

(No Model.)

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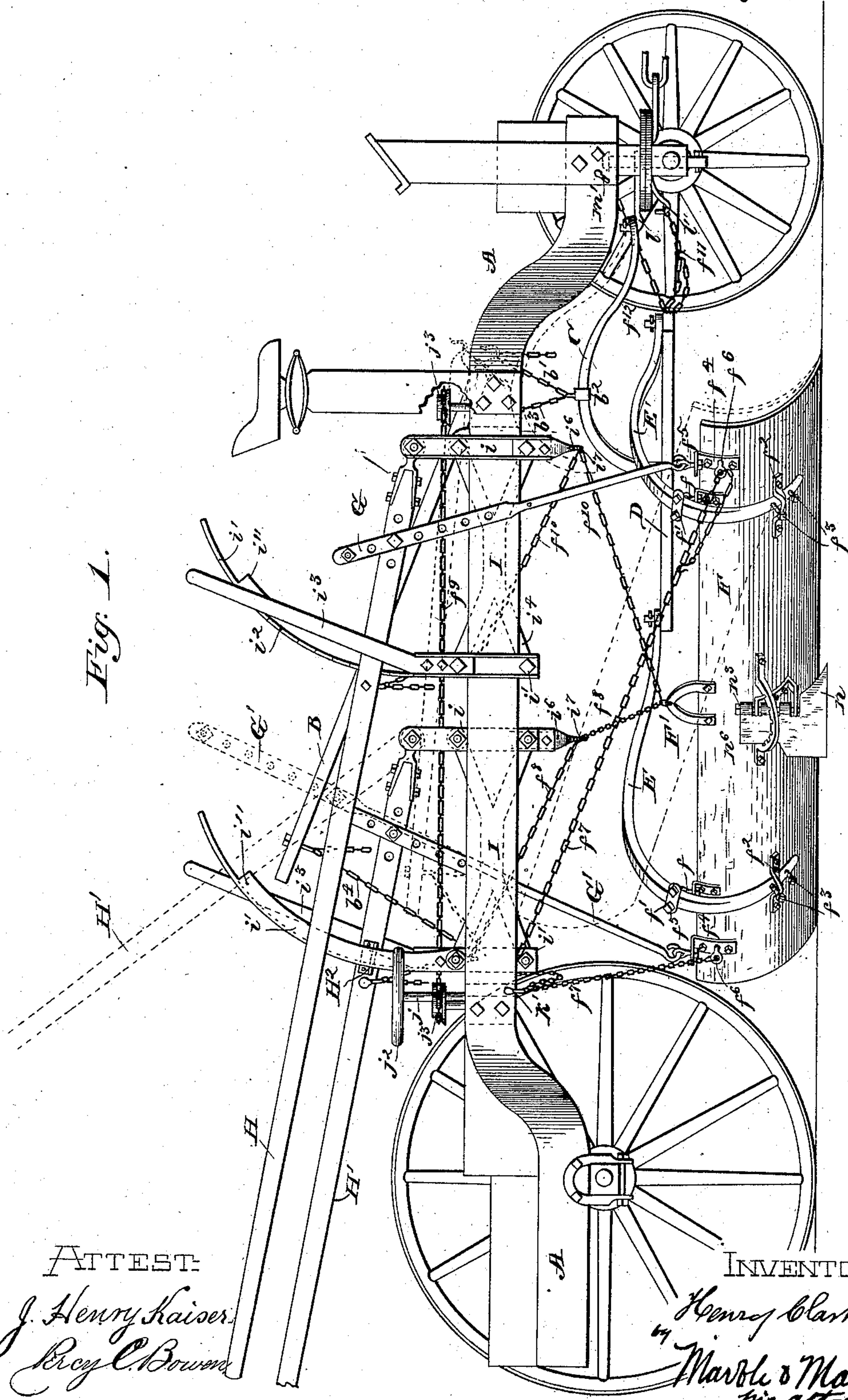
H. C. MOORE.

DIRECT DRAFT ROAD AND DITCHING MACHINE.

No. 365,847.

Patented July 5, 1887.

Fig. 1.



ATTEST

J. Henry Kaiser  
Per C. Brown

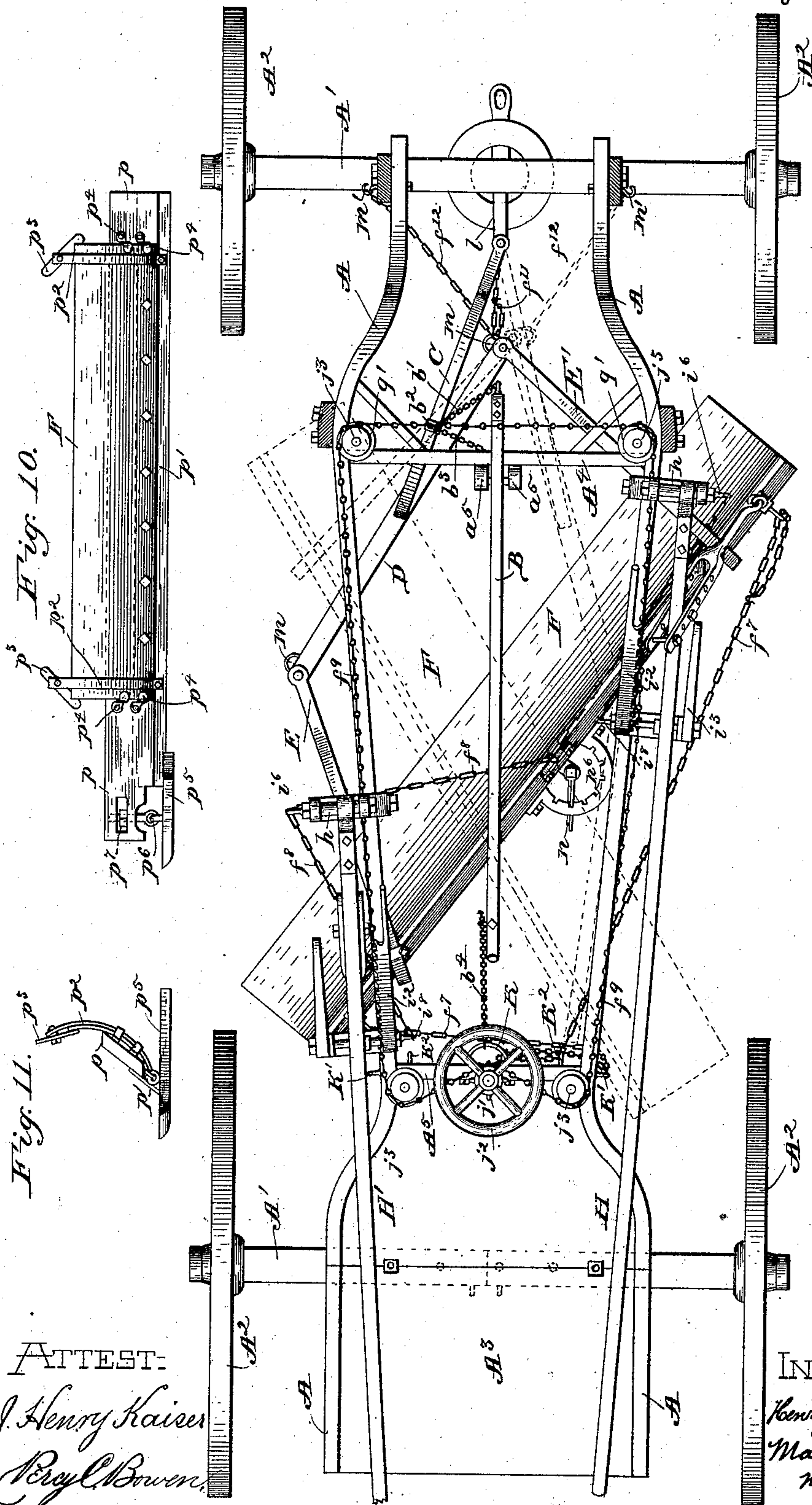
INVENTOR:

Henry Clarke Moore  
Marble & Mason  
his atty

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## DIRECT DRAFT ROAD AND DITCHING MACHINE.

Patented July 5, 1887.



ATTEST:

J. Henry Kaiser  
Perce C. Bowen.

INVENTOR:

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(No Model.)

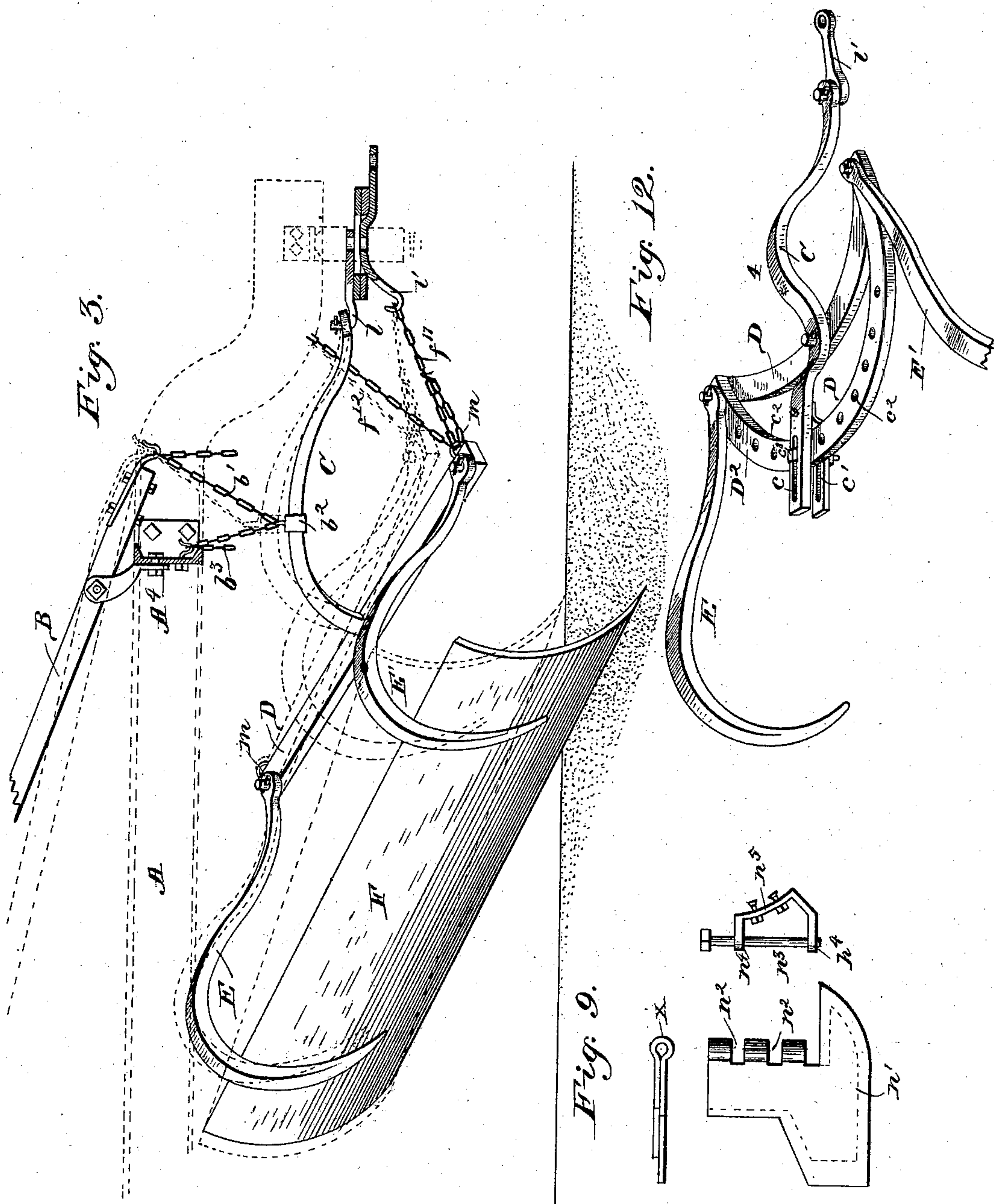
H. C. MOORE.

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DIRECT DRAFT ROAD AND DITCHING MACHINE.

No. 365,847.

Patented July 5, 1887.



ATTEST:  
J. Henry Kaiser  
Percy C. Bowen

INVENTOR:  
Henry Clarke Moore  
by Marshall Mason  
his atty.

(No Model.)

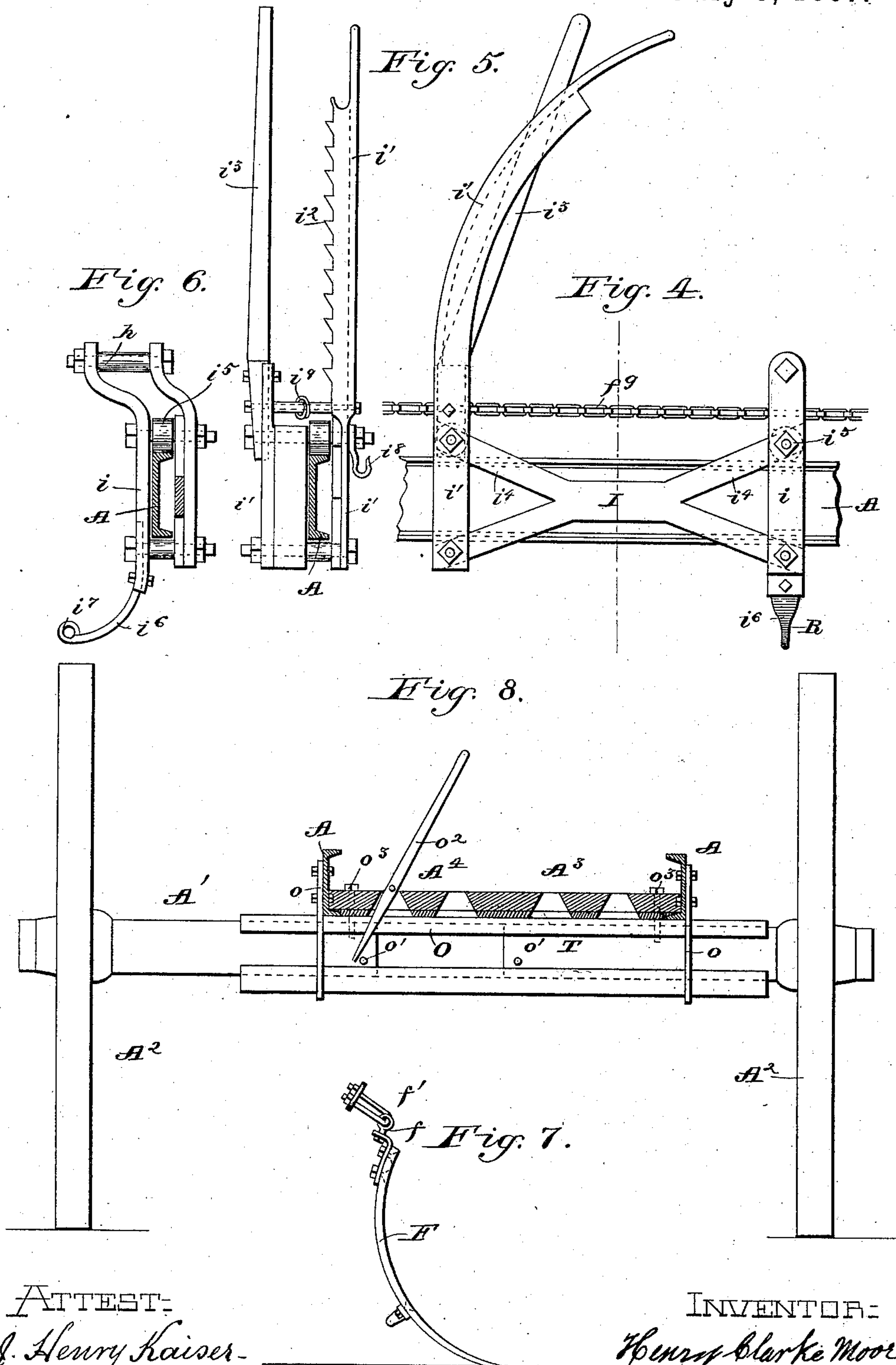
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INVENTOR:  
Henry Clarke Moore  
by Marble & Mason  
his attys.



# UNITED STATES PATENT OFFICE.

HENRY CLARKE MOORE, OF TAMA CITY, IOWA.

## DIRECT-DRAFT ROAD AND DITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,847, dated July 5, 1887.

Application filed March 15, 1887. Serial No. 230,955. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY CLARKE MOORE, a citizen of the United States, residing at Tama City, in the county of Tama and State of Iowa, have invented certain new and useful Improvements in Direct-Draft Road and Ditching Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in road and ditching machines; and it consists in the construction and combination of parts, which will be particularly hereinafter described and claimed.

One object of my invention is to provide a road and ditching machine which combines reversibility and adjustability of the scraper part with a direct application of the draft power to said scraper, and, further, to increase its effectiveness and convenience in handling.

A further object of my invention is to provide a road and ditching machine which will be simple and effective in its construction and operation, easily operated, and readily understood.

I attain these objects by the mechanism illustrated in the accompanying drawings, wherein the same letters and figures of reference indicate the same or corresponding parts in the several views, and in which—

Figure 1 is a side elevation of my improved machine, showing the scraper set for work, the dotted lines showing it in position for ditching. Fig. 2 is a top plan view of the machine, showing its wasp-shaped frame, and also the scraper in reversed position in dotted lines. Fig. 3 is a detail view in perspective of the scraper and its attachments to the main draft-bar, the scraper being shown at an angle with one portion thereof below the surface of the ground in full lines and as resting on the surface of the ground in dotted lines. Fig. 4 is a detail view in side elevation of one of the traversing carriages and of a portion of the main frame. Figs. 5 and 6 are detail views in end elevation of the channeled sides of the main frame, the traversing-frame provided with the ratchet-teeth, the standards, lever-

fulcrums, guy-braces, and trucks or rollers. Fig. 7 is a detail view in end elevation of the scraper and one of the swivel-connections for attaching the same to the draft-beams. Fig. 8 is a detail view in elevation of the rear axle, showing it bisected or divided and the devices for operating the same. Fig. 9 indicates detail views in side elevation and plan of an adjustable and interchangeable rudder and the parts for connecting the same to the scraper. Fig. 10 represents a rear view of the scraper, having attached thereto the removable leveling attachment provided with the sled-shaped shoe. Fig. 11 is a front end elevation of the scraper, the leveling attachment, and the sled-runner-shaped gaging-shoe. Fig. 12 is a modified form of draft-bar and the devices in construction therewith.

A indicates the side bars of the supporting frame of the machine, which are constructed of channeled or I steel, or other suitable material, and formed of a shape similar to that of a wasp—as, for instance, the portions just to the rear of the front axle may be taken as the head of the wasp; then follow the shoulders, then gradual convergence to the point forming the waist, and then divergence which forms the tail; also, said sides are raised or formed to be in higher planes between the front and rear axles than they are just over said axles, for purposes hereinafter stated. These side bars are mounted at their ends upon axles  $A'$ , provided with wheels  $A^2$ , and the rear portions thereof are united by a platform,  $A^3$ , upon which the operator stands and controls the operation of the machine. In the front and rear portions of the said bars A, and secured to the inner side thereof at each of their ends, are cross-beams  $A^4$   $A^5$ . The forward beam,  $A^4$ , has ears or lugs  $a^5$  secured thereto, in which a lever, B, extending longitudinally and centrally of the machine, is pivotally mounted. The forward end of the lever B has a hook secured thereto, to which one end of a chain,  $b'$ , is adjustably attached. The lower portion of said chain is rigidly attached to a loop or eye,  $b^2$ , secured to the top of the main draft-beam C. Another chain,  $b^3$ , connects with said loop and passes up to a grab-hook in the front of cross-bar  $A^4$ , to which it is adjustably secured for sustaining the weight



while adjusting the chain  $b'$  from the end of lever B. The draft-beam C is pivotally secured to the rear end of the draft-iron, which extends over the front axle, and is held in connection therewith by the king-bolt passing there-through.

To the rear end of the draft-beam C a draft and sway bar, D, is pivoted at its center, and to the ends of the latter the draft-bars E E' are pivoted, and thence extend backward and in the rear of the scraper F, to which they are flexibly and removably secured. On the upper portion of the scraper swivel-eyes  $f f$  are secured, through which clevises  $f' f'$  pass, in which the draft-bars E E' are placed and firmly clamped by the clevis caps and nuts.

On the lower portion and near each end of the scraper F brackets  $f^2 f^2$  are bolted, and through these the ends of the draft-bars E E' pass, said brackets being of such construction as to allow the said bars to move into the positions required when the scraper is reversed, and thereby prevent binding or clamping between the ends of said bars and the scraper. Screw-bolts  $f^3 f^3$  are secured in the ends of the bars E E', one on each side of each bracket  $f^2 f^2$ , and in such a manner as not to bind the said bars, the said bolts only acting to retain the scraper in connection with the bars E E' and prevent said scraper from changing its elevation should the nuts of the clevises  $f' f'$  become loose.

To the back upper portion of the scraper, near each end, are secured brackets  $f^4 f^4$ , having swivel-eyes  $f^5 f^5$ , to which are secured the lower ends of the bifurcated rods G G'. These rods have loops at their lower ends fitting in the swivel-eyes  $f^5 f^5$ . Loops  $f^6 f^6$  are secured to the brackets  $f^4 f^4$  for the attachment of the chain  $f^7$ . The lower looped ends of the rods G G' are connected to the scraper F, and their upper ends are bifurcated and extend upward outside of the main frame—one on each side thereof.

In the bifurcations of said rods the long levers H H' are pivotally secured and rendered adjustable by pins or bolts and a series of holes in said rods and levers, whereby the leverage may be lengthened or shortened. The ends of levers H H' are fulcrumed on the bolts  $h h$ , between the upper ends of the front uprights,  $i i$ , of the traversing carriages on frames I I, said uprights extending above and below the side bars, A A, on both sides thereof. The rear uprights,  $i' i'$ , of said frames also extend below the side bars on each side thereof.

I I represent the traversing frames or carriages, one being arranged on each of the side bars of the machine, and each is constructed of two front uprights,  $i i$ , and two rear uprights,  $i' i'$ . One of the rear uprights,  $i' i'$ , is curved forwardly and extended upwardly above the side bars, A, where it is provided with ratchet-teeth  $i^2$  on its inner side, and the other rear upright has attached thereto an upwardly and forwardly inclined bar,  $i^3$ . The purpose of these inclined bars  $i^3 i^3$  is to prevent too great

lateral movement of the long levers H and H' as they are raised or lowered in adjusting the position of the scraper. These front and rear uprights of the traverse-frames are connected together by iron straps  $i^4 i^4$ , Fig. 4, which are forked at their ends and bolted to said uprights. The outer front uprights,  $i i$ , extend downward, curve outward, and have secured thereto, or formed in one therewith, the iron or steel extension  $i^6 i^6$ , having eyes  $i^7 i^7$ , the object being to form guy-braces for adjusting the chains. These front and rear uprights straddle the side bars of the frame and are bolted together above and below said side bars, the bolts being covered with pieces of gas-pipe for holding them solidly in place and preventing movement of the uprights toward each other. On the middle bolts are placed rollers  $i^5 i^5$ , which run upon the upper edges of the side bars and permit free movement of the traversing frames or carriages.

On the sides of the curved uprights, which are provided with the ratchet-teeth, and near their lower ends, are applied the grab-hooks  $i^8$ , Fig. 2, which receive the adjusting-chains  $f^8 f^{10}$ , which pass through the eyes at the ends of the guy-braces  $i^6 i^6$ . The upper bolts, which connect the rear uprights,  $i' i'$ , receive open links  $i^9 i^9$ , one of which is shown in Fig. 5, to which the traversing chain  $f^9$  is secured.

At the center of the cross-bar A<sup>5</sup> of the main frame is secured the short vertical shaft  $j$ , which carries a sprocket-wheel above the same. On the rear side of said cross-bar A<sup>5</sup>, at its ends, and at the front side of the cross-bar A<sup>4</sup>, at its ends, are secured short vertical shafts carrying the pulleys  $j^3 j^3 j^3 j^3$ . Around these pulleys the traversing or reversing chain  $f^9$  is moved, said pulleys being flanged at their lower ends or provided with thin disks of metal for holding said chain  $f^9$  in place. This traversing or reversing chain passes around the outside of the pulleys  $j^3 j^3 j^3 j^3$  and inside of the sprocket-wheel  $j$ , as shown in Fig. 2, said sprocket-wheel being also provided with a flange or thin metal disk for assisting in holding up said chain.

At the front end of the scraper F the chain  $f^7$  is attached to a loop,  $f^6$ , which is secured to bracket  $f^4$ . Said chain passes thence through a semicircular loop,  $k$ , attached to the front side of cross-bar A<sup>5</sup> at its center; thence it passes down to another loop,  $f^6$ , on bracket  $f^4$ , at the rear end of the scraper F, and has slack enough to reach either of the two grab-hooks  $k' k'$ , in which it is attached when the machine is in operation. This chain is also allowed slack for the operator who is upon the frame to adjust the position of the scraper by pulling on said chain. To secure the chain after the adjustment of the scraper, the grab-hooks  $k' k'$  on the sides of the frame are used, and also the grab-hooks  $k^2 k^2$ , located at each end of the cross-bar A<sup>5</sup>, near its lower edge and on its front side.

A curved loop, F', is affixed to the center of the scraper and rises above its upper edge.



To a ring located at the center of this loop are connected the two chains  $f^8 f^{10}$ , which pass through the eyes  $i^7 i^7$  at the ends of the guy-braces  $i^6 i^6$ , and thence to the grab-hooks  $i^8 i^8$ , (shown in Figs. 2 and 5,) placed on the inner sides of the curved ratchet uprights. These chains have sufficient length to permit of their ends remaining in the hooks  $i^8 i^8$ , for the convenience of adjustment of said chains by the operator in reversing the scraper from the frame.

The draft-iron  $l$ , to which the main draft-beam  $C$  is connected, is placed immediately above the upper circular plate at the front end of the frame and securely bolted to the bolster. The king-bolt passes through this draft-bar, and also through the lower draft-iron,  $l'$ , to which the team is attached. This lower iron passes rearward, curves over the axle-tree, and drops downward. To its upturned end is attached a link of an extensible draft-chain,  $f^{11}$ . This chain is attached to the sway or draft bar  $D$  by passing through the eye  $m$  at the front end of the latter, and is adjustable to the desired length by a hook at its end. When the scraper and other parts are reversed, this chain  $f^{11}$  is transferred by the driver or operator to the opposite end of the sway or traverse bar and attached to the other eye,  $m$ . Upright studs may be substituted at the ends of said bar in lieu of the eyes  $m m$ , if desired, as being more convenient for the removal of the chain. To either of these eyes  $m m$  at the ends of the traverse-bar one end of another chain,  $f^{12}$ , is attached in the same manner as the chain  $f^{11}$ , the other end being applied to any of the grab-hooks  $m' m'$ , secured to the standards over the front axle. In reversing the position or changing the angle of the scraper these chains  $f^{11} f^{12}$  are disconnected from the sway-bar, and the chain  $f^7$ , attached to both ends of the scraper, is thrown out of connection with its eyes  $f^6 f^6$ . In this operation—reversing—the chain  $f^7$  drags through the loop  $k$  under the sprocket or chain-wheel  $j'$ . In readjusting the chains after reversing the length of the chains from the center of the scraper may require to be changed. The two front chains,  $f^{11} f^{12}$ , are only used when at very heavy work.

To accompany the machine two rudders are provided having different shapes, one being colter-shaped, as shown at  $n$  in Fig. 1, and the other of a curved or sled-runner shape, as shown at  $n'$  in Fig. 9. These rudders are interchangeable for working in different kinds of ground. They are formed from plates of steel doubled back and shaped to form a bolt-hole, and are provided with recesses  $n^2 n^2$ , communicating with said bolt-hole, as shown in Fig. 9. A vertically-arranged bolt,  $n^3$ , forms a pivot upon which the rudder may be turned or adjusted, said bolt passing through lugs  $n^4 n^4$  of a bracket,  $n^5$ , which is bolted to the back of the scraper at its center. The lugs  $n^4 n^4$  may be fitted in the recesses  $n^2 n^2$  at various heights, and secured by the bolt  $n^3$ , thus pro-

viding for the adjustment of the rudder at different elevations.

To the back of the scraper, at its center, is secured a curved bracket,  $n^6$ , provided with ratchet-grooves on its inside. It is curved in the arc of a circle of which the pivot-bolt  $n^3$  is the center, and extends around the rear portion of the rudder when the latter is in operative position. The ratchet-grooves permit of the upper back portion of the rudder being placed in either of them, and thus said rudder on the back of the scraper holds the latter in the line in which the team travels and lessens side strain on the wheels and frame.

In Fig. 8 is represented an extensible axle-tree,  $A'$ , for the hind wheels of the vehicle. This axle-tree is bisected at its center and fitted in a sheath,  $O$ , made of channel and angle steel plates, or of either of these forms of metal. The plates forming the sheath are rigidly connected by collars  $o o$ , which pass around and rise above them and are firmly bolted to the sides  $A$  of the frame.

Projecting from the sides of the axle-tree sections, near their inner ends, are pins  $o' o'$ , against which the lower end of the removable hand-lever  $o^2$  impinges in moving the said sections to or from each other within the sheath for adjusting the length of the axle-tree. Upon the upper sheath-plate rests the platform or bottom  $A^3$ , upon which the operator stands. This platform has a line of openings formed in it above the pins  $o' o'$ , and above this line of openings is placed a piece of timber or plank having a line of openings registering with those first named. Passing through either of these openings is a removable hand-lever,  $o^2$ , provided near its lower end with a pin projecting from its sides and resting on the edges of the openings in the piece of timber above the platform. Bolts  $o^3 o^3$  are passed through the platform, the timber, and the upper sheath-plate, and are secured in any one of a series of openings formed along the upper surfaces of the axle-tree sections, so as to firmly hold said sections at any point to which they have been adjusted. By means of the extensibility of the axle-tree the wheels of the vehicle can be placed outside or inside of the ridge of earth formed at the delivery end of the scraper.

A modified form of the draft and sway bar  $D$  and the main draft-beam  $C$  is shown in Fig. 12 of the drawings. This draft and sway bar is formed of two bars,  $D' D^2$ , which have the form of segments of circles having different centers and are rigidly connected at their ends. The forward bar,  $D'$ , is pivoted to the main draft-beam  $C$ , at the rear of the center 4 of a circle of which the rear bar,  $D^2$ , forms a segment. The rear end of the draft-beam  $C$  is slotted at  $c$ , and beneath this portion of the bar is secured a slotted plate,  $c'$ ; also, the rear curved bar,  $D^2$ , is formed with a series of holes,  $c^2$ . A key or bolt,  $c^3$ , passes through these slotted portions and any one of the holes in said rear bar, whereby the draft-bars and the



scraper may be firmly held in any of the positions to which it may be necessary to adjust them.

The leveling attachment for the scraper is shown in rear and end elevation, respectively, in Figs. 10 and 11. It is constructed and applied to the scraper as follows: A plank,  $p$ , of suitable length and width, is provided with a steel leveler or cutting-plate,  $p'$ , secured to its front face and extending below the lower edge of the scraper proper when in place thereon. Pivoted to the rear side of said cutting-plate or leveler  $p$ , near its lower edge, are the curved iron straps  $p^2 p^2$ , which are provided with the pivoted latches  $p^3 p^3$  at their upper ends. At points corresponding to the ends of the scraper the plank  $p$  is provided on its rear side with pivoted bottoms  $p^4 p^4$ . When the leveling attachment is placed upon the main scraper, the lower edge of the latter rests between the straps  $p^2 p^2$  and the rear side of the plank  $p$ . Then when the straps  $p^2 p^2$  are turned up and rest upon the back of the main scraper, near its ends, and the latches  $p^3 p^3$  are turned down upon its face, the leveling attachment and the main scraper are rigidly connected in vertical position, and then when the buttons  $p^4 p^4$ , pivoted to the rear side of the plank, are turned so as to project upon the back of the scraper, they hold the leveling attachment still more rigidly in position upon the main scraper. A sled-runner-shaped shoe,  $p^5$ , is pivotally attached to one end of the plank  $p$  of the leveling attachment by means of eyebolts  $p^6$ , and is vertically adjustable by means of the nut  $p^7$  on the upper portion of said bolt and located in an aperture in the plank. By adjusting the nut  $p^7$  on the shank of the eyebolt  $p^6$ , which connects the sled-runner-shaped shoe  $p^5$  with the plank  $p$  of the leveling attachment, the depth to which the steel cutting-plate  $p'$  enters the ground is governed, and all gouging of the road is prevented. The attachment of this shoe to the scraper is readily effected, and when in position thereon the light operation of leveling a road is effected with much greater speed and accuracy than can be done when the operator depends upon his judgment or eye for the perfection of the work.

From the construction and arrangement of the parts thus described the following additional advantages will be evident to those skilled in the art. The draft sway-bar  $D$  is not only pivoted at its center to the main draft-beam  $C$ , but the draft-bars  $E E'$  are loosely pivoted to said draft sway-bar and are connected with the scraper  $F$  by swivel-eyes, and the rods  $G G'$ , connecting the operating-levers  $H H'$  with the scraper, are also connected by swivel-eyes. The flexibility of these connections permits free horizontal and vertical movement of said parts into various positions; also, by the employment of the draft sway-bar  $D$ , which is pivoted on the main draft-beam  $C$  and carried by the chain  $b'$ , extending from the end of the lever  $B$ , the draft-beams  $E E'$ , connecting with the scraper,

may be materially shortened, so as to effect close approach to the team, and thereby materially lessen the weight on the operating-levers; also, the jointed or pivoted connections of the draft parts contribute to and enlarge the variety of positions in which the scraper may be placed, not only allowing it to be projected in all manner of ways outside of the frame, but permitting the angle of approach of its cutting-edge to the ground to be adjusted; also, when the scraper  $F$  is raised by the rods  $G G'$  and the levers  $H H'$ , and the latter are placed in engagement with the ratchet-teeth  $i^2$  on the sides of the curved uprights  $i'$ , the whole weight of the scraper and its connections rests upon the traversing frames  $I I$ , mounted upon the side bars of the supporting-frame and upon the sway-bar  $D$ , and when the adjusting-chains  $f^7$  and  $f^{11} f^{12}$ , which are respectively attached to the scraper and sway-bar and draft iron, are detached therefrom, and when the traversing frames are moved by operating the chain  $f^9$ , passing around the pulleys  $j^2 j^3$ , by turning the hand-wheel  $j$  and the sprocket-wheel  $j'$  the scraper will fall vertically beneath its supports by its own weight, whatever their positions; also, by means of the loose and flexible character of the parts connecting with and supporting the scraper, it has freedom of movement for any desired adjustment; also, when said scraper has reached the limit of the angle of adjustment that its supports will permit, the operator can increase its movement by pulling upon the chain  $f^7$ , attached to its delivery end, said chain being then secured to one of the grab-hooks  $k'$ , attached to the sides of the frame opposite to the delivery end of the scraper; also, when the delivery end of the scraper is thus secured in the desired position, the chain  $f^8$ , at its middle, which runs to the guy-brace  $i^6$  directly opposite, is adjusted to give such projection to the forward end of said scraper as is desired. Then the chain  $f^7$ , which runs rearward from the forward end of the scraper, and the chain  $f^{10}$ , which runs to the front guy-brace  $i^6$ , are secured to their respective grab-hooks  $k^2$  and  $i^8$ , so as to firmly hold the scraper at work when it is in the desired position. The guy-braces  $i^6 i^6$  are so arranged with respect to the scraper and the chains  $f^8$  and  $f^{10}$ , which are attached to the curved loop  $F'$  at the center of said scraper, that the latter is always held in the exact position required, under whatever arrangement it is placed. The position of the front end of the scraper may be changed by adjustment of both of the chains  $f^{11} f^{12}$  at the end of the sway-bar  $D$ .

On reference to Fig. 3 of the drawings, it will be evident that the front end of the scraper is capable of adjustment, so as to penetrate the ground or enter a ditch to different depths and still be retained in rigid or fixed position when at work. To adjust the scraper for ditching, the lever  $H'$ , as shown in Fig. 1, is lowered in the bifurcated upper end of the bar or rod  $G'$ , which connects it with the



scraper by placing the bolt on which the lever operates in lower holes in said bifurcated rod. The lever is then raised, and the ratchet-catch  $H^2$  on said lever is placed between the ratchet-teeth  $i^2$ , or on the square shoulder  $i'^2$  of the curved uprights  $i'$ . To drop the forward end of the scraper deeper into the ground, and still retain an easy cutting approach to its work, one or both of the chains  $b'$   $b^4$ , connecting with the opposite ends of lever B, are lengthened, thereby dropping the draft-beams and the draft sway-bar, and by the central connection of the main draft-beam C with the sway-bar a lower reach of the cutting-edge of the scraper into the ground is permitted by the downward play of the forward end of the sway-bar, which could not be attained were the draft-beam  $E'$  at the front end of the scraper directly connected with either of the front draft-irons,  $l'$   $l'$ . The lower draft-iron  $l'$  permits lowering of the front end of the scraper deeper into a ditch and still retain its cutting approach to its work.

The dotted lines in Fig. 1 show a position in which the scraper may be placed by raising up the lever  $H'$ , connecting by the rod  $G'$  with the scraper at its delivery end, for the purpose of making or cleaning out narrow ditches.

The advantages in having the main frame of wasp-like shape at the waist are that it permits the rod  $G'$ , connecting with the delivery end of the scraper, to extend under the frame and thus permit a more acute angle to be given to the scraper than it could have with a full width of frame, and by the breadth given to its rear end, which rests on the axle, greater steadiness and strength to resist twisting strains thereon is provided for; also, it affords more room for the operator and for ballasting the machine when at extremely heavy work—such as grubbing sage and making irrigating and other ditches; also, when the main draft-beam C is raised by the lever B and its chain  $b'$ , and the scraper is placed at right angles to the frame, the front wheels of the vehicle can be turned in either direction with perfect freedom under the front raised portions of the side bars of said frame without interfering with the scraper or its connections.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A wasp-shaped frame made of channeled steel for mounting and applying the operating devices of a road and ditching machine mounted on wheels, in combination with an adjustable scraper, substantially as described.

2. The combination, with the adjustable scraper of a direct-draft road and ditching machine mounted on wheels, of a wasp-shaped frame made of channeled or I steel and mounting and operating devices for said scraper, substantially as described.

3. The combination, in a direct-draft road and ditching machine, of the main frame, the reversible and adjustable scraper, the adjust-

ing-chains attached to the same, and the traversing frames or carriages provided with downwardly-extending curved guy-braces with eyes through which said chains pass, substantially as described.

4. The combination of the main frame, the scraper, and the devices for connecting and operating the same with and from said main frame with the draft-irons, the draft-beam, the sway-bar, and the draft-bars, all of the draft parts being flexibly or pivotally connected together, as and for the purpose set forth.

5. The combination of the main frame, the scraper, and the holding and adjusting chains therefor with the draft-irons, the draft-beam, the sway-bar, and the draft-bars, the last-named parts being pivotally and flexibly secured together, and the pivotally and flexibly connected rods and levers for operating said scraper, substantially as described.

6. The combination of the reversible and adjustable scraper with the draft-bars attached thereto, the draft sway-bar attached at its ends to said draft-bars, the main draft-beam pivoted at the center of said draft sway-bar, and means for connecting said draft-beam to the source of power, substantially as described.

7. The combination of the reversible and adjustable scraper, the draft-bars, the draft sway-bar, the main draft-beam pivoted at its rear end to the center of said draft sway-bar, means for connecting said main draft-beam to the source of power, and devices for adjusting and operating said scraper, substantially as described.

8. The combination, in a direct-draft road and ditching machine, of a reversible scraper, operating devices therefor, the two draft-irons pivoted to the draft sway-bar for permitting the adjustment of the cutting-edge of said scraper, the draft devices intermediate of said scraper and draft-irons, and chains attached to the frame for relieving said operating devices from the weight of the scraper, substantially as described.

9. The combination, with the scraper of a direct-draft road and ditching machine, of the main draft-connections, composed of front and rear sections pivotally and flexibly connected together, the main draft-beam C, and the draft-iron composing the front section and the draft sway-bar D and the two draft-beams E and  $E'$ , connecting with the scraper composing the rear section, substantially as described.

10. The combination of the adjustable scraper, the draft-bars, the draft sway-bar, and the lower draft-iron with the adjusting draft-chain  $f^{11}$ , connecting with the forward end of said draft sway-bar and with the rear end of said lower draft-iron, substantially as described.

11. The combination of the main frame, the adjustable scraper and its draft-connections, including the draft sway-bar with the adjustable front chain,  $f^{12}$ , attached to the front end of said sway-bar, and the retaining-hooks  $m'$



*m'* on the main frame, to which said chain is secured, substantially as described.

12. The combination of the scraper, the front axle-tree, the intermediate draft-connections, the upper draft-iron, the lower draft-iron having a front projection to which the team attaches, and rear upturned end and the chain applied thereto, substantially as described.

13. The combination of the main frame, the reversible scraper, and the operating devices connected thereto with the traversing or reversing chain, the sprocket-wheel, and hand-wheel, the shaft on which they are mounted, and the pulleys around which said chain traverses, substantially as described.

14. The combination of the reversible scraper and suitable devices for operating the same with the draft devices and the adjusting-lever *B*, centrally mounted upon the frame of the machine, and the chain *b'*, by which the angle or line of approach of the lower or cutting edge of said scraper is regulated and the weight of the draft devices sustained, substantially as described.

15. The combination of the adjustable scraper and devices for operating the same with the adjusting-chains *f<sup>8</sup> f<sup>10</sup>*, attached to its center, and the chains *f<sup>i</sup>*, extending from its ends and passing through sustaining-loops *f<sup>6</sup> f<sup>6</sup>* thereon, and the grab-hooks *k' k'* on the sides of the main frame for retaining said chain, and thus holding the scraper in its adjusted position, substantially as described.

16. The combination of the main frame, the adjustable scraper and its operating devices, the semicircular loop *k*, attached to the main frame, and the adjusting-chain attached to both ends of the scraper and passing through said loop, substantially as described.

17. The combination of the main frame,

the adjustable scraper and devices for operating the same, the adjusting-chains *f<sup>8</sup> f<sup>10</sup>*, attached to the center of said scraper, the guy-braces *i<sup>6</sup> i<sup>6</sup>*, having eyes *i<sup>7</sup> i<sup>7</sup>*, and the retaining-hooks *i<sup>8</sup> i<sup>8</sup>*, substantially as described.

18. The combination of an adjustable scraper or plow with interchangeable rudders, the bracket *n<sup>4</sup>*, the pivot-bolt *n<sup>3</sup>*, and the curved bracket *n<sup>6</sup>*, provided with ratchet-grooves, substantially as described.

19. The combination, in a road and ditching machine, of a bisected extensible axle-tree provided with pins on its side, the sheath, the bottom, and the plank formed with openings, and the operating-lever fulcrumed in said openings and extending to said pins, substantially as described.

20. The combination of the bisected adjustable axle-tree, the sheath, the bottom and the plank provided with holes, and the keying-bolts fitting in said holes for securing the sections of the axle-tree in fixed position, substantially as described.

21. The combination, with the scraper, of the leveling attachment provided with the leveling-plate, the sled-runner-shaped shoe or gage, the eyebolts, and the adjusting-nut, substantially as described.

22. The combination, with the scraper, of the leveling attachment provided with the plank, the cutting or leveling plate, the pivoted straps, and the buttons and latches, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY CLARKE MOORE.

Witnesses:

TOM R. STUART,  
L. SEWARD BACON.