(No Model.) 3 Sheets—Sheet 1.

# M. G. BUNNELL.

## MACHINE FOR MAKING AND REPAIRING ROADS.

No. 455,702. Patented July 7, 1891.

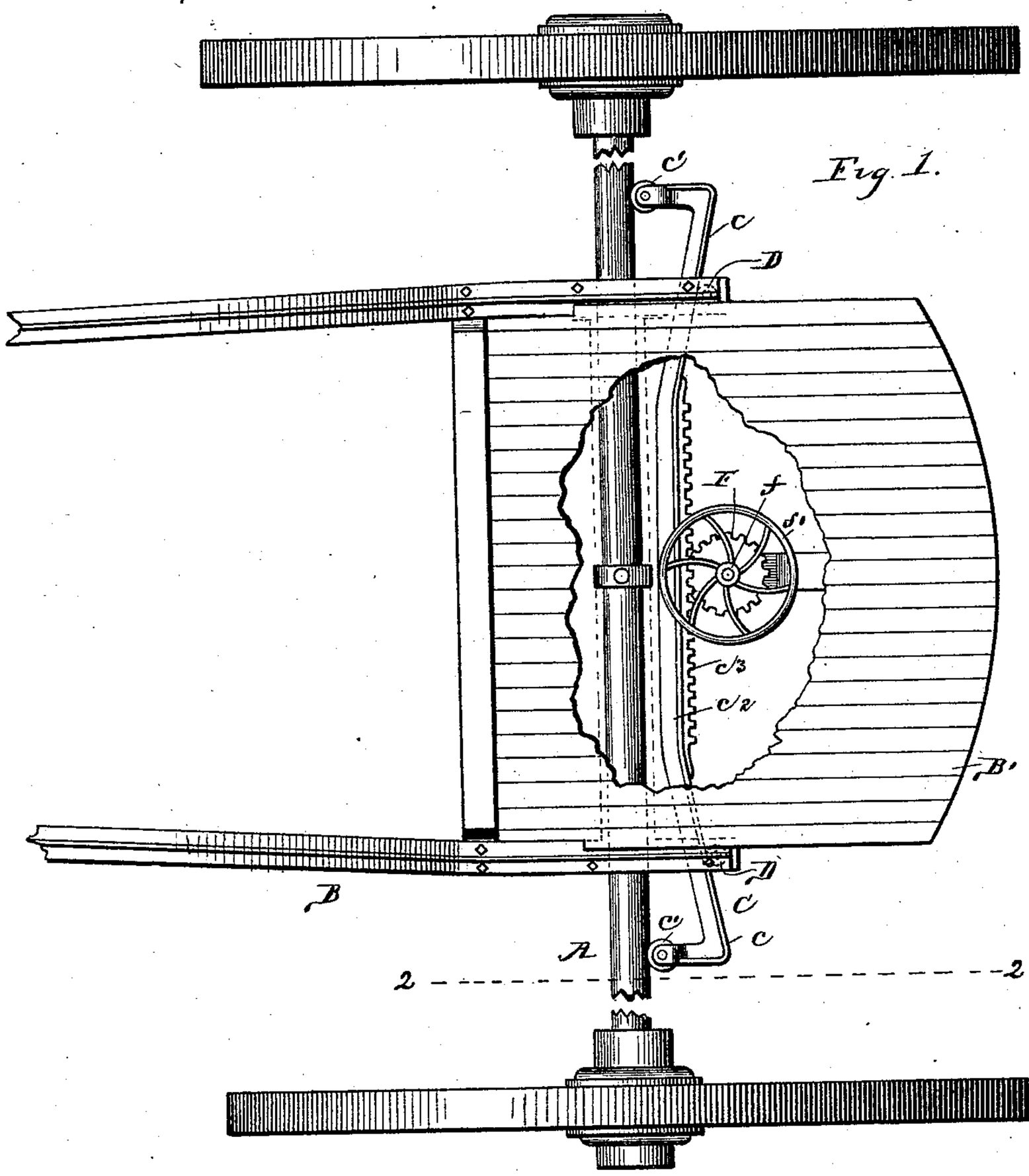


Fig. 1.

Fig. 2

Witnesses
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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

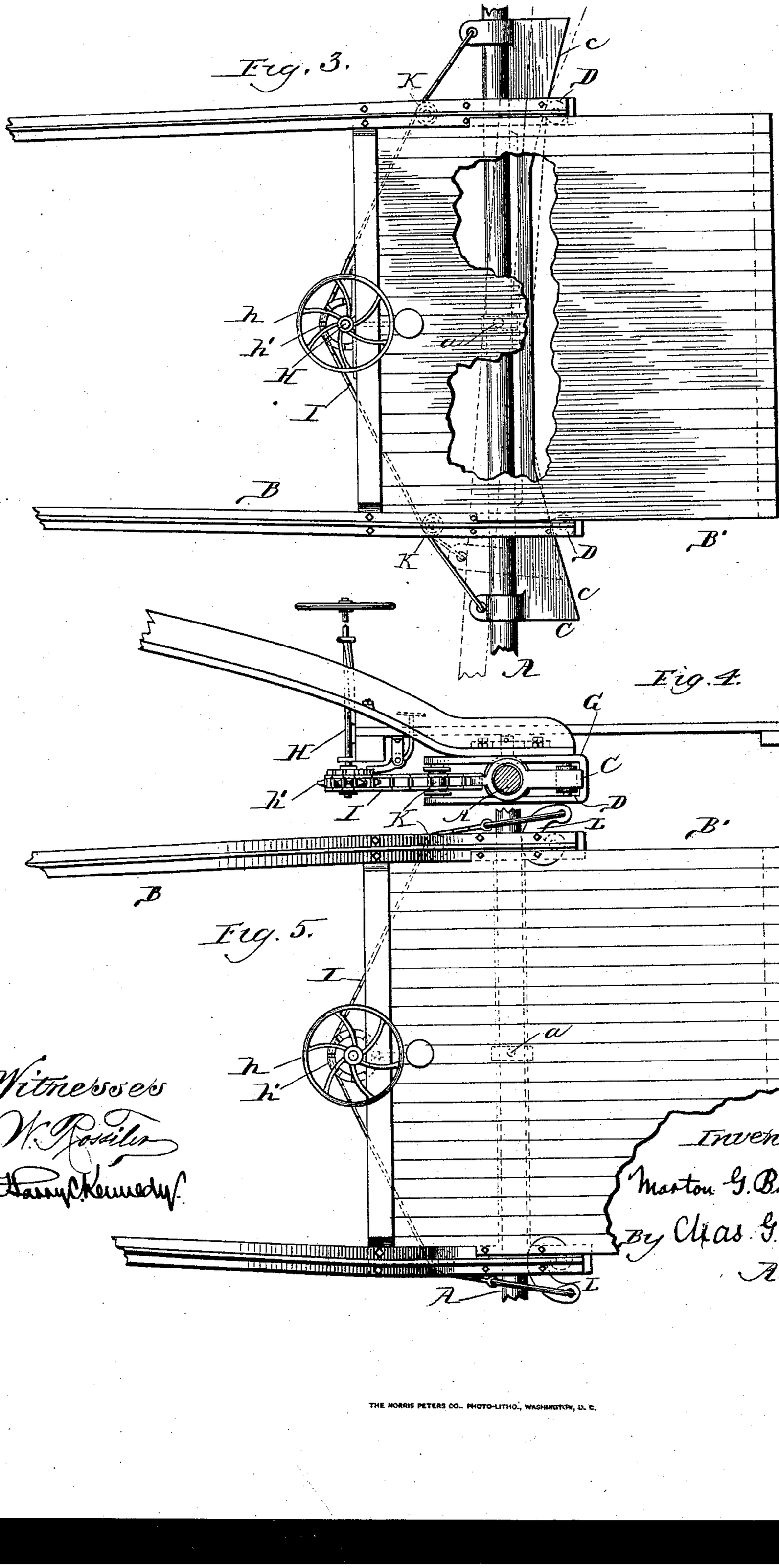


Fig. 4.




Fig. 5.




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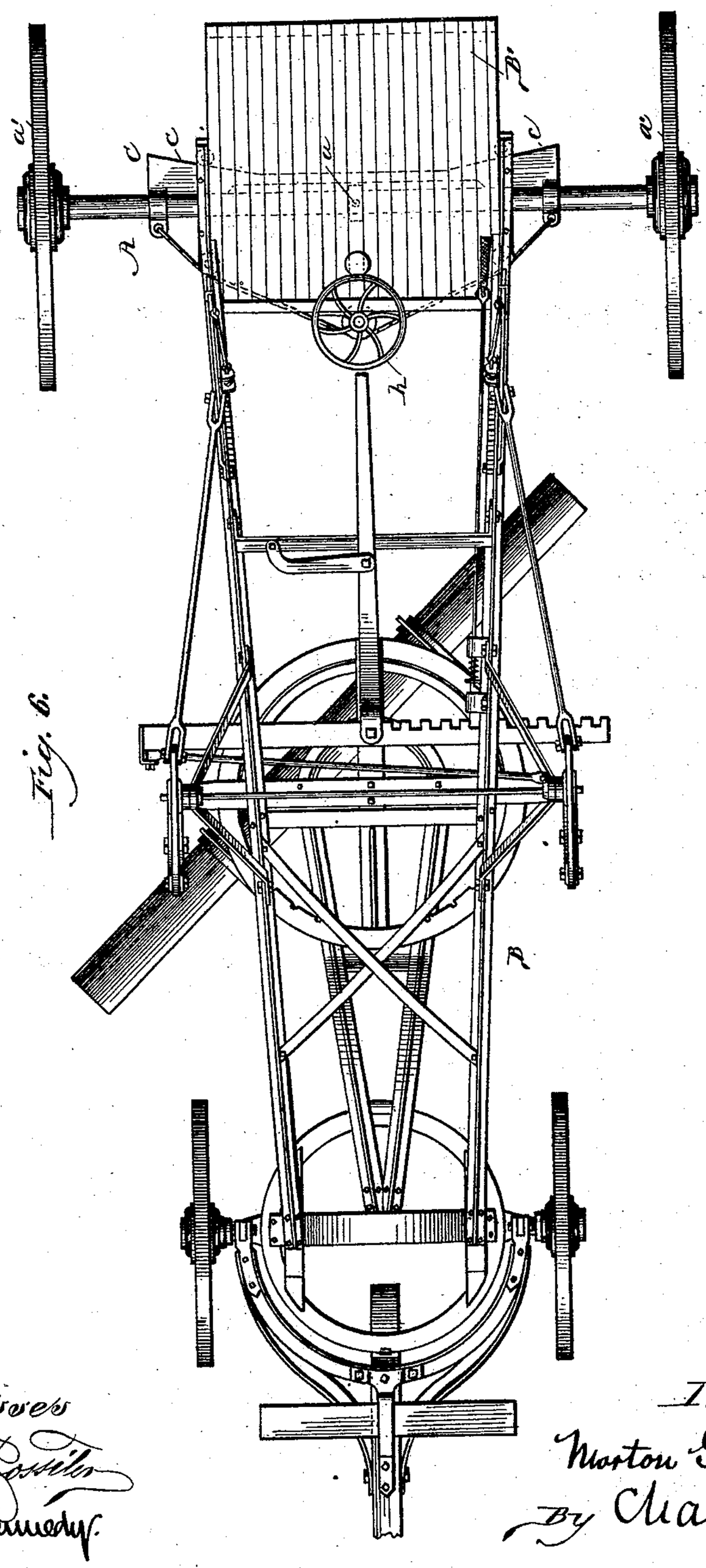


Fig. 6.

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# UNITED STATES PATENT OFFICE.

MORTON G. BUNNELL, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ANNA B. AUSTIN, OF SAME PLACE.

## MACHINE FOR MAKING AND REPAIRING ROADS.

SPECIFICATION forming part of Letters Patent No. 455,702, dated July 7, 1891.

Application filed September 8, 1890. Serial No. 364,294. (No model.)

*To all whom it may concern:*

Be it known that I, MORTON G. BUNNELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Machines for Making and Repairing Roads, of which the following is a specification.

My invention relates to a construction of road-making and road-repairing machines embodied in my application, Serial No. 370,236, for Letters Patent of the United States, filed November 3, 1890, and involving a body-frame which is pivotally supported at its forward end upon the front axle and at its rear pivotally supported upon a rear adjustable swinging axle, and means for effecting a horizontal swinging adjustment of the rear axle in either direction and arranged so as to be available to an attendant standing upon the rear platform of the machine.

The objects and advantages of the swinging rear axle are fully set forth in my said application and need not be here repeated, it being sufficient to state that after the rear axle has been adjusted about its pivotal connection with the body-frame, so as to place it oblique to the line of progression or line of draft, the body-frame will during the advancement of the machine swing obliquely to the line of progression and the rear axle will be brought at right angles to such line and parallel with the front axle, for the purpose fully described in said application. The particular pivotal connection of the rear axle illustrated in this case is included in the subject-matter of my pending application, Serial No. 363,273, filed August 28, 1890.

The object of my present invention is to relieve the device employed for adjustably swinging the rear axle from the severe strain which in practice may break some portion of the same unless said device is made undesirably heavy. To the attainment of such end I provide in connection with the rear swinging axle an adjustable two-part or double bearing or abutment, which is applied to the axle at points between its middle pivot and the two rear wheels, and which is adjustable with the swing of the axle and arranged to so back said axle that it will hold the same in its adjustment and relieve it from back pull or strain induced by the resistance of the wheels to the forward draft, and thereby relieve such hand-operated device as may be employed for adjusting the axle about its pivotal connection with the body-frame of the machine. As a preferred means for adjusting said bearing and swinging the axle I apply the hand-operated device from which the axle is adjusted to said bearing and effect the swinging of the axle by an adjustment of the bearing, as hereinafter more fully set forth.

Various means can be provided for adjusting said two-part or double bearing, such as a chain and sprocket, a lever, or a rack and pinion, and for the broader purposes of my invention said double bearing can be formed in various ways, such as by two connected bearings or by separately-arranged bearings, also arranged so that when adjusted they shall adjust the axle, as hereinafter set forth.

In the accompanying drawings, Figure 1 represents in top plan view the rear portion of the machine with a portion of the rear platform broken away so as to more clearly show an adjustable double bearing for swinging the rear axle either way about its pivotal connection with the body-frame. In this view the adjustment of the double bearing is effected by a rack and pinion. Fig. 2 shows a section through the axle on line 2 2 in Fig. 1, so as to show in side elevation the portion of the machine represented in Fig. 1. Fig. 3 is a view similar to Fig. 1, but illustrates a chain and sprocket for operating the adjustable bearing. Fig. 4 is a side elevation of Fig. 3, the axle being shown in cross-section. Fig. 5 is a top plan view of the rear portion of the machine with two bearing portions for adjusting the axle made separate from one another, but synchronously operated by a chain and sprocket. Fig. 6 is a top plan view of a road-working machine with the double bearing and chain and sprocket arranged for adjusting and backing the rear axle, as in Fig. 3.

In said drawings I have illustrated two forms or constructions of bearings, both of which, however, involve the feature of an adjustable double bearing or abutment arranged

for backing the swinging adjustable axle A at opposite sides of its pivotal connection at *a* with the body-frame B of a road-working machine, and also the feature of adjustable wedge or cam bearings for adjusting the rear axle about its pivoted connection with the body-frame B of the machine and holding it in such adjustment. Of these two adjustable double bearings or abutments the one C, consists of a frame or bar which is carried by the body-frame and provided at its end portions with oblique or inclined faces *c*. The said frame or bar is arranged in rear of the axle and abuts against the same at points between its pivotal connection with the body-frame and the rear wheels *a'*. It is also arranged to slide along the axle and is preferably provided with grooved anti-friction rolls *c'* for engaging and running along the axle, so as to lessen friction. The oblique or cam faces *c* of this frame or bar are arranged at points along its rear edge and bear against anti-friction rolls D, arranged in bearings secured to the body-frame, said rolls D being illustrated in dotted lines, except in Figs. 2 and 4, in each of which a roll D is shown in full lines. These fixed bearings embrace and form guides for the adjustable bearing C, and also preferably embrace the axle, so as to form guides for the same. The wedge or cam faces *c* are oblique to the axle, and may be said to be formed along lines which diverge toward the rear of the machine, so that when the bar or frame which serves to connect together said oblique bearing-faces is adjusted toward one side of the machine one of its cam or wedge ends will be forced forward, while its other end will be permitted to move rearwardly, owing to the fact that a longitudinal adjustment of the double bearing as a whole will cause one of its cam-faces to run along one of the rolls D in a direction to bring its highest portion opposite the roll, and thus move the bearing at this end forward, while on the other hand the other cam-face will run along the remaining roll D in a direction to bring its lowest portion opposite the same, it being understood that while I employ the terms "high" and "low" portions of the cam-faces said faces are of course formed along lines which run horizontally and oblique to the axle. By adjusting the cam-faced bar or frame as aforesaid the axle will be swung about its pivotal connection at *a* with a cross-bar or other fixture on the body-frame. Opposition to the forward movement of either rear wheel will tend to pull or hold back the end of the rear axle whereon it is arranged. Properly speaking the pull is exerted by the draft; but for convenience of description the axle may be said to pull back at one or the other of its ends, according to which one is swung forward by adjusting the double-faced cam-bearing. The latter, while being adjusted transversely to the line of draft, will as a whole move along the axle and also partake of the swinging movement of the same, and hence this shifting device for adjusting the axle will at all times provide bearing portions or abutments between the axle and the rolls D. The back pull of the end of the axle, which is swung forward, will therefore be met and taken up by one of the bearings afforded by the end portions of the adjustable bar or frame, and this back pull on the bearing will be met and taken up by the roll back of it.

With particular reference to Figs. 1 and 2 the middle portion $c^2$ of the bar herein shown serves as a connection between a couple of bearings which engage and are movable along the axle, and which are provided with wedge or cam faces *c*, oblique to the axle and arranged to engage the rearwardly-arranged rolls D. The two ends of the bar are therefore adapted to act as cams or wedges, which are adjustable between the axle and the rolls D, and as a simple and preferred arrangement I form these cams or wedges at opposite ends of a bar $c^2$, so that by shifting the bar the cams or wedges will move synchronously. When these cams or wedges are thus synchronously adjusted, the advancement of one of them toward the middle point of the axle will force one arm or end of the axle forward, while the receding movement of the other cam or wedge away from the middle point of the axle will permit the other arm or end of the latter to swing back proportionally to the forward swing of the first-mentioned arm or end. As a means for thus simultaneously adjusting the cams or wedges, which I may term "cam" or "wedge" bearings, I provide the connecting-bar $c^2$ in Figs. 1 and 2 with a rack $c^3$, and arrange a pinion F in engagement with said rack. As a convenient way of operating this rack-and-pinion movement, I arrange in a suitable bearing on the main frame of the machine a hand-wheel shaft *f*, provided at its lower end with the pinion F, and at its upper end provided with a hand-wheel *f'*, arranged within easy reach of an attendant who may stand upon the rear platform B'.

Upon the adjustable cross-bar $c^2$ (or, what is substantially the same thing, on its cam or wedge ends) I provide rolls *c'*, which engage the axle so that they may run along the same, and thus avoid unnecessary friction. The rolls D, which are engaged by the cam-faces *c*, are conveniently supported between the upper and lower sides of bearings G, which are secured to the body-frame—as, for example, said bearings can be bolted to the sides of the body-frame. The rear axle also extends between the upper and lower sides of the bearings G, which also form guide-bearings for steadying the axle, but permitting its horizontal swing.

As another way of operating the adjustable connected wedge or cam bearings, I can provide the body-frame with a bearing for a hand-wheel shaft H, provided at its upper end with a hand-wheel *h*, and at its lower end provided with a winding drum or sprocket *h'* for a chain I, which is at its ends connected with

the two cam or wedge bearings. By turning the hand-wheel therefore the adjustable bearings can be shifted simultaneously to the right or left, as occasion may require. The chain also passes about pulleys K, mounted within the bearings G at points in advance of the axle, or these pulleys can be omitted and the chain arranged to pass from the sprocket direct to the ends of the adjustable bearings.

L, Fig. 5, denotes another form of cam-bearing. The bearing L is in the nature of an eccentric pivotally supported on the body-frame. I provide two of these cam-bearings L, arranged at opposite sides of the point at which the rear axle is pivotally connected with the body-frame, and in connection therewith employ the hand-wheel shaft H, having a sprocket $h'$ for a chain I, which is at its ends attached to the arms of the cam-bearings L. By operating the sprocket the chain operates one of the cams in a direction to cause it to swing forward the end portion of the axle which it engages, while the other cam will be operated by the rearwardly-swinging end portion of the axle. With this arrangement the back pull of an end of the axle will be taken up by one of the cams, the strain or pull being exerted on the cam in such direction that it will be taken from the cam by its pivot.

By either of the foregoing arrangements, therefore, the axle can be adjusted about its pivot, and the strain on the chain and sprocket or other device for operating the cams or wedges will be comparatively light. Of the two forms, however, I prefer the connected cam or wedge bearings, and while I have in certain figures omitted the rolls on said cam or wedge bearings I prefer to use the same. I also prefer to employ the rack-and-pinion movement hereinbefore described, since by using the same I avoid lost motion which may be incurred in using the chain and sprocket.

The body-frame may be of any suitable construction and is understood to be provided with means suitable for suspending and raising and lowering a reversible scraper-blade K, adapted for diagonal work—that is to say, one or either of its ends can be placed ahead, and the blade as a whole set obliquely to the line of progression. The body-frame can be also pivoted upon a front-wheeled axle in any suitable way. The blade is preferably drawn by a draft-bar; but being suspended from the body-frame by some suitable raising and lowering device may properly be said to be carried by the body-frame. For a non-reversible machine—that is to say, a machine in which one end only of the blade can be placed ahead—I can of course use one wedge or cam bearing only.

In operating the machine the rear axle could of course be swung about its pivotal connection, so as to throw it into a position oblique to the line of draft, and the cam or wedge bearings interposed between the axle ends and the rolls D or other abutments back of the cam or wedge bearings. Such operation, however, is obviously inferior to the mode of adjusting the axle by operating the cam or wedge bearings. After the axle has been thus adjusted into position oblique to the line of draft the body-frame will swing about its pivotal connection with the forward axle and will assume a position oblique to the line of progression, under which conditions the rear axle will be brought into position parallel with the front axle. The strain or back pull of one or the other ends of the axle will be taken by one or the other of the adjustable bearings, both of which will evidently serve as a means for steadying the axle.

What I claim as my invention is—

1. The combination, substantially as hereinbefore set forth, in a machine for making and repairing roads, of the swinging rear-wheeled axle pivoted to a body-frame pivotally supported by a front-wheeled axle and carrying a scraper-blade for diagonal work, and an adjustable bearing for resisting back pull or strain on the axle beyond the point whereat it is pivoted to the body-frame.

2. The combination, substantially as hereinbefore set forth, in a machine for making and repairing roads, of the swinging rear-wheeled axle pivoted to a body-frame carrying a scraper-blade for diagonal work, and an adjustable cam-bearing movable in unison with the swing of the axle and serving as an abutment for opposing back pull on the axle beyond the point whereat it is pivoted to the body-frame.

3. The combination, substantially as hereinbefore set forth, in a machine for making and repairing roads, of the swinging rear-wheeled axle pivoted to a body-frame carrying a scraper-blade for diagonal work, an adjustable cam or wedge bearing for swinging and backing the axle, and means suitable for adjusting the cam or wedge bearing.

4. The combination, substantially as set forth, of the swinging rear axle pivoted to a body-frame carrying a scraper-blade for diagonal work, and an adjustable cam or wedge bearing movable along the axle and arranged for backing the same at opposite sides of the point whereat it is pivotally connected with the body-frame.

5. The combination, substantially as hereinbefore set forth, of the rear swinging axle pivotally connected with a body-frame carrying a scraper-blade for diagonal work, and a couple of connected cam or wedge bearings adjustable in unison along the axle and arranged for backing the same at opposite sides of the point at which it is pivotally connected with the body-frame.

6. The combination, substantially as hereinbefore set forth, of the rear swinging axle pivotally connected with a body-frame carrying a scraper-blade for diagonal work, a couple of connected cam or wedge bearings movable

in unison along the axle and arranged for backing the same at opposite sides of the point at which it is pivotally connected with the body-frame, and means suitable for adjusting said cam or wedge bearings, so as to adjust the axle about its said pivotal connection with the body-frame.

7. The combination, substantially as hereinbefore set forth, of the rear swinging axle pivotally connected with a body-frame carrying a scraper-blade for diagonal work, connected cam or wedge bearings movable along the axle and arranged for backing the same at opposite sides of the point at which it is pivotally connected with the body-frame, and a rack-and-pinion movement for simultaneously adjusting said cam or wedge bearings so as to effect a swinging adjustment on the part of the axle.

8. The combination, substantially as hereinbefore set forth, of the rear swinging axle pivotally connected with the body-frame of a road-working machine carrying a scraper-blade for diagonal work, a longitudinally-adjustable cross-bar provided at its ends with cams or wedges having faces *c* oblique to the axle, rolls on said bar engaging the axle, and rolls on the body-frame engaged by said oblique faces *c*.

9. The combination, substantially as hereinbefore set forth, of the swinging rear axle pivotally connected with the body-frame of a road-working machine carrying a scraper-blade for diagonal work, the adjustable bar $c^2$, provided at its ends with cams or wedges having faces *c* oblique to the axle, rolls on the cam or wedge ends of said bar engaging the axle, rolls on the body-frame engaged by said oblique faces, a rack on the bar, and a hand-wheel shaft provided with a hand-wheel and further provided with a pinion engaging said rack.

10. The combination, substantially as hereinbefore set forth, with the rear swinging axle pivotally connected with the body-frame in a road-working machine, of the adjustable bar provided at its ends with cams or wedges and with rolls engaging the axle, guide-bearings embracing the axle and permitting the horizontal swing thereof, and rolls D, arranged between the upper and lower sides of said guide-bearings and engaging the cam-faces of said cams or wedges.

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