

(No Model.)

5 Sheets—Sheet 1.

C. J. & A. B. COREY & E. O. WATTIS.
GRADING AND DITCHING MACHINE.

No. 559,165.

Patented Apr. 28, 1896.

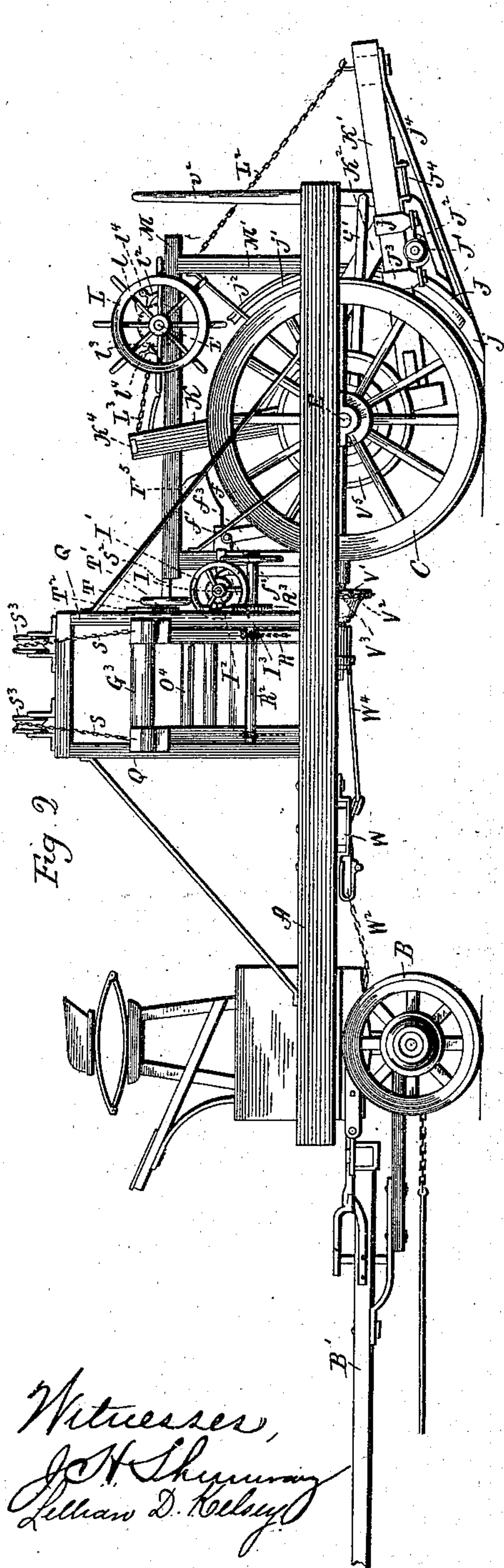
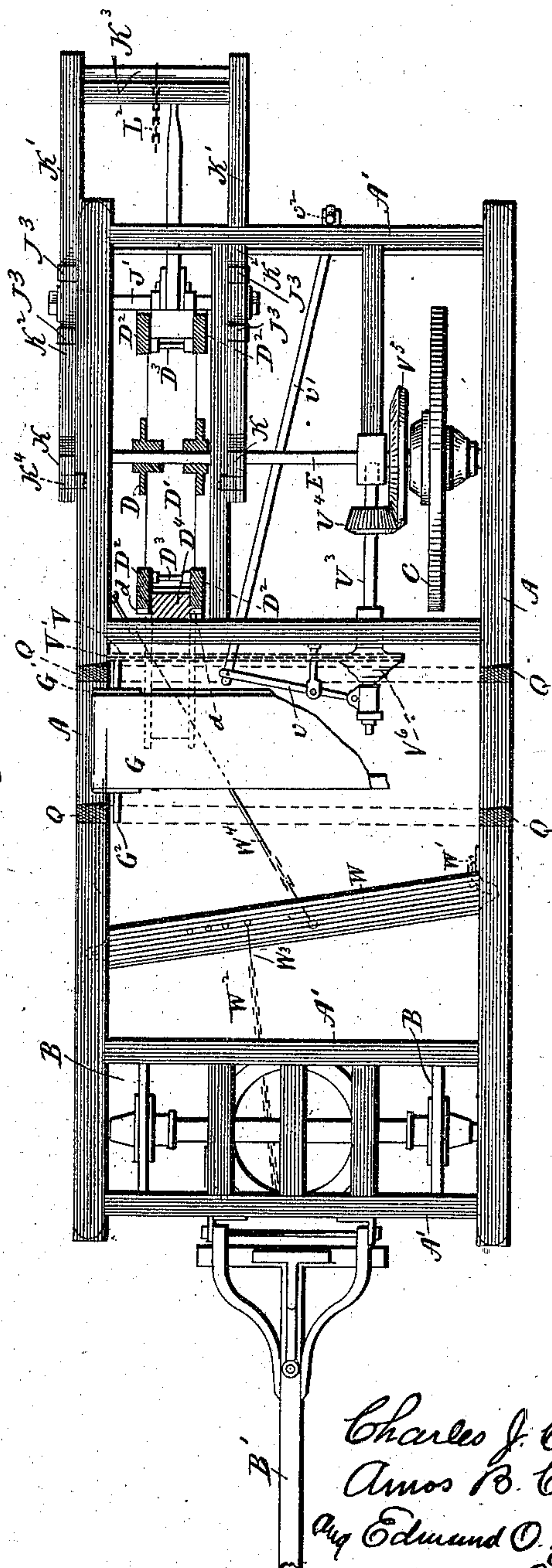


Fig. 2

Fig. 1



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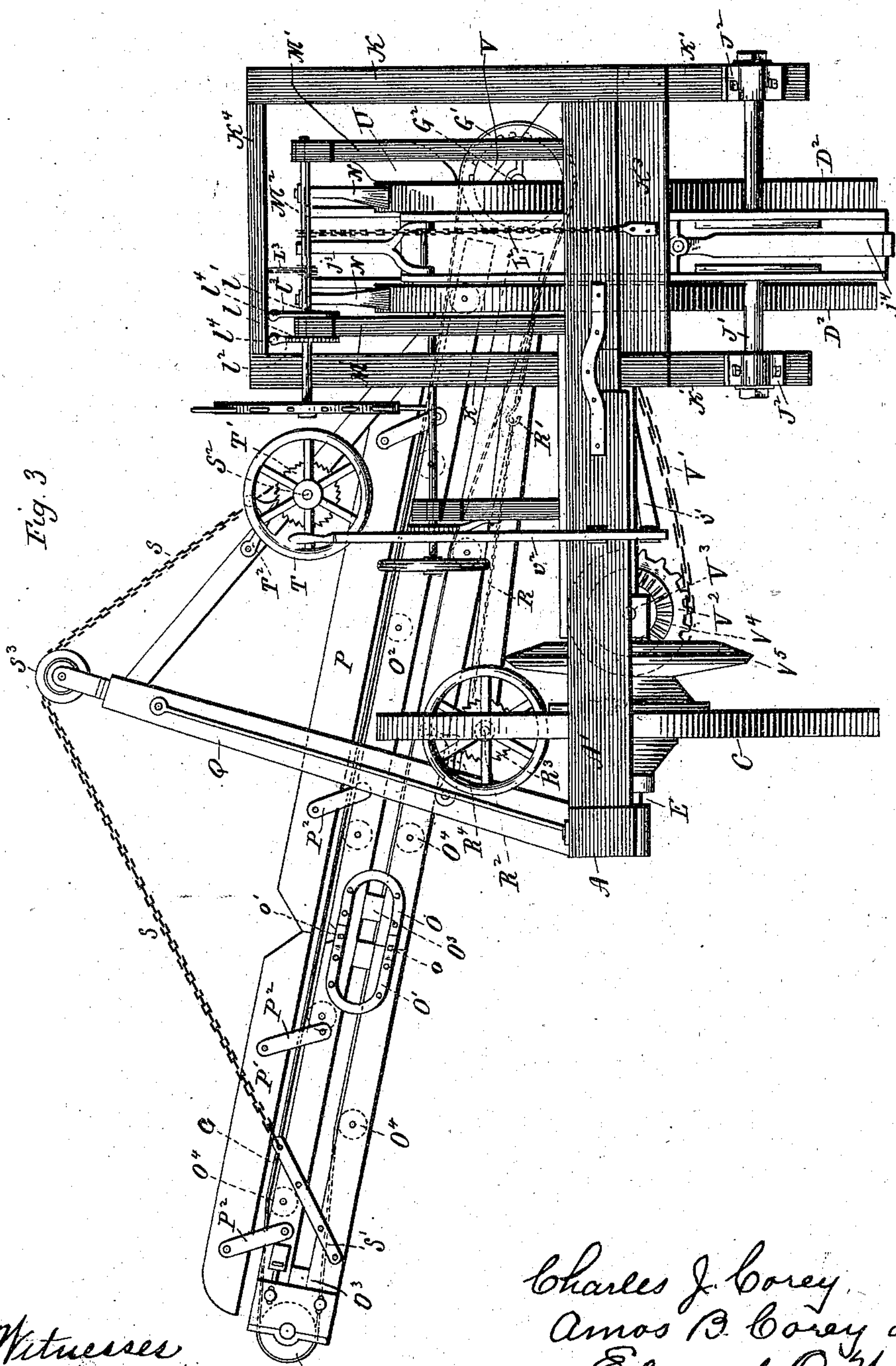
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Witnesses
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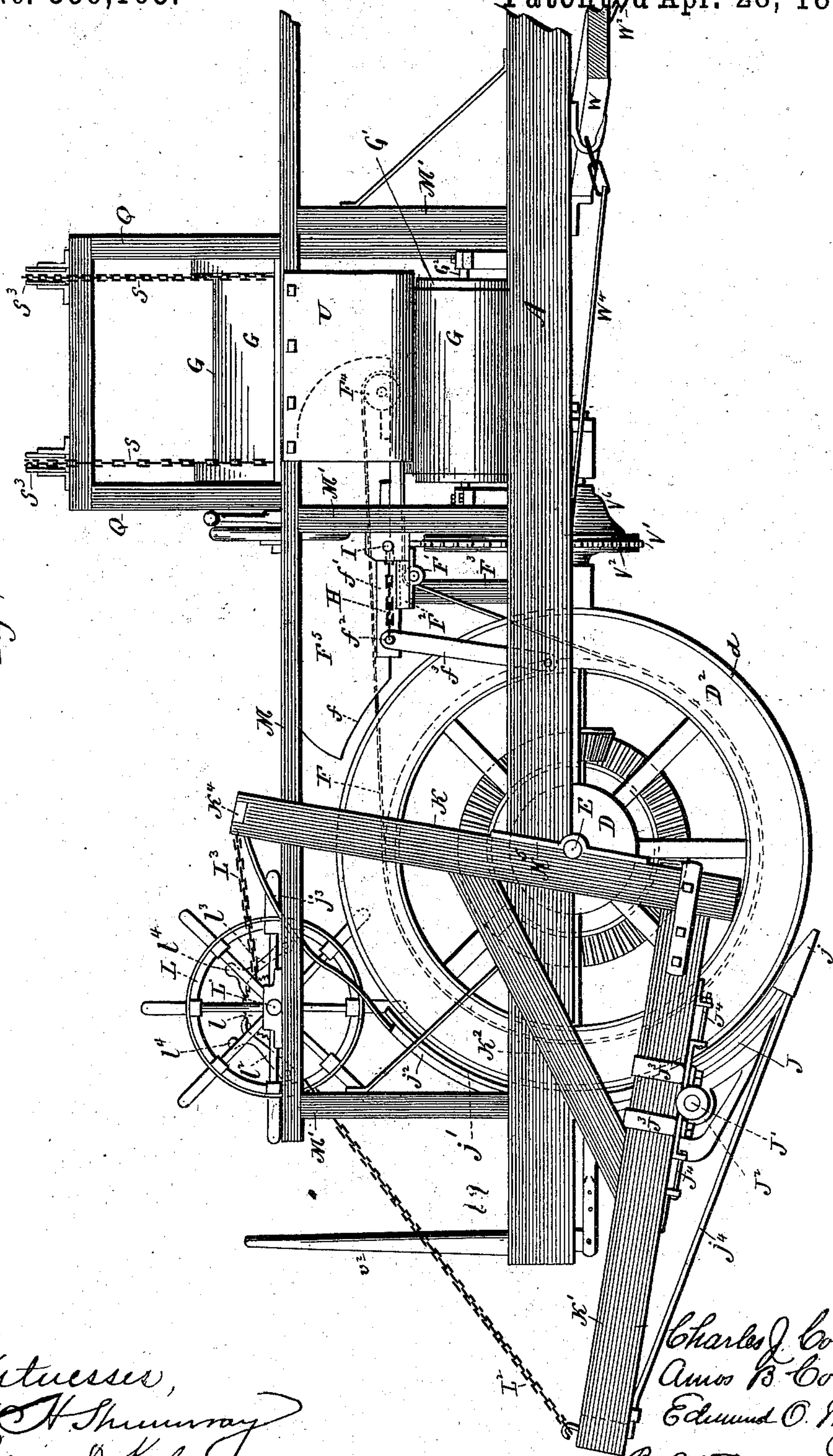
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Fig. 4



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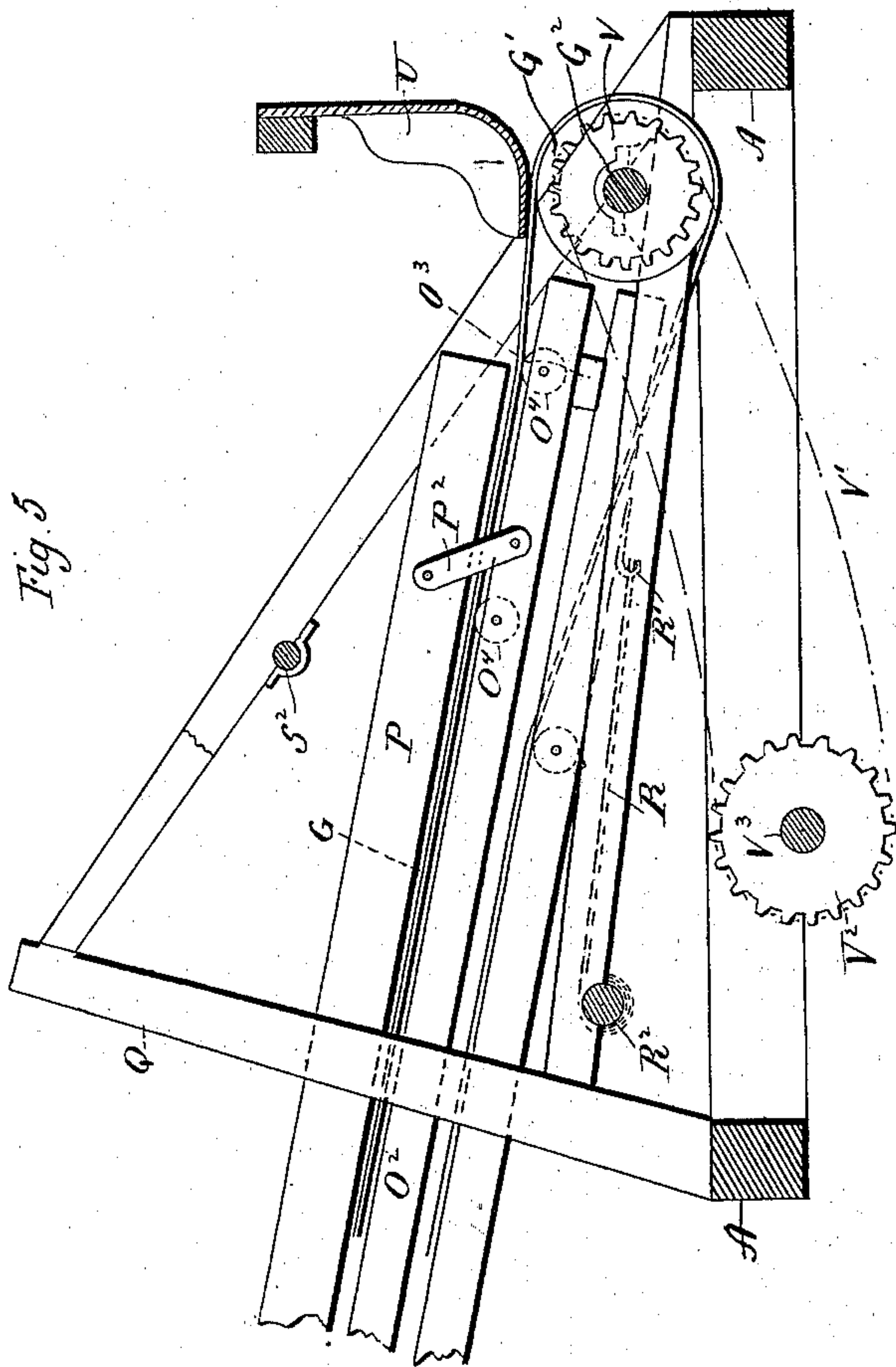
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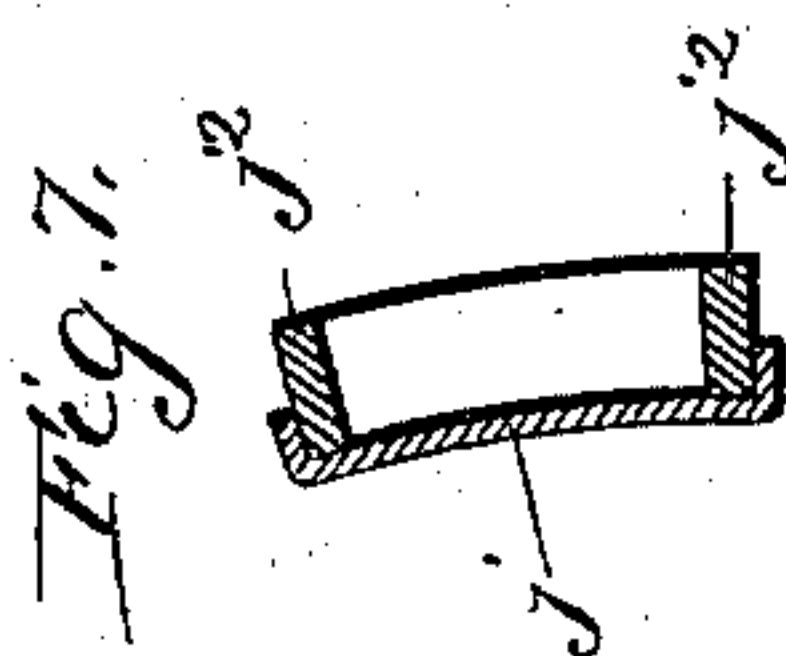
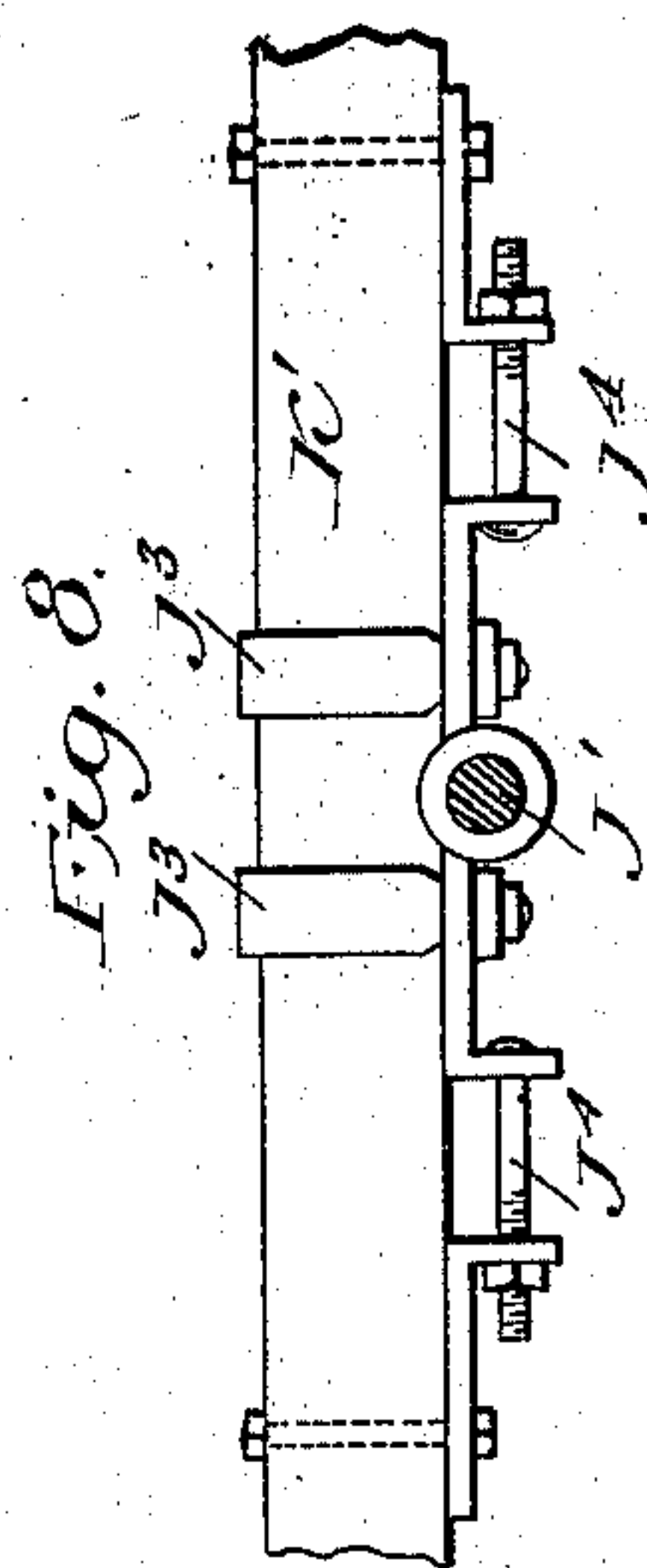
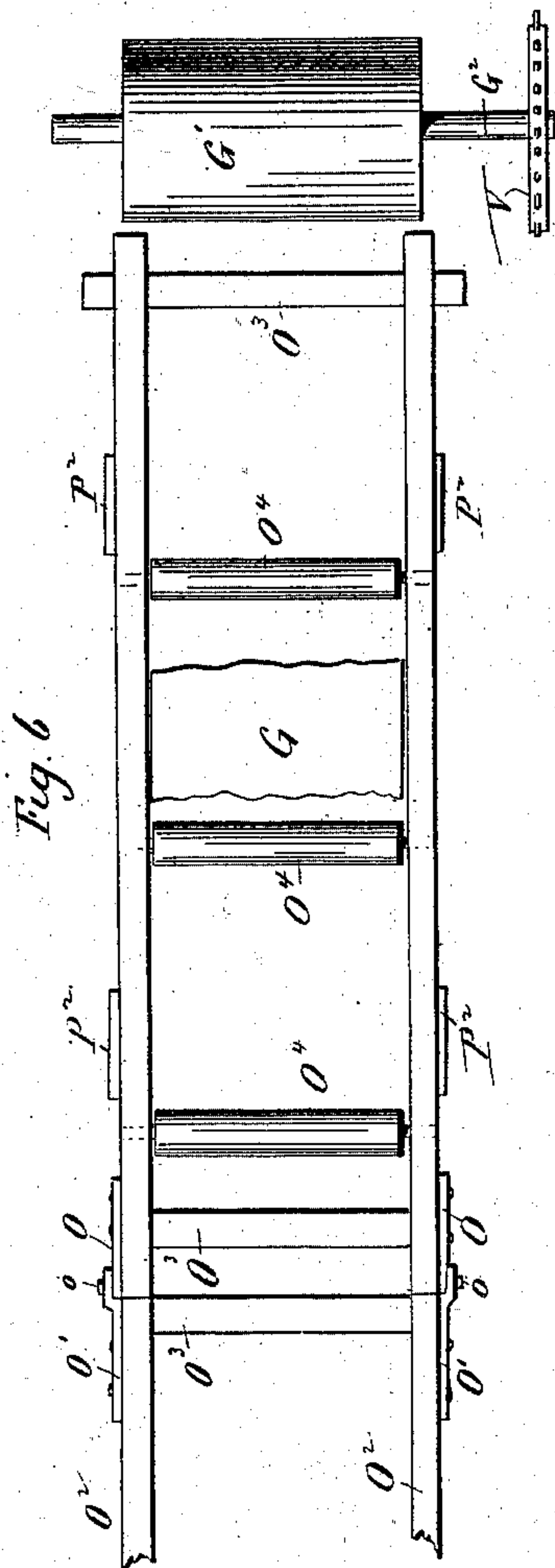
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Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES J. COREY, AMOS B. COREY, AND EDMUND O. WATTIS, OF OGDEN,
UTAH.

GRADING AND DITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,165, dated April 28, 1896.

Application filed November 5, 1894. Serial No. 527,912. (No model.)

To all whom it may concern:

Be it known that we, CHARLES J. COREY, AMOS B. COREY, and EDMUND O. WATTIS, of Ogden, in the county of Weber and Territory of Utah, have invented a new Improvement in Grading and Ditching Machines; and we do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a broken plan view of a ditching-machine constructed in accordance with our invention, the carrier and carrier-frame being partly broken away; Fig. 2, a complete view of the machine in side elevation; Fig. 3, a view thereof in rear elevation; Fig. 4, a broken view of the machine, drawn on a larger scale than the preceding figures, taken on the opposite side from Fig. 2 and showing in particular the elevator-wheel, the plow, the plow-frame, the means employed for raising and lowering the latter, the delivery band or apron, and the box interposed between the same and the elevator-wheel; Fig. 5, a broken view, in rear elevation, of the carrier and carrier-frame, the machine-frame and the fender which coacts with the delivery-apron being shown in transverse section; Fig. 6, a detached plan view, on the same scale as Fig. 5, of the carrier, the delivery band or apron thereof being broken away to show the rolls which support it; Fig. 7, a detail view, in transverse section, of the shield or tailpiece of the plow; Fig. 8, a detail view in side elevation, showing the provision for the adjustment of the plow on the plow-frame.

Our invention relates to an improved machine for grading and ditching, and is adapted to be used, for instance, for grading city streets and country roads and railway-beds, and for excavating canals, irrigating-ditches, and trenches for gas, water, and sewer pipes, &c.

The object of our invention is to provide a convenient and effective machine having a wide range of adjustments to adapt it to the requirements of different kinds of work.

With these ends in view our invention con-

sists in a grading and ditching machine having certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

As herein shown, the various instrumentalities of our machine are mounted upon a horizontally-arranged frame or body composed of two long parallel side pieces A A and transverse cross-pieces A', interposed between and secured to the side pieces at a right angle thereto. The forward end of the said body is supported upon a truck, which may be of any approved construction, and which is provided with wheels B B and has connected with it an ordinary draft-pole B'. The rear portion of said body is supported upon a large wheel C, which, because it is utilized as a source of power, we shall call the "power-wheel," and also upon a wheel of substantially the same diameter and called, from its function, the "elevator-wheel," and comprising a heavy hub D, wide flat spokes D', two deep annular flanges D² D², secured to the outer ends of the said spokes, transverse bolts D³, uniting the inner edges of the flanges, and an annular rim D⁴, located within the flanges at a point outside of the bolts D³ and forming the bottom wall of a deep rectangular groove, of which the flanges form the side walls.

The outer edges of the flanges D² are furnished with tires d, for it is to be understood that the elevator-wheel has, in addition to its function of elevating the excavated earth, the function of carrying a part of the load.

An axle E, mounted at its ends in the side pieces A A near the rear ends thereof, carries the power and elevator wheels above described.

A flexible elevator-band F, Fig. 4, formed of any suitable material and substantially corresponding in width to the width of the groove in the elevator-wheel, passes over the rim thereof and also over a small antifriction-roller F', located directly in front of the elevator-wheel above the center thereof and mounted in a bracket F², located at the upper end of the upright F³, the lower end of which is connected with the body of the machine. The said band also passes over an antifriction-roller F⁴, journaled in the forward end

of the bottom of a horizontally-arranged longitudinally-movable box or chute F^5 , substantially corresponding in width to the width of the groove in the elevator-wheel, and therefore to the width of the elevator-band. The inner end of this box is cut away, as at f , to conform it to the curvature of the elevator-wheel, and receives the elevator-band as the same leaves the wheel, while the outer end of the box or chute terminates over the delivery band or apron G , the arrangement and operation of which will be described later on. The said box or chute is mounted in a support f' , arranged to slide back and forth in the bracket F^2 before described, and is itself supported at its rear or inner end upon a short horizontal tie-rod f^2 , mounted in the upper ends of two rock-arms f^3 , the lower ends of which are pivotally attached to the frame of the machine, and which swing back and forth as the box is adjusted. Only one of the arms f^3 is shown, but the other is like it.

For the purpose of moving the box in order to tighten or loosen the elevator-band I employ two chains H , each connected at one end to the said rod f^2 and at the other end to a horizontal shaft I , carrying a hand-wheel I' , Fig. 2, and also a ratchet-wheel I^2 , which is engaged by a pawl I^3 . The said shaft I is also utilized to assist in supporting the forward end of the box F^5 .

When it is desired to tighten the elevator-band, the hand-wheel is turned in the right direction for moving the box or chute away from the elevator-wheel, with the obvious effect of tightening the band. On the other hand, when it is desired to loosen the band the pawl I^3 is disengaged from the ratchet-wheel, whereupon the tension of the band will operate to draw the box back toward the elevator-wheel until the band is relieved of all tension, or until it is loosened to the desired extent.

A plow J , of any suitable construction, is employed to cooperate with the elevator-wheel, and to loosen, displace, and lift the earth, gravel, or sand preparatory to the elevation thereof by the said wheel. This plow is located below the elevator-wheel at a point just to the rear of the center thereof, and is carried by means of a suspended triangular plow-frame, embracing the elevator-wheel, so to speak, and extending rearward of the same and composed of two upright members K , two horizontal members K' , two diagonal braces K^2 and cross-pieces K^3 and K^4 . The said plow-frame is hung by means of plates K^5 , secured to its members K from the axle E , and therefore has the same center as the driving and elevator wheels. The plow itself is designed to substantially conform in width to the width of the groove in the elevator-wheel, and may be of any approved construction. As herein shown, it is itself suspended from a horizontal shaft J' , the ends of which are mounted in bearings J^2 , secured to the horizontal members K' of the plow-frame by means of clips

J^3 J^3 , applied to the said members so as to be moved back and forth thereupon by means of adjusting-bolts J^4 , the ends of which are respectively connected with the plow-frame and the plow.

The point j of the plow merges at its rear or upper end into a long bowed tailpiece or shield j' conforming in curvature to the curvature of the elevator-wheel, and located close to but out of contact with the periphery of the same, so as to virtually close a portion of the groove therein. The said shield is reinforced by two integral longitudinal flanges extending throughout its length, located upon its edges and extending rearward, making the tailpiece trough-shaped in cross-section though its smooth face is presented to the elevator-wheel while its dished face opens outward. The said tailpiece is backed by two long longitudinally-bowed supporting-bars j^2 , located within the dished outer face of the tailpiece against the respective flanges thereof, and connected at their upper ends to the forked lower end of a tie j^3 , adjustably connected at its upper end with the cross-piece K^4 of the plow-frame. A heavy brace j^4 extends directly rearward from the point j of the plow to the cross-piece K^3 of the plow-frame, and largely assists in holding the plow up to its work.

For the purpose of raising and lowering the plow-frame, and hence for gaging the depth of the cut made by the plow, we employ a large hand-wheel L , mounted upon the outer end of a horizontal shaft L' , journaled upon the horizontal side pieces M of a stage rigidly secured to the body of the machine and comprising, besides the said side pieces, uprights M' and cross-rods M^2 . A chain L^2 , connected at one end with the cross-piece K^3 of the plow-frame and at the other end with the shaft L' , and a chain L^3 , connected at one end with the said shaft and at the other end with the cross-piece K^4 of the plow-frame, are wound upon the shaft according to the rotation of the hand-wheel L in one direction or the other for raising the frame and thus lifting the plow or for depressing the frame and positively forcing the plow deeper into the earth or sand. For the purpose of holding the frame in any of its adjustments the shaft L' is furnished with two ratchet-wheels l and l' , the teeth of which extend in opposite directions and which are engaged by oppositely-arranged pawls l^2 and l^3 , having operating-handles l^4 , as clearly shown in Fig. 4.

It will be understood that when the machine is being used a man standing upon the rear end of its body will manipulate the hand-wheel L according to the constantly-changing conditions under which such a machine works. Brushes or scrapers N N (shown in Fig. 3 of the drawings) depend from the cross-piece M^2 of the stage, before described, in position to keep the peripheries of the flanges D^2 D^2 of the elevator-wheel clean. We do not necessarily employ these brushes or scrapers,

but prefer to use them, particularly if the soil being excavated is of a character which will cause it to adhere to the wheel.

The earth having been loosened by the plow and raised by the elevator-wheel is discharged by the elevator-band upon the endless delivery band or apron G, which is arranged at a right angle to the elevator-band as well as transversely to the machine. At its inner end the delivery-band passes over a wheel or drum G', mounted upon a horizontal shaft G², connected with the body of the machine, while its outer end passes over a drum G³, mounted in the outer end of a suspended sectional carrier composed of an inner and an outer section arranged in line with each other and joined by means of two pairs of horseshoe-like joint-pieces O O', one pair of which is clearly shown in Fig. 3, said joint-pieces being firmly secured to each other by means of bolts o o'. The use of the said joint-pieces permits the outer carrier-section to be removed and interchanged with other longer or shorter sections, as may be required by the nature of the work to be done and the distance the earth excavated must be carried to one side before it is deposited. Each of the said carrier-sections is composed of longitudinal pieces O² and transverse pieces O³. Small antifriction-rollers O⁴, mounted in the side pieces of the two carrier-sections, support the endless delivery band or apron G between its inner and outer ends.

A pair of fenders P is applied to the sides of the inner carrier-section, while a corresponding pair of fenders P' is applied to the sides of the outer carrier-section, the said fenders consisting of long strips arranged vertically, and located so as to prevent the sand or earth upon the delivery-band from escaping therefrom sidewise. These fenders are secured to the longitudinal pieces of the carrier by means of links P², as shown in Fig. 3, which flexibly connect the fenders with the carrier-sections and permit the fenders either to be pushed down out of the way and retired or to be lifted into their operative positions, in which they are shown in the drawings.

A carrier-frame Q, mounted upon the body of the machine, is provided for the suspension of the carrier. If desired, this frame may be adapted to be reversed in position, so that the earth may be delivered from either side of the machine, as desired; but preferably it will be delivered from the side of the machine opposite the elevator-wheel, as that secures the best balancing or counterpoising of the machine. The inner end of the cross-piece or stretcher O³ of the long inner carrier-section is extended at its ends to rest upon the side rails of the carrier-frame, which it is held down upon by means of the strain imposed upon the carrier by means of two chains R, employed to tighten the delivery band or apron G, as will be described later on. The outer end of the carrier is supported in a suspended position by means of two chains S,

secured at their outer ends to chain-plates S', fastened to the short outer carrier-section, while their opposite ends are secured to a shaft S², mounted horizontally in the carrier-frame, the said chains passing over pulleys S³ S³, mounted in the highest position of the frame. A hand-wheel T, mounted on the shaft S², provides for taking up and letting out the chains S for raising or lowering the carrier, which is held in any desired position of adjustment through the medium of a ratchet-wheel T', mounted upon the shaft, and a suitable pawl T², pivoted to the carrier-frame, as shown in Fig. 3.

The chains R, provided, as before mentioned, for tightening the delivery band or apron, are secured to hooks R', fastened to the inner carrier-section and at their opposite ends to a horizontal shaft R², provided with a ratchet-wheel R³, with which a pawl R⁴ coacts. It will readily be understood that by turning the said wheel in the right direction for taking up the chains R R the whole carrier will be moved longitudinally outward, and any slack in the delivery band or apron taken up and the same tightened. On the other hand, by letting out the chains R R the tension of the delivery band or apron will operate to draw the carrier inward.

A stationary fender U, located at the inner end of the carrier, directly above the driving-drum G', prevents the earth from escaping from the apron or band, particularly when it is dry or when the carrier is at a relatively high elevation.

For driving the carrier we connect it with the power-wheel C. These connections may obviously be varied as required, but, as herein shown, they consist of a sprocket-wheel V, mounted upon the shaft G² and receiving a driving-chain V', the opposite end of which passes over a sprocket-wheel V², mounted upon a shaft V³, carrying a bevel-pinion V⁴, meshing into a bevel-wheel V⁵, secured to the axle E, carrying the power-wheel C and the elevator-wheel. The sprocket-wheel V² is not constantly rotated, but is coupled with and uncoupled from the shaft by means of a clutch mechanism V⁶, which it is not thought necessary to describe, but which is operated by means of a lever v, connected with an operating-bar v', the outer end of which is connected with a hand-lever v², extending upward at the rear end of the machine in convenient position for being operated by the same operator who manipulates the hand-wheel L, which is used to control the position of the plow.

If desired, the power-wheel C may be replaced by another elevator-wheel substantially like that shown and described, in which case one or both of the elevator-wheels would also be made to do duty as power-wheels by the use of suitable gearing connections, of which those above described will serve as an example. By replacing the power-wheel by another elevator-wheel, as suggested, the ca-

capacity of the machine will be doubled, but it will require more power—*i. e.*, horses—for its operation. In case two elevator-wheels are employed provision will preferably be made for the reversal of the carrier, so that the earth or sand may be delivered from either side of the machine.

The side draft of the machine is equalized by means of a bar W, located in an inclined position between the two side pieces A A of the machine-body, the bar being pivoted to one side piece and movably connected with the other by means of a chain W'. A chain W², connected with the bar by means of a clevis W³, which is shiftable in position thereon, leads forward to the pole B', while a heavy draft-rod W⁴, connected at its forward end with the bar W, extends rearward, where it is connected with the machine-frame at a point substantially in front of the elevator-wheel. The instrumentalities just described provide for equalizing the draft as may be required to adapt the machine to the various conditions of grade and soil which it may have to contend with.

It will be understood that when the machine is in use the earth or sand will be raised by the elevator-wheel and thence discharged by the elevator-band upon the delivery band or apron, which will carry the earth and discharge it well to one side of the place where the machine is working and either upon the ground or upon wagons, cars, or trucks. In case the machine is adapted for digging ditches and trenches the front wheels B B will be separated enough to run on either side of the ditch or trench, on opposite sides of which the horses will walk.

It is obvious that in carrying out our invention changes in the construction and arrangement of the parts herein shown and described may be made. We would therefore have it understood that we do not limit ourselves to the exact construction herein shown and described, but hold ourselves at liberty to make such changes and alterations as fairly fall within the spirit and scope of our invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel having an annular groove for the reception of the material excavated, a pivotally-suspended plow-frame, a plow mounted upon the plow-frame to the rear of the fulcrum thereof and adjustable back and forth on the said frame and therefore toward and away from the elevator-wheel, means connected with the machine-frame for swinging the plow-frame vertically to change the inclination of the entire plow, an elevator band or carrier surrounding the said wheel at the bottom of the groove therein, and a delivery band or apron upon which the elevator band or apron discharges its freight, substantially as described.

2. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel mounted therein and having an annular groove for the reception of the material excavated, a pivotally-suspended plow-frame straddling the elevator-wheel, a plow mounted upon the substantially horizontal rear members of the plow-frame to the rear of the fulcrum thereof, and adjustable back and forth on the said frame, and therefore toward and away from the elevator-wheel, an adjusting device mounted upon the upper portion of the machine-frame and connected with the plow-frame for swinging the same vertically, and hence varying the inclination of the entire plow; an elevator band or carrier surrounding the said elevator-wheel at the bottom of the groove therein, and a delivery band or apron upon which the elevator band or apron discharges its freight, substantially as described.

3. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel having an annular groove for the reception of the material excavated, a pivotally-suspended plow-frame straddling the elevator-wheel, a plow carried by the said frame, a hand-wheel mounted upon the upper portion of the machine-frame and connected with the rear and forward portions of the plow-frame, whereby the same may be raised or lowered for changing the inclination of the plow, an elevator band or carrier surrounding the said wheel at the bottom of the groove therein, and a delivery band or apron upon which the elevator band or apron discharges its freight, substantially as set forth.

4. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel mounted therein and having an annular groove for receiving the material excavated, a pivotally-suspended plow-frame straddling the elevator-wheel, a plow mounted upon the substantially horizontal rear members of the plow-frame and adjustable back and forth thereupon, an adjusting device mounted upon the upper portion of the machine-frame, and connected with the plow-frame for swinging the same vertically to change the inclination of the plow, an elevator band or carrier surrounding the wheel at the bottom of the groove therein, and a delivery band or apron upon which the elevator band or apron discharges its freight, substantially as described.

5. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel having an annular groove, a plow for raising the earth into the said groove, a vertically-swinging pivotally-suspended plow-frame straddling the elevator-wheel, a plow connected with the rear portion of the said frame, an upwardly-extending curved tailpiece or shield forming an extension of the plow and connected at its upper end with the forward portion of the plow-frame, means connected with the plow-frame for swinging the same to change the inclination of the plow, and an

elevator band or carrier surrounding the said wheel at the bottom of the groove thereof, substantially as described.

6. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel having an annular groove, a vertically-swinging pivotally-suspended plow-frame straddling the elevator-wheel, a plow attached to the rear portion of the said plow-frame and having an upwardly-extending tailpiece or shield connected at its upper end with the upper portion thereof and partially closing the groove in the wheel for temporarily confining the material excavated, therein, an elevator-band surrounding the elevator-wheel and located in the bottom of the groove thereof, a delivery-band for receiving the material excavated from the elevator-band, and a box interposed between the two bands to prevent the material excavated from escaping from the elevator-band in transit between the elevator-wheel and the delivery-band, substantially as described.

7. In a ditching-machine, the combination with an elevator-wheel having an annular groove, of a plow for lifting the earth into the said groove, an endless elevator-band surrounding the elevator-wheel and located in the bottom of the groove thereof, an endless delivery-band upon which the elevator-band discharges its freight, a box located between the elevator-wheel and the delivery-band, and means for adjusting the box for tightening the elevator-band which is connected with it, substantially as set forth.

8. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel containing an annular groove, a vertically-swinging, pivotally-suspended plow-frame, straddling the elevator-wheel, a plow mounted upon the plow-frame to the rear of the fulcrum thereof, and adjustable back and forth on the said frame and therefore toward and away from the elevator-wheel, means mounted upon the upper portion of the machine-frame for raising and lowering the plow-frame to change the inclination of the entire plow, an elevator-band passing around the elevator-wheel, a delivery band or apron upon which the elevator-band discharges its freight, a power-wheel adapted to travel upon the earth, and mounted upon the same shaft as the elevator-wheel, the said wheels being respectively located on opposite sides of the longitudinal center of the machine, and connections between the said power-wheel and the delivery-point for the actuation of the same, substantially as described.

9. In a ditching-machine, the combination with the frame thereof, of excavating and elevating devices, a delivery-band upon which the material excavated is discharged, a carrier upon which the delivery-band is mounted, a carrier-frame arranged at a right angle to the machine-frame and having the carrier suspended in it in an inclined position, means connected with the outer end of the carrier

for raising and lowering it, and devices for moving the carrier longitudinally to change the tension of the said delivery-band, the inner end of the carrier sliding, when so moved, upon the carrier-frame, substantially as described.

10. In a ditching-machine, the combination with a delivery band or apron, of a sectional carrier upon which the same is supported, and fenders mounted upon the said sections, along the sides thereof for preventing the sidewise escape of the earth upon the band or apron, the said fenders being movably connected with the sections of the carrier by means of links, substantially as described.

11. In a ditching-machine, the combination with the frame thereof, of an elevator-wheel having an annular groove, a plow-frame straddling the elevator-wheel and pivotally hung upon the same center as the same, a plow mounted upon the substantially horizontal rear members of the plow-frame at a point to the rear of the said center, and adjustable back and forth on the said frame, and therefore toward and away from the elevator-wheel, means mounted upon the upper portion of the machine-frame and connected with the substantially vertical and horizontal members of the plow-frame for raising and lowering the frame, and an elevator-band encircling the elevator-wheel for lifting the material excavated by the plow, substantially as described.

12. In a ditching-machine, the combination with an elevator-wheel having an annular groove, of a plow, a suspended plow-frame in which the plow is mounted, an endless elevator-band encircling the wheel in the bottom of the groove thereof and extending forward from the wheel, a delivery band or apron upon which the elevator-band discharges its freight, a power-wheel mounted upon the same shaft as the elevator-wheel and traveling upon the ground, and driving connection between the said power-wheel and the delivery-band, substantially as set forth.

13. In a ditching-machine, the combination with an endless delivery band or apron, of a carrier upon which the same is supported, a carrier-frame, and means mounted in the said frame for the suspension of the outer end of the carrier, the inner end of which has a transverse stretcher projecting at its ends beyond the sides of the carrier, the said projecting ends of the carrier resting and sliding upon the carrier-frame; means mounted in the carrier-frame for positively moving the carrier outward, whereby the delivery-band is tightened and the sliding connection between the inner end of the carrier and carrier-frame maintained, substantially as set forth.

14. In a ditching-machine, the combination with an elevator-wheel having an annular groove for receiving the earth, of a plow for raising the earth into the said groove while it is being elevated, a longitudinally-bowed shield extending upward from the plow for holding the earth in the groove of the wheel

while it is being elevated, the said shield having a smooth inner and a flanged outer face, longitudinally-bowed supporting-bars applied to the outer face of the said shield for
5 supporting the same, and means for receiving and discharging the earth elevated by the wheel, substantially as described.

In testimony whereof we have signed this

specification in the presence of two subscribing witnesses.

CHARLES J. COREY.
AMOS B. COREY.
EDMUND O. WATTIS.

Witnesses:

C. M. BROUGH,
C. E. COREY.