O. PFANHAUSER.

MOTOR PLOW.

APPLICATION FILED JUNE 10, 1918.

1,402,648.

Patented Jan. 3, 1922.

3 SHEETS—SHEET 1.

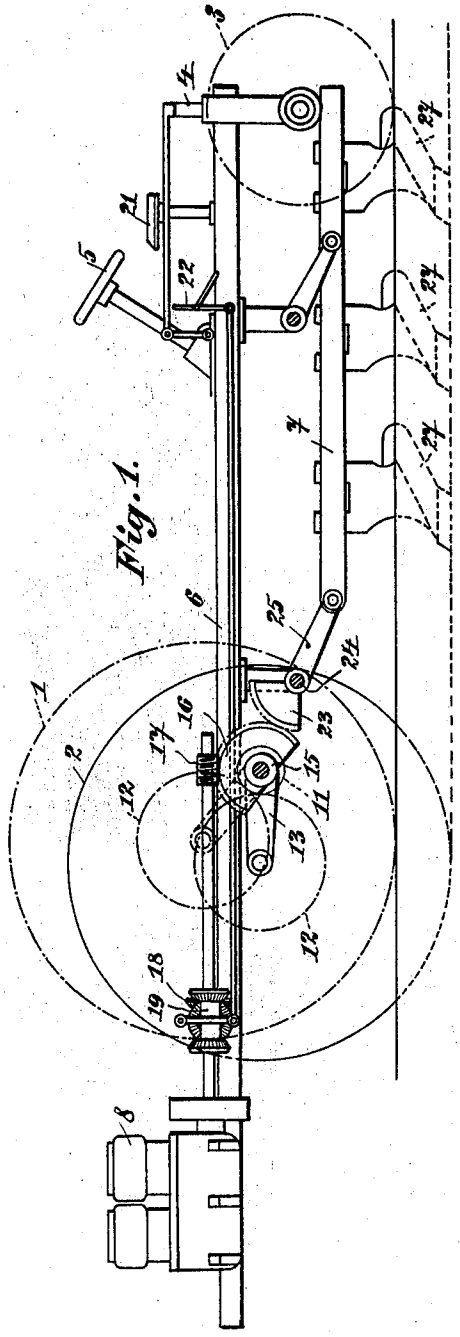


Fig. 1.

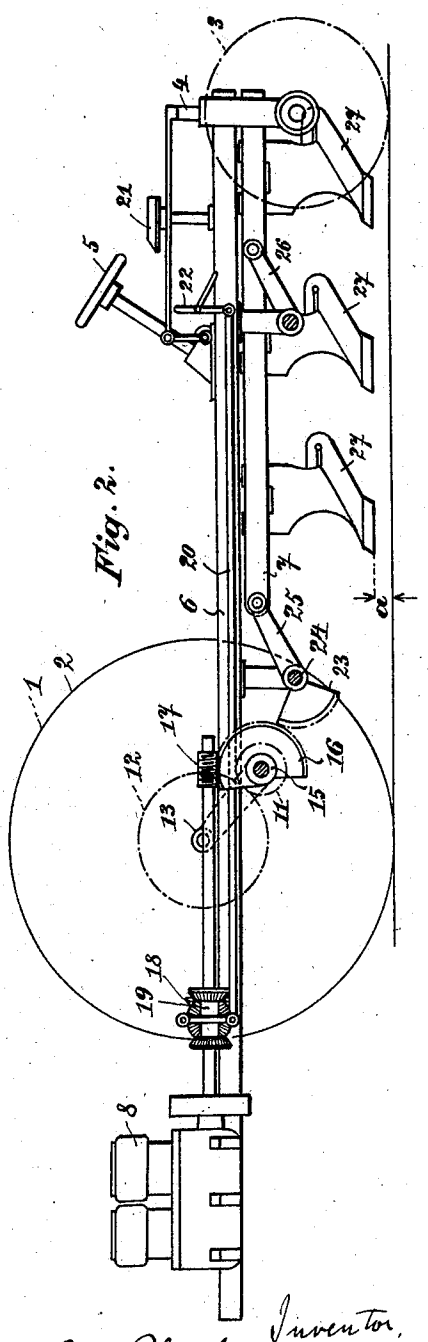


Fig. 2.

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Fig. 3.

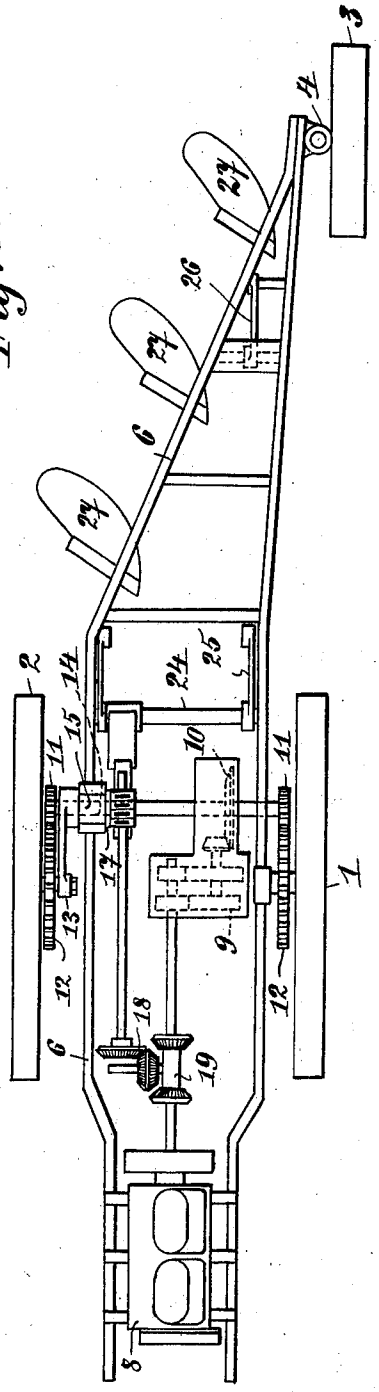
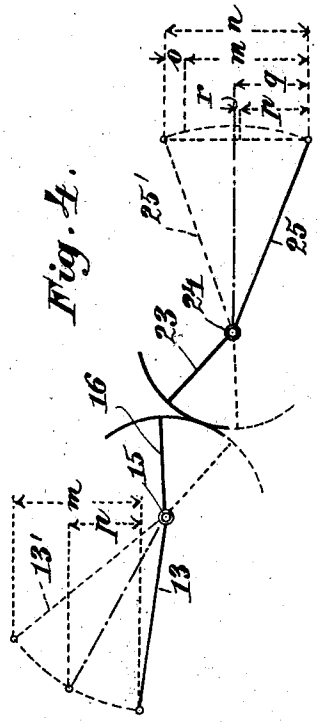


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

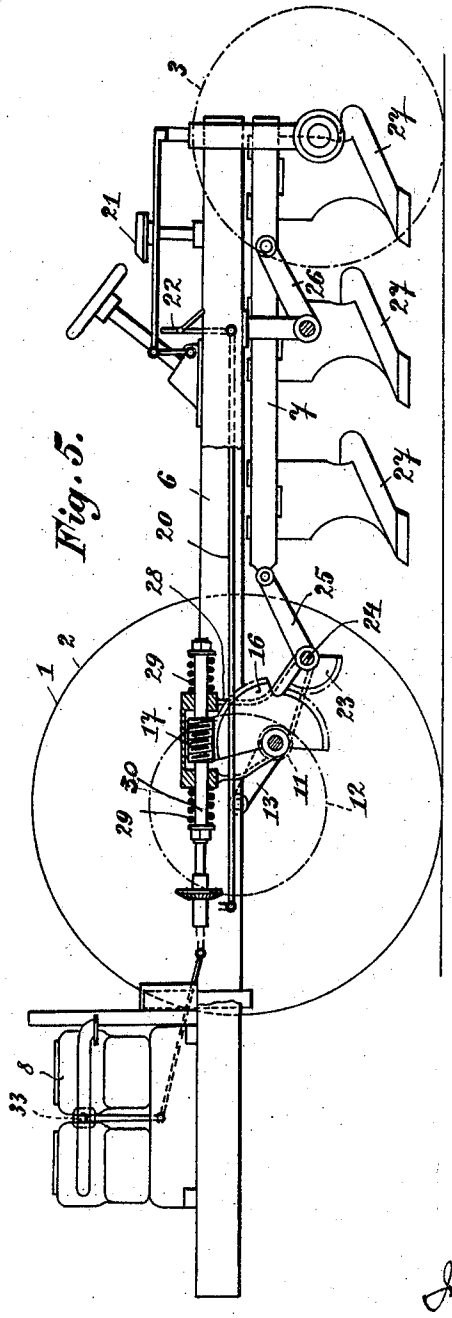
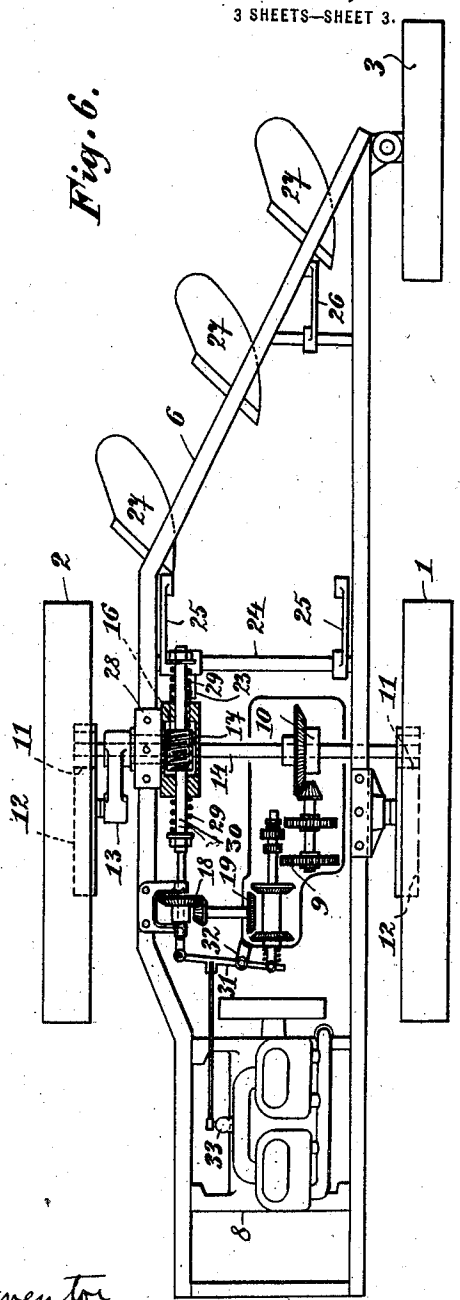


Fig. 6.



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UNITED STATES PATENT OFFICE.

OTTO PFANHAUSER, OF VIENNA, AUSTRIA.

MOTOR PLOW.

1,402,648. Specification of Letters Patent. Patented Jan. 3, 1922.

Application filed June 10, 1918. Serial No. 239,300.

To all whom it may concern:

Be it known that I, OTTO PFANHAUSER, a subject of the Emperor of Austria, residing at Vienna, in the Province of Lower Austria and Empire of Austria, have invented a new and useful Motor Plow (for which I have filed applications in Austria, March 10, 1917; Austria, additional, June 30, 1917; Germany Apr. 17, 1917; Germany, additional, July 6, 1917; Great Britain March 3, 1918, Patent No. 114,155; Hungary April 10, 1918; and in France, main and addition combined, April 22, 1918,) of which the following is a specification.

This invention relates to motor plows of the suspended shares type, in which the auxiliary frame carrying the soil working tools is so connected with the main frame that it can be lowered and raised, and in which one of the driving wheels can also be lowered and raised and these displacements coincide with a corresponding movement of the frame carrying the tools.

The invention has for its purpose to provide a plow of this kind having two driving wheels at the front end and a steering wheel at the rear end and in which the depth at which the shares enter the soil exclusively depends on the position given to the furrow wheel, while the land wheel running upon the soil not yet worked and the steering wheel at rear are mounted to the main frame in unalterable positions. To this end, the share frame is suspended from the main frame by means of links, and at the rate the furrow wheel is raised or lowered, the share frame also rises or sinks while always keeping parallel position to the main frame. The pivoted arm carrying the furrow wheel and the share frame are so connected together by means of two toothed sectors in gear or by a system of levers and links that the pressure caused by the resistance against the advance of the furrow wheel and the weight of the share frame balance each other without the aid of springs or counterpoises and that the depth at which the shares enter the soil corresponds to the height to which the furrow wheel is adjusted.

With that, the transmitting mechanism connecting the furrow wheel with the share frame is so constructed that when the furrow wheel is raised to the level of the land wheel, the share frame advances at the end of this movement to the effect that when the furrow wheel has reached its topmost position, the said frame is no longer at the level of the lowermost portion of the wheel but at a certain distance above the ground, for enabling the plow to travel on roads.

In order to prevent destructive action upon the transmitting mechanism between the furrow wheel and the share frame by the variations of the resistances met by the said wheel and the shares, the driving member of this mechanism is adapted to slide between two springs and its displacements are utilized for governing the output of the engine and for adjusting the positions of the furrow wheel and of the share frame.

The drawings show a form of embodiment of a motor plow constructed according to the invention. In the drawings, Fig. 1 is a side elevation of the plow in working position and Fig. 2 a side elevation of the same in travelling position. Fig. 3 is a top view of the plow. Fig. 4 is a diagram of the positions of the transmitting levers. Figs. 5 and 6 show in side elevation and plan, respectively, a motor plow provided with the sliding driving member hereinbefore referred to.

Like any motor plow with suspended shares, the plow in question is a three-wheeled car, in which the two larger front wheels, 1 and 2, are driving wheels, while the smaller wheel 3 at the rear is the steering wheel, carried by an upright trunnion 4 and adapted to be adjusted by any suitable mechanism, for instance by a mechanism to be acted upon by the hand wheel 5. The motor plow comprises a main frame 6 and a share frame 7. The front end of the main frame carries the engine, which, in the well-known manner, actuates the driving wheels 1 and 2 by means of a change speed gear 9, bevel gear 10 (see Fig. 3) and spur wheels 11 and 12. While the pivot of the driving wheel 1 is secured to the frame 6, the pivot of the driving wheel 2 is carried by an arm 13 adapted to swing around the secondary shaft 14.

By means of a tube 15 loosely surrounding the shaft 14, the arm 13 is rigidly connected with the toothed sector 16, which can be turned in either direction by the worm 17, the bevel gear 18 and the reversing gear 19. The reversing gear 19 is operated from the driver's seat 21 by means of the rod 20 and the pedal 22.

Besides that, the toothed sector 16 is in gear with the toothed sector 23 keyed upon

the shaft 24 carried by the main frame 6 and connected with the share frame 7 by arms 25. The share frame 7 is of triangular shape like the rear portion of the main frame 6, and as it is suspended by means of the two lever arms 25 and by the link 26 at the rear, it can be raised and lowered under the action of the toothed sectors 23 and 16 while always keeping parallel position to the main frame. It is obvious that the toothed sectors may be replaced by a suitable system of levers and links.

It will be seen from the foregoing statements that one is enabled to push forward, from the driver's seat 21, by means of the pedal 22 or in similar way the rod 20, which has for its effect that the reversing gear 19 causes, by means of the bevel wheels 18 and the worm 17, the toothed sector 16 to turn in either direction and the pivoted arm 13 to rise or to lower. Thus this lever arm raises or lowers the furrow wheel 2. At the same time, the toothed sector 23 and the lever arms 25 cause to raise or to lower the share frame 7 to which the shares or other tools are secured in the usual manner.

Fig. 1 shows the shares in their working position, that is to say sunk into the soil to a certain depth and with their edges at the same level as the lowermost portion of the furrow wheel 2. In Fig. 2, the share frame 7 is shown in its uppermost position, corresponding to the furrow wheel being raised to the level of the land wheel and ready for travel on roads, while the edges of the soil working tools 27 are located at a certain distance a above the ground and consequently can not touch it.

The reaction of the ground in the furrow tends to raise the lever arm 13 and the share frame 7 is drawn downward by its own weight. Now, as the two lever arms 13 and 25 which would be displaced under the action of these forces, are connected together by the toothed sectors 16 and 23, the reaction pressure acting upon the arm 13 and the weight of the share frame acting upon the arms 25 counterbalance each other and the use of springs or counterpoises for this purposes is dispensed with.

The diagram Fig. 4 shows the relative positions of the arm 13 and the arms 25, the lowermost positions being drawn in full and the topmost positions in dash lines 13′, 25′. For the sake of easier explanation, the medium positions are also drawn in dot and dash lines. For passing from the lowermost position to the uppermost one 13′, the arm 13 has run through the vertical space m and at the same time, the arms 25 have passed from the lowermost to the uppermost position 25′ by running through a vertical space n. Owing to the different positions of the angles 13—13′ and 25—25′ toward the vertical, the height n is by the length o more considerable than the height m and this has for its effect that after the raising of the furrow wheel 2 and the share frame 7, the edges of the shares 27 are located a certain distance above the ground. At the middle position of the arms, this difference of the heights is trifling; the space q run through in vertical direction by the arms 25 is only longer than the vertical space p covered by the arm 13 by the insignificant length r which does not play any part in practice.

In the Figs. 5 and 6, there is shown the movable driving part of the transmitting gear connecting the furrow wheel with the share frame. Owing to this particular arrangement of the driving part, the increase beyond a certain limit of the resistance against the advance of the shares in the soil has for its effect the automatic raising of the share frame and the furrow wheel up to the moment when the resistance decreases again, and in this manner damage to the plow is avoided. It has already been proposed to interpose, into the adjusting mechanisms of the shares, springs which are put under tension by the resistance against the advance of the share, but this arrangement merely acts against this resistance and only provides elastically yielding seats for the shares. Differing from this, the springs which according to this invention are put under tension by the movable driving part, are not only acted upon by the resistance met by the shares but also by the resistance against the furrow wheel, because these two parts have a common adjusting mechanism. The adjustment according to this latter resistance is very important especially during rainy weather and with heavy soils, and consequently the adaptation of the working depth of the shares to the available force of traction can only be obtained by simultaneous adjustment according to both resistances.

In this case, the intermediate shaft 14 is carried by a pillow-block 28, an arm of which also carries the shaft 24 of the lever arms 25 and through which passes the shaft 30 of the worm 17. This pillow-block 28 is rigidly bolted to the main frame 6. The shaft 30 of the worm is adapted to slide lengthwise and the worm is keyed to it. The resistance against the advance of the shares 27 and the resistance against the rolling of the furrow wheel which is transmitted to the crank 13 act upon the two buffer springs 29, bearing on the one hand against collars of the shaft 30 and on the other hand against the pillow-block 28. According to the variations of these two resistances, the springs 29 are more or less compressed in either direction, as the worm shaft 30 is displaced under the action of these resistances. The displacements are utilized for automatically adapting the working depth of the shares to

the output of the engine. For this purpose, the shaft 30 is connected by a lever 31 having its pivot at 32, on the one hand with the throttle valve 33 of the engine 8 and on the other hand with the reversing gear 19. When the pressure upon the springs 29 increases, the lever 31 opens the throttle valve 33 and afterwards it also operates the reversing gear 19 in order to raise the share frame 7 and the furrow wheel 2 to such a height that the pressure on the springs is diminished. When this arrives, the lever 31 disengages the reversing gear and at the same time it gives to the throttle valve 33 the position with which the quantity of fuel is adapted to the desired output of the engine. It has already been proposed automatically to govern, according to the resistance of the soil, the output of engines of motor plows and consequently the invention is limited to the combination with a worm shaft adapted to slide lengthwise of the throttle valve.

Every time the product of the resistance against the advance of the shares and against the rolling of the furrow wheel sinks below a given minimum, the endwise displacement of the shaft 30 in the opposite direction and the angular movement of the lever 31 thereby caused have for their effect that the feeding of fuel to the engine is throttled and that, on the other hand, the reversing gear 19, engaged for the rotation of the worm 17 in the opposite direction causes the shares 27 more deeply to enter the soil, until the product of the resistances against the rolling of the furrow wheel and against the advance of the shares corresponds to the tension of the springs 29.

The two springs 29 arranged as hereinbefore described also prevent ruptures of the machine and injuries to the shares and to the frame. Indeed, if the shares hit in the soil against an obstacle of extraordinary resistance, for instance against a stone-block, the share frame 7 is raised in the described manner sufficiently high for allowing the shares 27 to pass above the obstacle.

I claim:

1. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, transmitting mechanism interposed between the said lever arm and one of the links and means for so gearing the said mechanism with the engine as to be driven in either direction.

2. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, a toothed sector rigidly connected with the nave of the lever arm, another toothed sector meshing with the said sector and rigidly connected with the nave of one of the links, a worm in gear with one of said sectors, a reversing gear mounted on the driving shaft of the engine and transmitting connection between the said reversing gear and the worm shaft.

3. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, a toothed sector rigidly connected with the nave of the lever arm, another toothed sector meshing with the said sector and rigidly connected with the nave of one of the links and means for angularly displacing one of said sectors, the axis of the link sector being located at a lower level than the axis of the lever sector and the path of the link sector in the upright portion of the circle, while the path of the lever sector comprises the lower portion of the circle, for the purpose of enabling the share frame to be raised more highly than the furrow wheel.

4. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a drivng wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, transmitting mechanism interposed between the said lever arm and one of the links, means for so gearing the said mechanism with the engine as to be driven in either direction and two springs bearing in opposite directions against a part of the mechanism adapted to displace itself in a corresponding direction when the mechanism is operated.

5. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, a toothed sector rigidly connected with the nave of the lever arm, another toothed sector meshing with the said sector and rigidly connected with the nave of one of the links, a worm in gear with one of said sectors and keyed to an endwise movable shaft, a reversing gear mounted on the driving shaft of the engine, transmitting gear between the said reversing gear and the endwise movable shaft and two springs adapted to oppose the displacements of the shaft.

6. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, transmitting mechanism interposed between the said lever arm and one of the links, means for so gearing

the said mechanism with the engine as to be driven in either direction, two springs bearing in opposite directions against a part of the mechanism adapted to displace itself in a corresponding direction when the mechanism is operated and transmitting mechanism connecting the said part with the throttle valve of the engine.

7. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, transmitting mechanism interposed between the said lever arm and one of the links, means comprising a reversing gear for gearing the said mechanism with the driving shaft of the engine, two springs bearing in opposite directions against a part of the mechanism adapted to displace itself in a corresponding direction when the mechanism is operated and transmitting mechanism connecting the said part with the said reversing gear.

8. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, transmitting mechanism interposed between the said lever arm and one of the links, means comprising a reversing gear for gearing the said mechanism with the driving shaft of the engine, two springs bearing in opposite directions against a part of the mechanism adapted to displace itself in a corresponding direction when the mechanism is operated and transmitting mechanism connecting the said part with the said reversing gear and with the throttle valve of the engine.

9. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, a toothed sector rigidly connected with the nave of the lever arm, another toothed sector meshing with the said sector and rigidly connected with the nave of one of the links, a worm in gear with one of said sectors and keyed to an endwise movable shaft, a reversing gear mounted on the driving shaft of the engine, transmitting gear between the said reversing gear and the endwise movable shaft, two springs adapted to oppose the displacements of the shaft, a lever hinged to the front end of the endwise movable shaft and a rod connecting the lever to the throttle valve lever.

10. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, a toothed sector rigidly connected with the nave of the lever arm, another toothed sector meshing with the said sector and rigidly connected with the nave of one of the links, a worm in gear with either sector and keyed to an endwise movable shaft, a reversing gear mounted on the driving shaft of the engine, transmitting gear between the said traversing gear and the endwise movable shaft, two springs adapted to oppose the displacements of the shaft, and a two-armed lever having one end hinged to the front end of the endwise movable shaft and the other end to the adjusting rod of the reversing gear.

11. In a motor plow, the combination with the main frame and the engine carried thereby of a lever arm pivoted to the main frame, a driving wheel carried by the said lever arm, a share frame suspended from the main frame by means of links, a toothed sector rigidly connected with the nave of the lever arm, another toothed sector meshing with the said sector and rigidly connected with the nave of one of the links, a worm in gear with either sector and keyed to an endwise movable shaft, a reversing gear mounted on the driving shaft of the engine, transmitting gear between the said reversing gear and the endwise movable shaft, two springs adapted to oppose the displacements of the shaft, a two-armed lever having one end hinged to the front end of the worm shaft and the other end to the adjusting rod of the reversing gear and a rod connecting this lever with the throttle valve lever.

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