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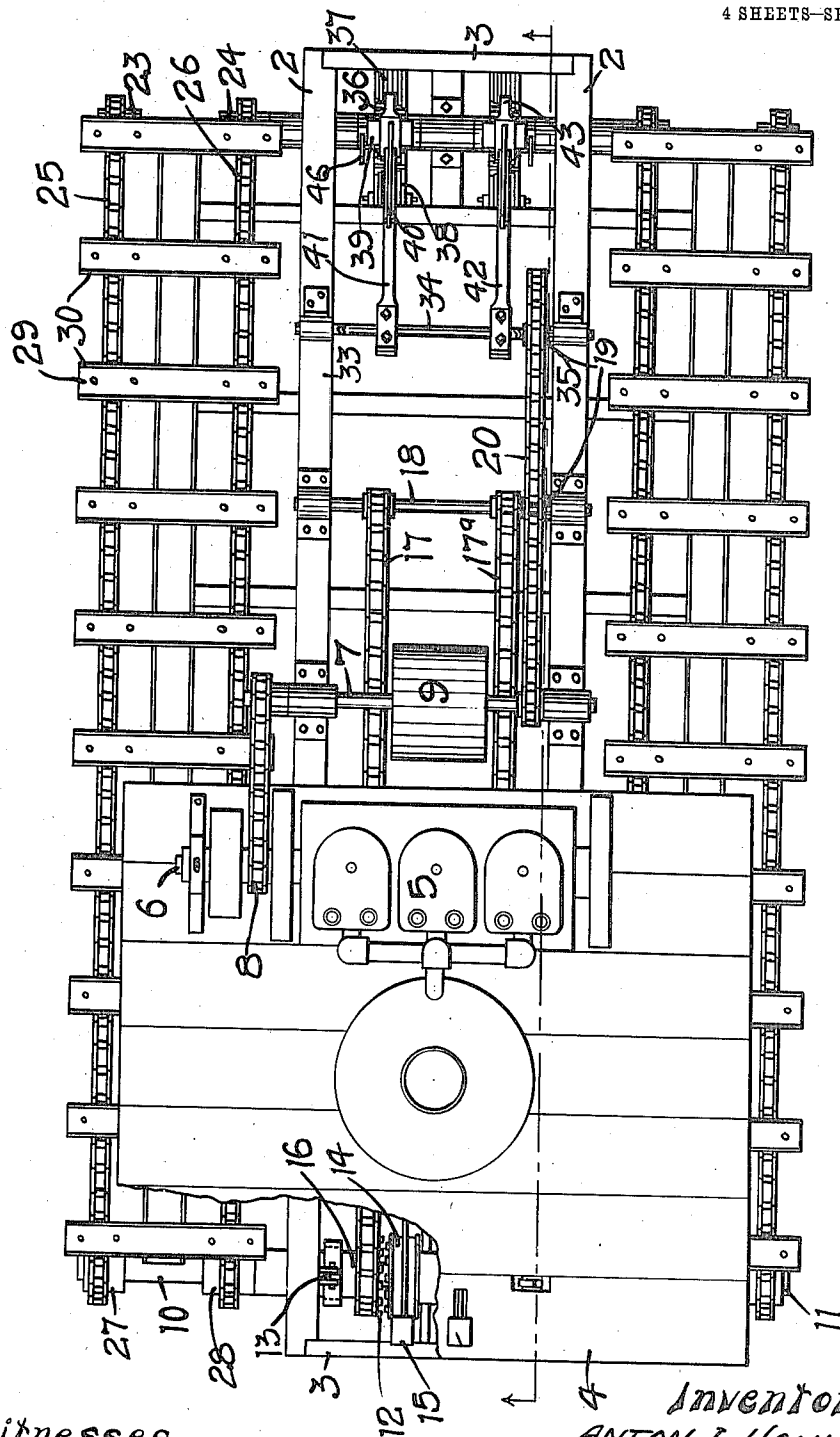


Fig. 1.

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TRACTION MACHINE.
APPLICATION FILED AUG. 3, 1909.

Patented June 3, 1913.

4 SHEETS—SHEET 2.

Fig. 9.

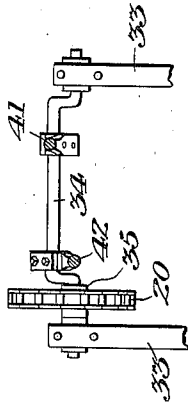
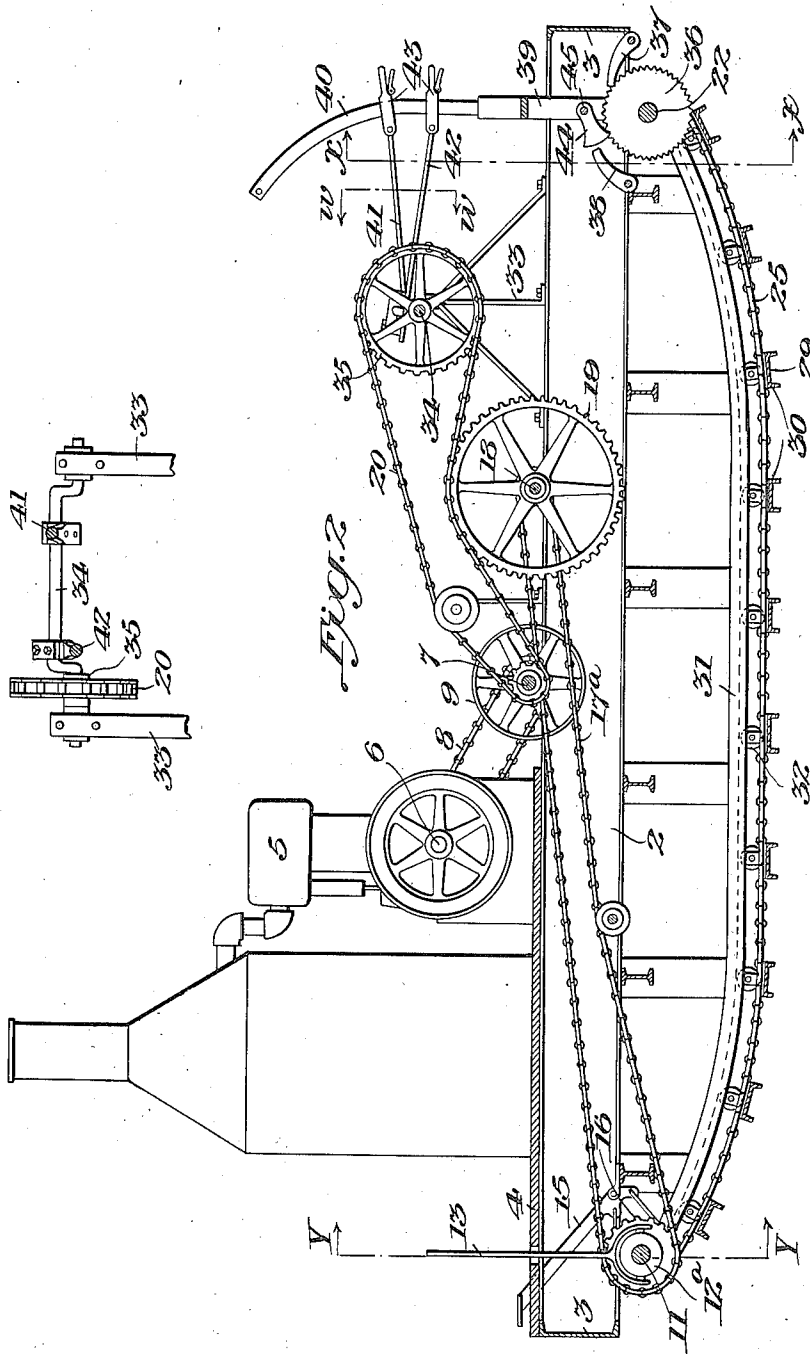


Fig. 2.



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Patented June 3, 1913.

4 SHEETS—SHEET 3.

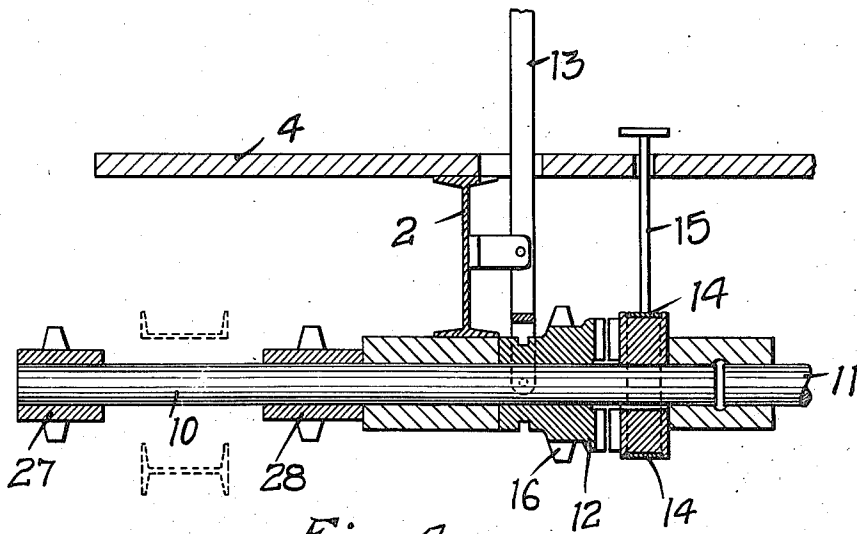
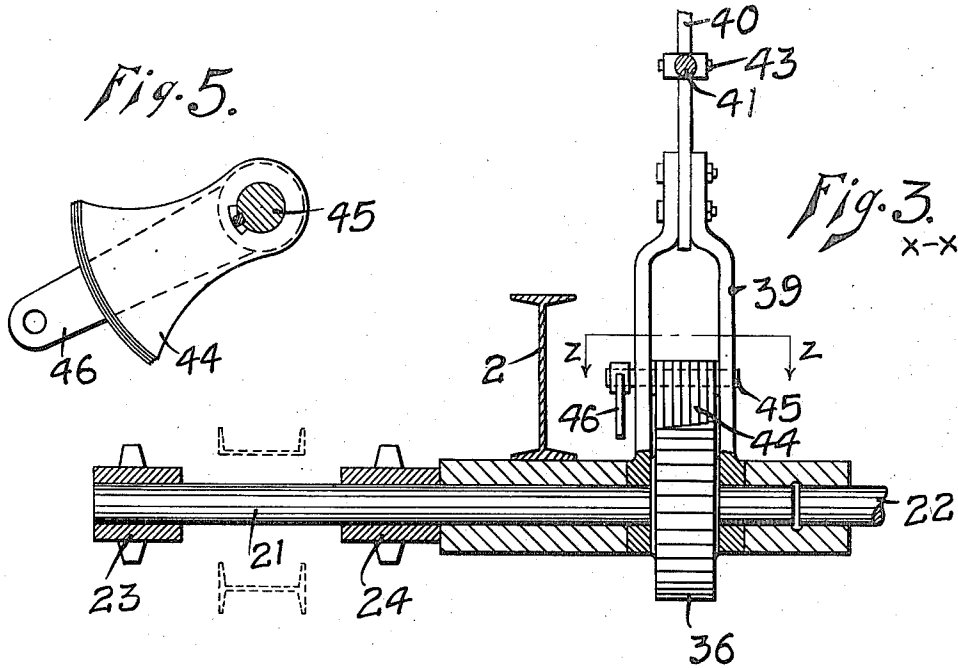


Fig. 4. y-y

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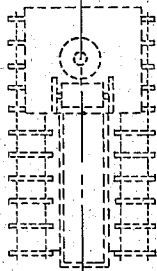
A. I. HOVLAND.
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Patented June 3, 1913.

4 SHEETS—SHEET 4.

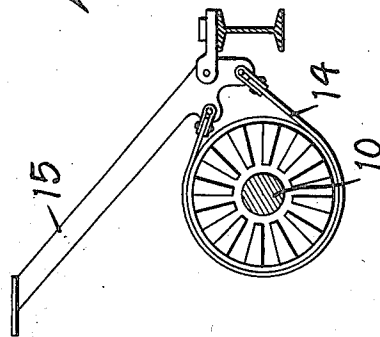
1,063,200.

Fig. 8.



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Fig. 6.



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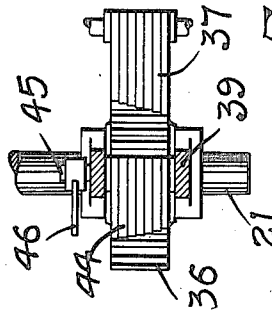


Fig. 7. z-z

UNITED STATES PATENT OFFICE.

ANTON I. HOVLAND, OF ST. PAUL, MINNESOTA.

TRACTION-MACHINE.

1,063,200.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed August 3, 1909. Serial No. 511,067.

To all whom it may concern:

Be it known that I, ANTON I. HOVLAND, citizen of the United States, resident of St. Paul, Ramsey county, Minnesota, have invented certain new and useful Improvements in Traction-Machines, of which the following is a specification.

The object of my invention is to provide a traction machine having broad traction surfaces adapting it particularly for use on soft ground and for drawing a ditching machine or a gang of plows, although capable of use wherever it may be desired to employ an apparatus of this kind.

My invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of a traction machine, embodying my invention, Fig. 2 is a longitudinal sectional view of the same, Fig. 3 is a sectional view on the line $x-x$ of Fig. 2, looking in the direction of the arrows, Fig. 4 is a similar view on the line $y-y$ of Fig. 2, looking in the direction of the arrows, Fig. 5 is a detail view of the ratchet dogs shown in Fig. 3, Fig. 6 is a detail view of the clutch brake mechanism. Fig. 7 is a sectional view on the line $z-z$ of Fig. 3, Fig. 8 is a diagrammatic view, illustrating the manner of turning the machine out of a direct line, Fig. 9 is a detail view on the line $w-w$ of Fig. 2, looking in the direction of the arrows.

In the drawings, 2-2 represent the side rails of the machine, connected by suitable cross bars 3. A platform 4 is supported on the rails 2 and an engine or motor 5, of any suitable type, is arranged upon this platform and is provided with a drive shaft 6. A counter-shaft 7 is journaled in suitable bearings on the rails 2 and may be driven from the shaft 6 through a suitable belt 8. A pulley 9, preferably having a wide face, is usually provided on the shaft 7, and from this pulley a suitable belt, (not shown) may be extended to a suitable pulley on a ditching machine located in the rear of the traction machine.

At the forward end of the machine I provide shafts 10 and 11, preferably in alignment with each other and each adapted to be driven from a shaft 18 mounted in suitable bearings on the machine frame and driven preferably by a belt 20 which extends

from a pinion on the shaft 7 and engages a gear wheel 19 on said shaft 18. (See Fig. 2). The shaft 10 has suitably secured thereon a fixed clutch member which is adapted to be engaged by a corresponding clutch member 12 that is mounted so as to rotate freely upon the shaft 10. The clutch member 12 has formed upon its circumference a sprocket wheel 16, and a chain 17 extends from a suitable pinion on the shaft 18, engages said sprocket 16, and rotates the clutch member 12. This clutch member and sprocket may be rotated freely upon said shaft. When it is desired to drive the shaft 10 through the shaft 18 and chain 17, the clutch member 12 is slid into engagement with the fixed clutch member by means of the lever 13, and said shaft 10 will be rotated so long as said clutch member 12 remains in engagement with said fixed clutch member. Said fixed clutch member is also preferably provided with a brake strap 14 having its ends secured to a pivoted treadle 15. The shaft 11 is provided with a similar fixed clutch member and a similar loose clutch member 12^a arranged to be controlled by another lever 13. A brake strap and lever are also provided for the fixed clutch member on the shaft 11, and a belt 17^a extends from the shaft 18 to a sprocket on the clutch member 12^a on the shaft 11. Said shafts 10 and 11 are each provided with sprocket pinions 27 and 28, and in engagement with these pinions are the traction belts 25 and 26. At the rear of the machine I preferably provide shafts 21 and 22, usually arranged in line with each other and each provided with sprockets 23 and 24 and engaged by the traction belts 25 and 26. It will thus be seen that for moving the traction device from place to place or moving it over the road, I provide means whereby all four of the traction belts may be driven simultaneously from the shaft 18 that is in turn operated from the engine. This driving connection is designed for use when the machine is on the road or being moved from place to place, and it may be designated a "high speed drive." When both clutches are in engagement with the shafts 10 and 11 the said shafts will be driven at the same speed, and the traction chains upon both sides of the machine will also be driven at the same speed. The traction machine will, therefore, move in substantially a straight line. When it is desired to change the direc-

tion of movement of the machine, as indicated in the diagrammatic view, Fig. 8, the operator by means of one of the levers 13 can disconnect the corresponding clutch and temporarily render inoperative the traction chains upon one side of the machine. At the same time, the brake strap on the fixed clutch member may be tightened and the traction chains on that side of the machine will be held back and the machine will be swerved or turned toward that side, as indicated by dotted lines in the diagrammatic view, Fig. 8.

Secured to the belts 25 and 26 at intervals I preferably provide transverse shoes 29 having suitable flanges 30 thereon which dig into the soil, the shoes being of sufficient width to form a broad bearing surface to support the machine, preventing it from sinking too deeply into the soil. Above the lower stretch of each traction belt is a channel bar guide-way 31 having upwardly turned ends adapted to receive anti-friction wheels 32 which are mounted on the shoes 29 at points intermediate to their ends. These anti-friction wheels roll on the guide-ways 31 and form backings for the traction shoes, and there are preferably a single row of wheels on each side of the machine and the wheels have comparatively narrow faces so that the traction shoes may tilt and adapt themselves to an uneven surface over which the machine may be moving, and as each shoe is provided with an anti-friction wheel it will be supported and held in the proper position with respect to the other shoes throughout the travel of the lower stretch or run of the belt. I therefore regard the use of these anti-friction wheels in connection with the shoes and guide-ways as an important feature of my invention.

I have not shown in detail the sprocket pinions on the shafts 11 or 22, but I have shown such pinions on the shafts 10 and 21 and those on the shafts 11 and 22 correspond to those that I have thus illustrated. This high-speed driving device already described will ordinarily be employed when the machine is being moved over a road or from place to place, or at any time when a continuous movement of the traction machine is desired.

When the machine is being employed for moving a ditcher, it is preferable to provide means whereby the power may be concentrated and the traction chains may be given a step by step movement, thus causing the device to advance with a slow step by step movement which enables it to exert great power in moving a ditching or other machine that may be connected thereto. When the machine is to be driven with this step by step movement the levers 13 are operated so as to disconnect the clutches on the shafts 10 and 11 and thereby to render

inoperative the connections between the driving shaft and said shafts 10 and 11.

The means which I prefer to employ for advancing the machine with a step by step movement is clearly shown in the drawings and in its preferred form may be described as follows: At the rear of the machine, a frame 33 is provided, supporting a crank shaft 34 and carrying a sprocket 35 that is driven from the belt 20. On the shafts 21 and 22, ratchet wheels 36 are secured in position to be engaged by the dogs 37 and 38 pivoted on the machine frame. Forks 39 are pivoted on the shafts 21 and 22 and having arms 40, which are curved on the arc of a circle equi-distant from the center of the crank shaft 34. Levers 41 and 42 are mounted on said crank shaft and adapted to slide on the arms 40 and have locking devices 43, by means of which the levers can be secured in any position on the curved arms.

Upon each of the forks 39 a series of dogs 44 are pivoted and adapted to engage the teeth of the ratchet wheels 36. These dogs are of different length, a series of them being provided for each ratchet wheel and they are adapted to slide over the teeth of the ratchet in one direction and revolve said ratchet wheels on the shafts 21 and 22 when the forks 39 are oscillated by the movement of the crank shaft 34. The degree of oscillation of the forks 39 and the travel of the dogs over the ratchet wheels will depend upon the position of the levers 41 and 42 on the arms 40. The nearer these arms are adjusted to the pivots of the forks, the greater the stroke of the forks will be and the faster the travel of the traction belts. By moving the levers outwardly on the curved arms, the travel of the belt will be correspondingly decreased and by moving one lever farther than the other, as indicated in Fig. 1, the speed of the belts will be varied and the machine caused to swerve to one side or the other from a straight line. The operator, having control of the levers 41 and 42, can change the direction of travel of the machine, causing it to move on the arc of a circle or straight ahead, as desired, or change the direction of travel from one side to the other. The stroke of the levers will remain the same in both cases, as they are mounted on the same crank shaft, as indicated in Fig. 9, but the degree of oscillation of the forks 39 will depend upon the adjustment of the levers on the curved arms 40.

When the machine is being moved forward, the dogs 38 are raised so as to be out of engagement with the teeth of the ratchet wheels, as shown in Fig. 2 of the drawings, while the dogs 37 are in engagement with the teeth of said ratchet wheels, as also is shown in said figure of the drawings. With the dogs 44 in the position shown in this

figure, and with the dogs 37 in engagement with the teeth of the ratchet wheels, the oscillation of the arms 40 and forks 39 will turn the shaft 22, with a step by step movement, in the direction to advance the machine. Should it be desired, for any purpose, to move the machine backward, or in the opposite direction, the dogs 44 may be swung over on their pivots 45 so that their other edges will engage the ratchet teeth on the reverse movement of the arms 40 and forks 39. In this instance the dogs 38 will be in engagement with the teeth of the ratchet wheels to prevent backward movement thereof, while the dogs 37 will be raised clear of said ratchet wheels.

As indicated in Figs. 3 and 7, the dogs 44 are mounted upon pivot pins 45 and a lever 46 is provided on each pin and when these levers are raised, the dogs will all be lifted simultaneously out of engagement with the ratchet teeth. The movement of these levers is preferably controlled by the attendant on the ditching machine, who is able at any time to throw out the dogs and stop the traction.

It will be seen that this machine is capable of a variety of uses. Where it is desired to operate it at high speed the traction chains will be operated directly and continuously from the shaft 18 through the driving chains 17 and 17^a, and by means of the clutches and brake straps either side of the machine may be retarded and therefore the direction of travel of the machine may be changed at will. When it is desired to employ the machine for drawing a ditching machine suitably connected thereto, the continuous drive will be disconnected and the chains will be driven with a step by step movement through the oscillating levers 41 and 42 connected to the arms 40 and forks 39 carrying the ratchet-engaging dogs 44. The machine will thus be moved slowly, exerting great power, with a step by step movement, and will be capable of drawing a ditcher or other mechanism connected thereto.

I do not limit myself to the details of construction, as the same may be varied in many particulars without departing from my invention.

I claim as my invention:—

1. The combination, with a suitable frame, of independent shafts 10 and 11 at the forward end of said frame, and independent shafts 21 and 22 at the rear end of said frame, a set of traction belts supported by said shafts 10 and 21, and an independent set of traction belts supported by said shafts 11 and 22, a suitable engine mounted on said frame, driving means between said engine and said shaft 10, independent driving means between said engine and said shaft 11, and means for disconnecting, at will, the

driving means from either, or both, of said shafts 10 and 11.

2. The combination, with a suitable frame, of traction belts provided at each side thereof, a suitable engine mounted on said frame, independent driving means between said engine and the belts on each side of the frame, means for disconnecting, at will, said driving means from either or both sets of traction belts, a ratchet mechanism operatively connected with said belts, and having driving connections with said engine, whereby said traction belts may be driven continuously from said engine through said first named driving means, or may be driven with a step by step motion through said ratchet mechanism.

3. The combination, with a suitable frame, of traction belts provided on each side thereof, a suitable engine mounted on said frame, independent drive means between said engine and the belts on each side of the frame, means for disconnecting said driving means from said traction belts, ratchet mechanisms operatively connected with said traction belts and having driving connections with said engine, and means for varying the speed of one ratchet mechanism with respect to the speed of the other.

4. The combination, with a suitable frame, of traction belts provided on each side thereof, a suitable engine mounted on said frame, independent driving means between said engine and the belts on each side of the frame, means for disconnecting said driving means from either or both sets of traction belts, ratchet mechanisms connected with said traction belts and having driving connections with said engine, and means for varying the speed of either ratchet mechanism with respect to the other.

5. The combination, with a suitable frame, of traction belts provided on each side thereof, an engine mounted on said frame, means connecting said engine with said traction belts for operating the same at a continuous speed, means for throwing out such connection, and a ratchet mechanism operatively connected with each traction belt for operating it with a step by step movement and having a driving connection with the engine.

6. The combination, with a frame, of traction belts provided on each side thereof, an engine mounted on said frame and geared to said belts to operate the same at a comparatively high speed, a clutch, a ratchet mechanism operatively connected with each belt and having a driving connection with the engine, and means for varying the speed of said ratchet mechanism to produce a corresponding variation in the travel of the belts to guide the machine.

7. The combination, with a frame, of traction belts mounted on each side thereof, a

source of power mounted on said frame, ratchet mechanisms operatively connected with said belts respectively and having driving connections with said source of power, and means for changing the stroke of said driving connections and varying the speed of one ratchet mechanism with respect to the other ratchet mechanism and thereby producing a corresponding variation in the travel of said belts; for the purpose specified.

8. The combination, with a frame, of shafts mounted thereon and provided with chain belts connecting the forward and rear shafts on the same side of the machine, transverse shoes secured to said belts, ratchet wheels secured to said rear shafts, a source of power mounted on said machine and operatively connected with said ratchet wheels, and means for changing the stroke of said operative connection and varying the speed of the respective wheels to produce a corresponding variation in the travel of said belts.

9. A traction machine comprising a frame, traction belts provided on each side thereof, forward and rear shafts having pinions around which said belts pass, ratchet wheels secured to said rear shafts, forks pivoted on said shafts, a series of dogs carried by said shafts and adapted to engage the teeth of said ratchet wheels, curved arms carried by said forks, a crank shaft, levers mounted thereon and having sliding engagement with said curved arms, whereby the oscillation of said forks can be controlled by the adjustment of said levers, a source of power mounted on said frame, and operative connections provided between said source of power and said crank shaft.

10. A traction machine comprising a frame, traction means mounted thereon, ratchet wheels operatively connected with said traction means, a series of dogs adapted to engage the teeth of said ratchet wheels, oscillating supports whereon said dogs are mounted, a source of power mounted on the machine and operatively connected with said ratchet dog, levers to oscillate the same, said connections being capable of adjustment to vary the degree of oscillation of one support and its ratchet and the movement of this ratchet independently of the other support and its ratchet, for the purpose specified.

11. The combination, with a frame, of traction belts arranged on each side thereof, shafts having sprockets with which said belts engage, ratchet wheels secured to said shafts, a series of dogs arranged to engage the teeth of said ratchet wheels, oscillating supports for said dogs, curved arms carried by said supports, a crank shaft, a source of power operatively connected with said crank shaft, levers mounted on said crank shaft and slidably connected with said curved

arms, said levers being movable independently of one another on said arms, whereby the degree of oscillation of said supports and the movement of said ratchet wheels can be varied, for the purpose specified.

12. A traction machine comprising a frame, traction means mounted thereon, a source of power carried by said frame, ratchet mechanisms operatively connected with said traction means respectively and having driving connections with said source of power, and means for changing the length of stroke of said driving connections and varying the speed of one ratchet mechanism with respect to the other ratchet mechanism and thereby obtaining a corresponding variation in the travel of said traction means.

13. A traction machine comprising a frame, traction belts arranged on each side thereof, shafts having sprocket wheels with which said belts engage, clutch mechanisms provided in connection with said shafts, means for operating said clutch mechanisms independently of one another, said clutch mechanisms having cooperating teeth and independently operating means allowing either one of said clutch mechanisms to be rendered temporarily inoperative, for the purpose specified.

14. A traction machine comprising a frame, traction belts provided on each side thereof, said frames having inverted channel bar rails extending lengthwise thereof and provided with upwardly curved ends, said traction belts having shoes mounted thereon and anti-friction wheels adapted to bear on said channel bar rails and be guided by the flanges thereof, a source of power mounted on said frame, and mechanism operatively connecting said source of power with said belts.

15. The combination, with a frame, of traction belts, shafts and sprocket wheels for said belts, ratchet wheels secured on said shafts, dogs for said ratchet wheels, oscillating supports for said dogs having curved arms, reciprocating levers slidably connected with said arms, the adjustment of said levers on said arms regulating the degree of oscillation of said dog supports.

16. The combination, with a suitable frame, of traction belts provided on each side thereof, a suitable engine mounted on said frame, ratchet mechanisms connected with said traction belts and having driving connections with said engine, and means for varying the speed of either ratchet mechanism with respect to the other, said means including oscillating arms and reciprocating levers adjustably connected with said arms.

17. A traction machine comprising a frame, traction belts provided on each side thereof, rails extending lengthwise of said frame on each side thereof and having upwardly curved ends, shoes mounted trans-

versely on said traction belts at intervals, anti-friction wheels journaled in said shoes and adapted to bear on said rails and be guided thereby, a source of power mounted
5 on said frame, and mechanism operatively connecting said source of power with said belts.

18. A traction machine comprising a frame, traction belts provided on each side
10 thereof, rails extending lengthwise of said frame on each side thereof, shoes mounted transversely on said traction belts at in-

tervals, anti-friction wheels mounted on said shoes and adapted to bear on said rails and be guided thereby, a source of power 15 mounted on said frame, and mechanism operatively connecting said source of power with said belts.

In witness whereof, I have hereunto set my hand this 23rd day of July 1909.

ANTON I. HOVLAND.

Witnesses:

J. M. SULLIVAN,
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