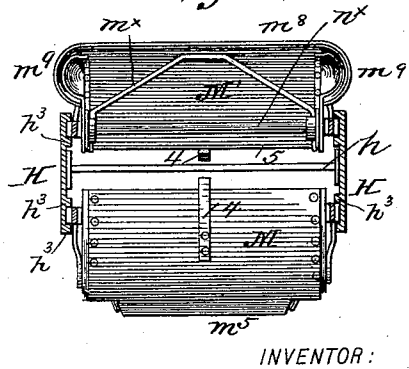


Fig. 8.



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L. A. DÉSY.

DITCHING MACHINE.

No. 470,107. Patented Mar. 1, 1892.

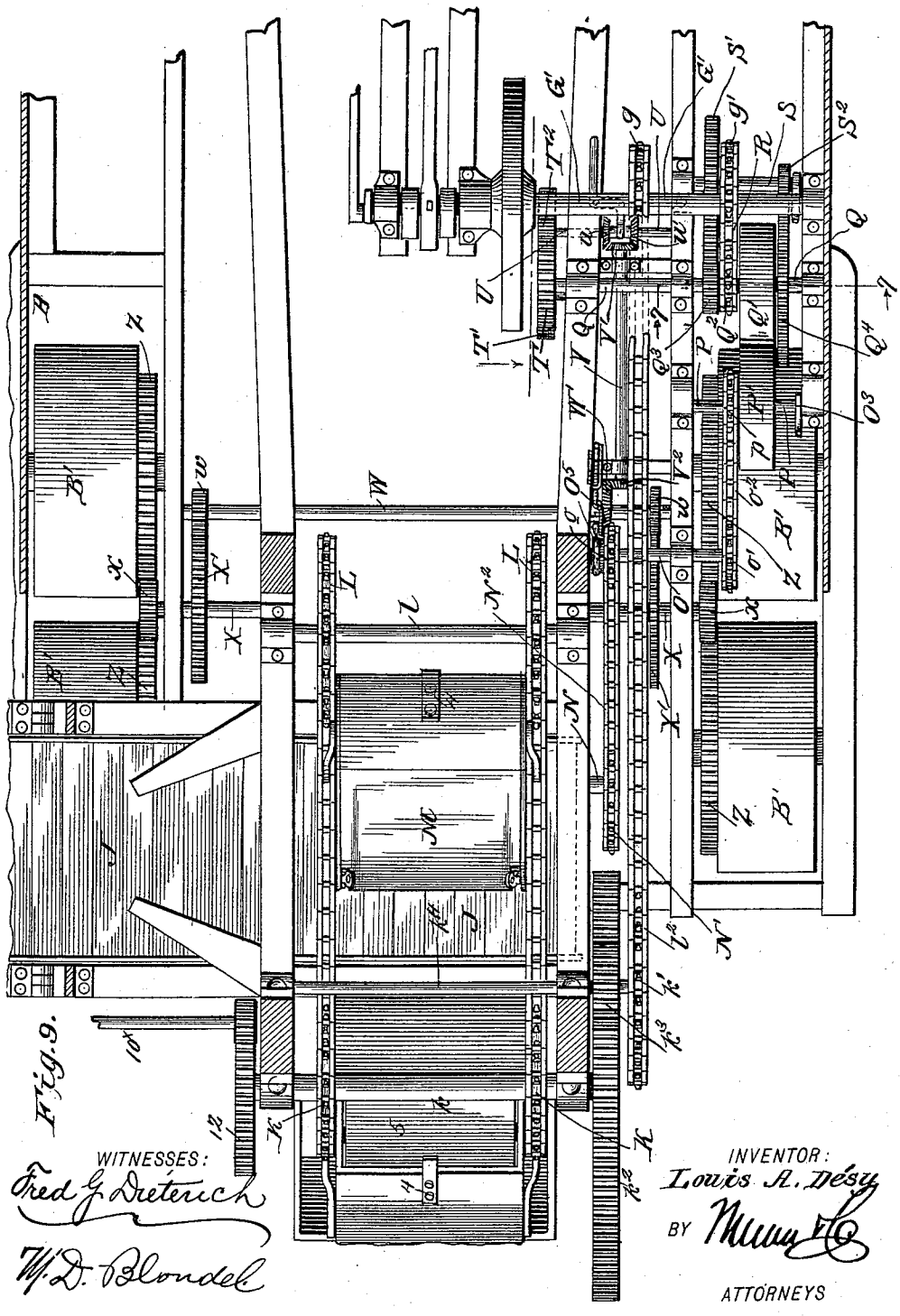

Fig. 9.

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UNITED STATES PATENT OFFICE.

LOUIS A. DÉSY, OF MONTREAL, CANADA, ASSIGNOR TO HENRI ALEXANDRE ABDON BRAULT, ANSELME LABRECQUE, AND ALEXINA MICHAUD DÉSY, OF SAME PLACE.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 470,107, dated March 1, 1892.

Application filed June 23, 1891. Serial No. 397,245. (No model.)

To all whom it may concern:

Be it known that I, LOUIS ARSENE DÉSY, residing at Montreal, in the Province of Quebec, Canada, have invented certain new and useful Improvements in Ditching-Machines, of which the following is a specification.

My invention has for its object to provide a ditching-machine more especially adapted for digging trenches of uniform width and of different depths; and it consists in the peculiar construction and novel arrangement of the several parts, all of which will be hereinafter fully described in the annexed specification, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation (parts broken away) of my improved ditching-machine in operative position. Fig. 2 is a top plan view of the same with the top of the car removed, parts being shown in section. Fig. 2^a is a detail view of the gears T, T′, and T^2, hereinafter referred to, looking in the direction indicated by the arrow in Fig. 9. Fig. 3 is a longitudinal section of the scoop-frame and the adjacent parts of the main frame. Fig. 3^a is a detail view hereinafter referred to. Fig. 4 is a detail view illustrating the scoop-frame as elevated. Figs. 5, 5^a, 6, and 6^a are views illustrating the construction of the scoops or buckets. Fig. 7 is a section on the line 7 7, Fig. 2, and Fig. 8 is a cross-section on the line 8 8, Fig. 1. Fig. 9 is a detail top plan of the traction and the scoop-frame elevating mechanism on an enlarged scale.

In the accompanying drawings, A indicates the car or platform upon which my improved ditching devices are mounted, which car is mounted on a fixed truck B at its rear end, having four traction-wheels B′, while the forward end of the car is supported on a four-wheeled steering-truck C, the wheels of both trucks being of a wide tread, so as to adapt them for the easy travel of the machine on roads. The truck C, which is most clearly shown in Fig. 2 of the drawings, may be provided with steering devices of any approved construction; but I prefer to employ the construction shown, which consists in providing the centrally-pivoted frame C′ with a rear extension C^2, formed with a segmental gear C^3, with which meshes a worm D′ on a shaft D, carrying a bevel-gear d', which is geared with and operated by the hand-wheel shaft F, as shown.

G indicates the engine, and G′ the main drive-shaft, which is equipped with two driving sprocket-wheels g g', one of which g is arranged to be belted with the scoop-operating devices, while the other g' is arranged to be connected with the traction devices hereinafter fully described.

As before stated, my ditcher is especially arranged for digging trenches of uniform width, such as gas-pipe, water-main, or sewer trenches. It is also arranged in such a manner that with the same scoop-operating devices the parts can be readily adjusted to dig a deep or shallow trench. Thus should the scoop-carrying frame be of such a length that when it is lowered to its utmost limit it will dig a trench ten feet deep and it is desired with the same devices to cut a trench, say, eight feet deep, the cutter-frame is adjusted to more of an obtuse angle, such adjustment being readily understood from Figs. 1 and 3 of the drawings.

The scoop-carrying frame, which is most clearly illustrated in Fig. 3 of the drawings, consists of the oblong side pieces H H, connected by the transverse brace-bars h and at their upper and lower ends by the transverse rods h' h^2, the upper rod h' serving as the pivotal axis or support for such frame, while the lower rod forms the lowermost shaft for the endless-chain sprocket-wheels i i, as shown. The endless chains I, which are guided in lateral flanges h^3 on the side pieces H, pass over the said sprocket-wheels i i at the lower end of the frame and over sprocket-wheels K and L, arranged above the scoop-frame on shafts k l, spaced apart and arranged one to each side of the dirt-receiving apron J, the shaft k serving as a drive-shaft for the endless chain, it being provided with a large gear k^2, which meshes with a gear k^3 on a shaft k^4, which shaft is also provided with a sprocket-wheel k', which is belted by the chain l^2 with the sprocket-wheel g on the drive-shaft G. (See Fig. 1.)

M indicates the buckets or scoops, which

are arranged and constructed in a manner hereinafter fully described. To provide means for adjusting the scoop-carrying frame H to cut to the depth desired or for lifting it out of operative position, I employ the devices clearly shown in Figs. 2 and 3, which also illustrate the traction devices, by reference to which it will be observed that upon the upper end of the frame H is formed a segmental rack H^5, which meshes with a gear n on a transverse shaft N, provided with a sprocket-wheel N', belted by the chain N^2 with a sprocket-wheel o on a counter-shaft O, also provided with an additional sprocket-wheel o', belted by the chain o^2 with a sprocket-wheel p on a sliding shaft P, also carrying a friction-pulley P', which is arranged to be brought (by means of the lever O^3) into contact with a friction-wheel Q', formed with a sprocket-wheel Q^2 and a gear Q^3, said friction-wheel Q' and its sprocket-wheel and gear-sections Q^2 Q^3 being loosely mounted upon a shaft Q, upon which is fixedly held a large gear-wheel Q^4, as clearly shown in Fig. 7.

R indicates a chain belt, which connects the sprocket-wheel Q^2 with the sprocket-wheel g' on the main drive-shaft.

To provide means for regulating the speed of the shaft Q to turn slow while ditching and fast while traveling over the road, I provide the shifting-shaft S, journaled adjacent the shaft Q, upon which is fixedly secured the large gear S', which is adapted to mesh with the small gear Q^3 and a small gear S^2, which meshes with the large gear Q^4 on the shaft Q. Upon the inner end of the said shaft Q is fixed a gear T, which meshes with an idler T', mounted in an adjustable bearing t, which idler meshes with a larger gear T^2 on the end of a short shaft U, provided with shifting bevel-gears u u', which are arranged to be alternately thrown in gear with a bevel-gear V' on a longitudinal shaft V, provided with a bevel-gear V^2, which meshes with a bevel-gear W' on a transverse shaft W, which shaft is also provided with small cog-wheels w, which mesh with larger cog-wheels X' X' on short counter-shafts X X, which in turn are further provided with small cog-wheels x x, which engage large cog-flanges Z Z on the inner faces of the rear traction-wheels, as shown.

By arranging the several gear mechanisms as stated, it will be readily seen that when it is desired to operate the machine to dig a trench the operator moves the shaft S, so that the gears S' S^2 thereon will engage the gears Q^3 Q^4 on the shaft Q, which will cause said shaft to travel at a slow speed, which in turn, through the gears T, T', and T^2 and the bevel-gears u and V', turns the shaft V, which shaft, being geared to the shaft W, which in turn is geared to the shafts X, through such shafts drives the rear traction-wheels.

As the machine can travel at a faster speed when digging a shallow trench than when it digs a deep one, I arrange for making the gear T interchangeable. Thus should it be desired to reduce the speed of the machine, a smaller gear T is placed on the shaft Q, and the idler T', with its movable bearing-box t, is moved up and brought into contact with the wheel T, and is held up to its adjusted position by the screw $t^\times$, as clearly shown in Fig. 2^a.

Now when it is desired to slightly elevate the scoop-frame H or raise it out of operative position, the operator, by shifting the lever O^3 and throwing the friction-wheel P' in contact with the friction-wheel Q', will cause the shaft N to revolve and, through its gear and the segmental rack in the scoop-frame, swing such frame to the position desired, which is held in such position by suitably-arranged brake devices O^5, as shown.

Owing to the peculiar arrangement of the upper chain-supporting pulleys, special means are provided for taking up the slack in the chain, which means are most clearly shown in Fig. 3, by reference to which it will be seen that a curved guide 1, pivoted at its ends 2 to the frame H and the machine-frame, and a pulley 10 are employed, such guide 1 having a central articulated joint 3. The said jointed guide and the pulley 10 when the frame H is elevated assume the position shown in Fig. 4.

When it is desired to move the machine from one point to another, the shaft S is thrown out of engagement with the shaft Q and a direct connection between such shaft and the main drive-shaft is made by a bolt $Q^\times$, which connects the friction-wheel Q' and the fixed gear Q^4 together in a manner clearly understood from Fig. 7 of the drawings. This will cause the shaft Q to move at a great speed and carry the machine rapidly forward, it being obvious that by shifting the bevel-gears u u' the machine may be caused to travel backward.

The scoops M', which are most clearly shown in Figs. 5 and 5^a, have their sides and bottoms braced by the brace-bars $m^\times$ and the transverse rods $n^\times$, and the scoops M, which are clearly shown in Figs. 6 and 6^a, are also provided with transverse brace-rods $n^\times$, as shown. The said scoops M M' are arranged to travel between the side bars of the frame H, and to provide for making the ditch of a width sufficient to accommodate the said frame, and to render the operation of the scoops easy and positive with a moderate engine-power, I arrange such scoops with alternate cutting-edges—*i. e.*, every other scoop is arranged to cut the central part of the ditch, while the alternate scoops have cutting-edges which extend entirely across the end thereof and project laterally to cut the edges of the ditch. The scoops M have each a central depression or cutter m^5, which extends over about two-thirds of the end of the scoop and which tapers rearward toward the bottom and has its ends curved up, as at m^6, such cutter portion being braced to the sides of the scoops

at m^7, as shown. The scoops M′ have each a cutting-blade m^8, which extends entirely across the scoop-body and projects at the sides thereof, as at m^9, which projections are curved up, as at m^{10}. The scoops M M′ are secured to the chain, as shown, and each of such scoops is formed with a tilting bottom plate 5, which is held to its normal or closed position by a spring-latch 4, such bottom plate 5 being arranged to be tripped and turned over to dump the earth and clean the scoop as it passes over the discharging-apron before referred to, and to provide a simple and effective means for tilting said bottom I arrange a spring-actuated arm 6, pivoted to the main frame, which is provided with a catch-finger 7, arranged to project in the path of the bottom of the moving scoop, so that when it reaches its uppermost or dumping position such finger will engage the front end of the bottom plate and hold it temporarily. Now as the scoop continues in its movement the bottom plate will be tilted on its pivot, forcing the spring-arm down until it and the plate reach the position shown in Fig. 3, a further movement causing the bottom plate to turn almost entirely over to the position shown in Fig. 3ª, at which time it will have become released from the arm 6, but will not yet be in a locked position, and to provide for locking it to the spring-catch 4, I employ the lever-arm mechanism 8, arranged as shown, which engages the rear end of the said bottom plate and forces it into a locked position.

The discharging-apron J (which may be of any well-known construction) is driven by a shaft $10^{\times}$, geared with and driven by a large gear 12, mounted on the same shaft which operates the endless scoop-chains.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of the main frame, the swinging scoop-frame H, hinged at its upper end to said main frame, the chain-wheels in the lower end of the frame H, and the scoops arranged whereby each alternate one will cut the center of the trench and the others the edges thereof, and means for operating the chains, substantially as and for the purposes described.

2. In a ditching-machine, the combination, with the main frame, the swinging scoop-carrying frame H, the chain-wheels K L, journaled on the main frame above the frame H, the endless chain, and the scoops secured thereto, said frame H formed with a segmental-rack portion on its upper end, of the shaft Q, provided with a friction-disk Q′, the adjustable disk-shaft P, having a disk P′ adapted to be moved in contact with the disk Q′, the shaft N, geared with the segment on the frame H, the belt connections between the said shafts N and P, and means for operating the shaft Q, all arranged substantially as shown, and for the purpose described.

3. The combination, with the main frame, the wheels K and L, the hinged frame H, the chains I, and the scoops carried thereby, of the chain-guide 1, pivoted at its ends to the frame H and main frame and formed with an articulated joint 3, substantially as and for the purposes described.

4. In a ditching-machine, the combination, with the main frame and the chain-wheels K L, of the swinging scoop-frame H, pivoted at a point below the wheels K L to the main frame, said frame having depending side arms, shaft h^2, having chain-wheels $i\ i$ journaled in the lower ends thereof, the endless chains I I, operating over the wheels $i\ i$, K, and L and arranged to travel within the side arms of the frame H, and the scoops M M′, carried by the chains I I, the scoops M having cutting-edges of less width than the frame, and the scoops M′ having cutting-edges of greater width than such frame, all arranged substantially as and for the purpose described.

5. In a ditching-machine, the combination, with the scoop-frame H and the endless chains I I, operating within the side arms of such frame, of the scoops M′, pivotally connected with the chains I I, their main or body portions being of a less width than the frame, such body portions having transverse cutting-edges projected beyond the side arms of the frame and turned up at their ends, substantially as shown and described.

6. The combination, with the main frame, the frame H, the endless chains I I, the scoops each having a centrally-pivoted bottom 5, and a spring-catch 4 for holding the bottom in a closed position, of the arm 6, provided with a catch-finger 7, arranged to engage the front end of the bottom 5 and tilt it, and the arm 8 for throwing the tilted bottom back into engagement with the spring-catch 4 to lock it in place, substantially as and for the purpose described.

7. In a ditching-machine, the combination, with the main frame, the driving mechanism, the frame H, hinged to the main frame, the chain-wheels K and L on the main frame and $i\ i$ on the frame H, and the chains I I, carrying the scoops M M′, of gear connections between the chain-wheel K and the drive mechanism for operating the chains, the traction devices geared with and operated by the said drive mechanism, friction-gearing connected with swinging frame H, and means for throwing such friction-gearing into contact with the traction mechanism, whereby to operate to raise or lower the frame H, all arranged substantially as and for the purpose described.

LOUIS A. DÉSY.

Witnesses:
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FRED G. DIETERICH.