G. E. BURT & E. A. HILDRETH.

Horse-Power.

No. 203,320. Patented May 7, 1878.

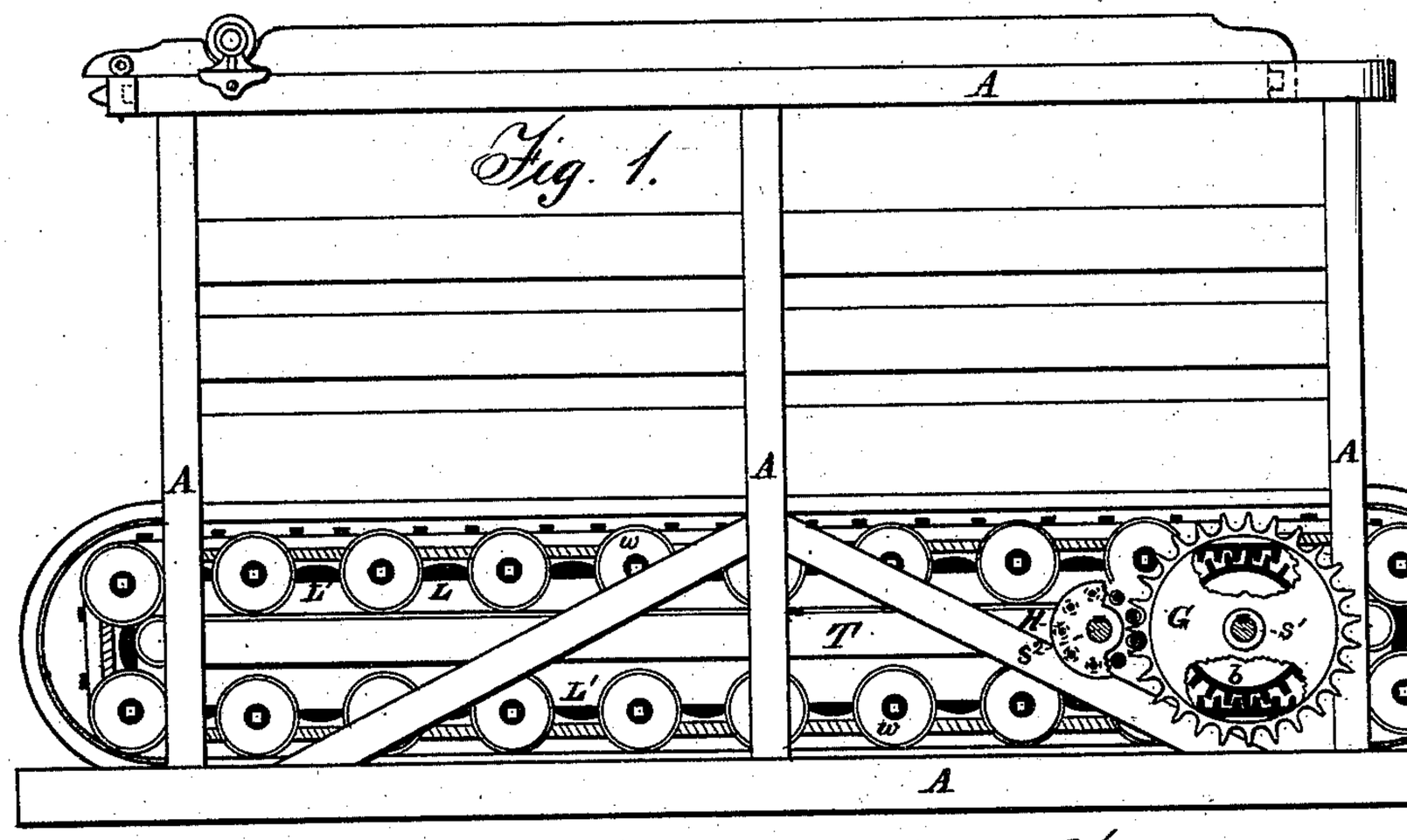


Fig. 1.

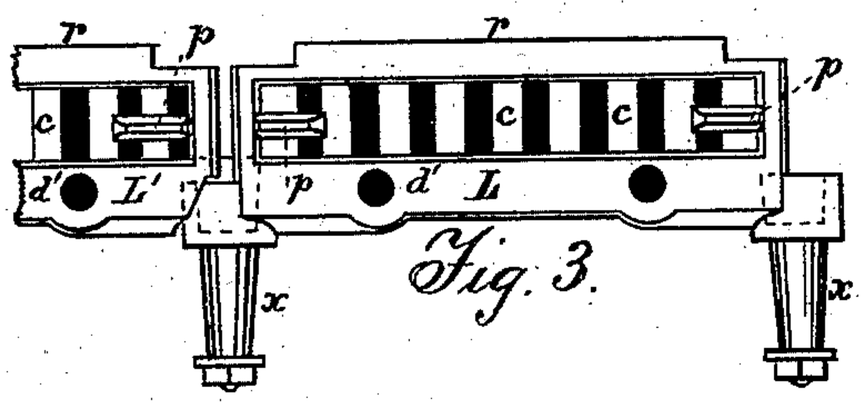


Fig. 3.

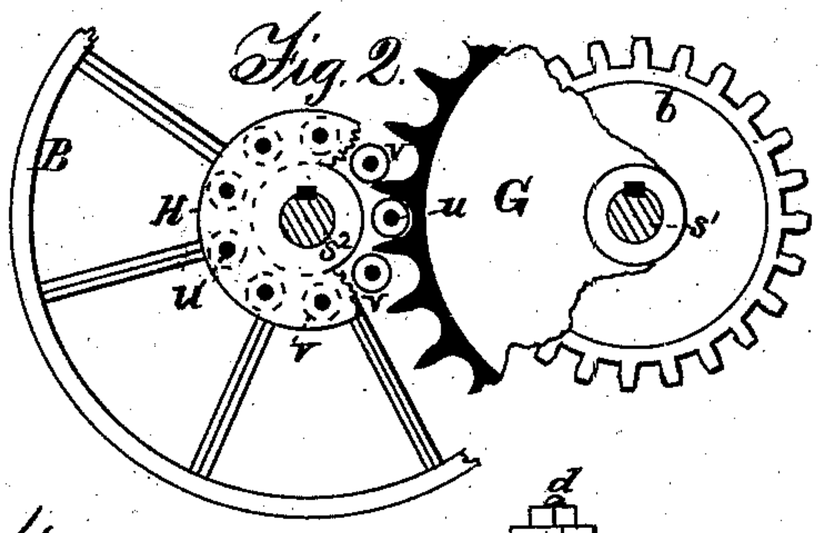


Fig. 2.

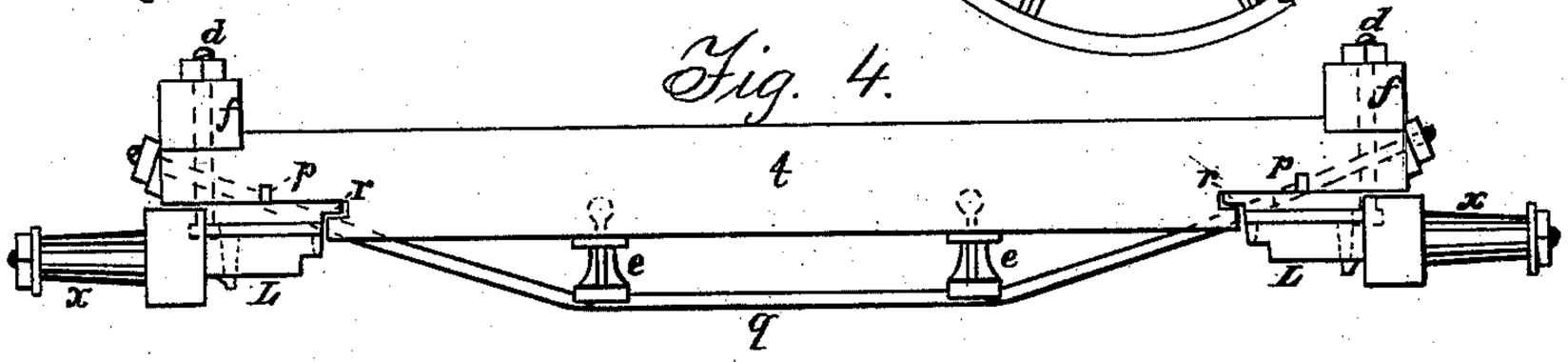


Fig. 4.

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## IMPROVEMENT IN HORSE-POWERS.

Specification forming part of Letters Patent No. **203,320,** dated May 7, 1878; application filed March 30, 1878.

*To all whom it may concern:*

Be it known that we, GEORGE E. BURT and EDWIN A. HILDRETH, both of the town of Harvard, in the county of Worcester, in the State of Massachusetts, have jointly invented certain new and useful Improvements in Endless-Chain Horse-Powers; and we do hereby declare that the following is a full, clear, and exact description of the same.

The first part of our invention relates to the gearing, by which we obtain a high rate of speed on the belt-wheel; and the object is to save the loss of friction, as far as possible, in the gears.

The second part of our invention relates to an improved link or chain section, to which the rolling trucks are attached, said links supporting and connecting the treads or lags upon which the horses walk.

The third part of our invention relates to an improved method of supporting the central portion of the treads or lags upon which the horses walk.

Figure 1 is a side elevation of a machine embodying our invention. Fig. 2 is a partial side view, showing the gearing used for communicating the power and increasing the speed. Fig. 3 is a top view of the chain links or sections which connect and support the moving platform. Fig. 4 is a cross view of the moving platform, and showing the method of supporting the central portion of the treads.

Like letters represent like parts in all the figures.

A is the main frame of the horse-power, and should be constructed in such a manner as to give a strong and light frame.

The moving platform is constructed of lags or treads *t*, which rest upon and are secured to the links L L′. The links L are formed with chilled axles *x x*, cast onto the links, and the links L′ are connecting-links, used to connect the axle-links together.

*f f* are strips of wood, placed lengthwise of the chain over the ends of the lags, and are called "bunters." These bunters *f*, lags *t*, and links L or L′ are securely bolted together by the lag-bolts *d d*.

*q* is a supporting or truss rod, extending under the central portion of each lag *t*, and is so placed as to come in the central portion of each chain-section. The truss-rod *q* is provided with a nut on each end of the lag, to tighten the truss-rod and bring it to a bearing on the standards *e e*, one or more under each lag, to prevent the lags from sagging between the wheels under the weight of the team. As this truss-rod passes across the central portion of each section of the moving platform, they can never be injured by the horses' feet when the lags wear away between the joints of the moving platform. As the strain on these truss-rods is only a tension strain, a very small rod is all that is required.

With this device thin lags can be used, making a lighter moving platform; and this supporting-truss is of especial advantage where the lags are long, as in two or three horse machines.

The links L are provided with axles *x x*, upon which the truck-wheels *w w* revolve. The truck-wheels *w* roll along tracks placed on the track-beams T. The links L L′ are provided with cogs *c c*, which form racks to mesh into the driving-gears *b b*. Two driving-gears, *b b*, are keyed onto the shaft S′, and are placed, one on each side of the machine, in such position as to run in the racks formed by the links on the ends of the treads. The driving-gears *b b* mesh into the rack on the moving platform both above and below, as shown in Fig. 1. The power is communicated to the gears *b b* from the upper sections of the moving platform as the team walks over it. The gears *b* mesh into the lower or returning sections, and by this arrangement the lower or returning sections of the moving platform are propelled along the lower track by the gears *b*, and the chain is relieved of all strain of the chain and truck-wheels while passing around the end circles.

In constructing the links or chain-sections for endless-chain horse-power machines, it is of especial importance that the link should be connected to the lags or treads of the moving platform, so that the links will always preserve their exact relative position with each other, so that they may always present a straight rack for the driving-gears *b* to run in.

The links must also be so connected with the lags that the weight of the team can be sustained on the truck-wheels without any

danger of having the links rock under the lags from the strain of supporting the team on the projecting axles and truck-wheels, on which the moving platform is carried.

In many of the endless-chain horse-powers, as heretofore constructed, cross-rods have been used to form the joint or hinge upon which the links or chain-sections turn in passing around the ends of the track. These same cross-rods formed also the axles upon which the truck-wheels were placed. By this old plan of using cross-rods between each section of the moving platform, it was necessary to make them very large and heavy. They were very liable to be bent when the edges of the treads wore away between the platform-sections, as the horses were almost sure to walk into the open joints and strike the cross-rods. They were a great additional weight to the moving platform, and were therefore an extra load for the team to carry. When bent, the truck-wheels were thrown out of line, and the whole mechanism of the moving platform was thrown out of order.

If the links and axles can be so securely fastened to the lags as to firmly hold the axles and truck-wheels in position, the cross-rods used for joints and axles can be dispensed with.

To effectually preserve the proper relative position of the links L and L′ with the lags *t*, we form the posts *p p* on the upper face of the links, as shown in Figs. 3 and 4, and cut corresponding recesses in the lag *t* to fit onto these posts *p p*, as shown in Fig. 4. The posts *p p* should be placed near each end of the link, and near the central line of the links, to hold the link firmly in position, and to leave as strong a shape as possible for the ends of the lags, after being grooved, to fit onto the links.

In our links the chill-hardened axles are cast solid onto the links. The weight of the team bearing upon the trucks and axles would tend to rock the inner edge of the links down and away from the surface of the lags above, and allow the axle to cant out of its true position, unless carefully provided against. To effectually overcome this tendency, and to hold our links and axles securely in position without using cross-rods in the joints for axles, we construct our link with a flange or rib, *r*, extending along the inner edge of the link. We also form a recess in the lags, as shown in Fig. 4, to fit onto the flange *r;* and the flange *r* and the corresponding recess in the lags securely hold the inner edge of the link up against the face of the lags, and sustain the axles in their proper positions under the weight of the team.

The bolts *d* extend from the links through the lags and bunters. These lag-bolts *d* are so near the outer edge of the links that they are well out of the way of the horses' feet.

The posts *p p* and the flanges *r* are so low down and so near the outer ends of the lags that the lags can be worn down quite thin under the action of the horses' feet without any danger from the feet of the horses ever coming in contact with any part of the chain-links and do damage.

In endless-chain horse-powers having cog-racks on the moving platform it is of great advantage to so construct them that the rack cannot become clogged with dirt, nor become filled with snow or water, which may freeze into the rack.

To make our rack more safe and free from clogging, we cast a solid link, connecting the cogs at each end to the side pieces of the link, and forming an open rack, with openings through the link between the cogs *c c*, as shown in Fig. 3. By this arrangement snow, water, and dirt can pass down between the cogs, and there is consequently less liability of clogging the rack or breaking the gearing from the accumulation of ice or any foreign substance.

In horse-powers which are designed for thrashing grain, sawing wood, or any such work, where a high rate of speed is required, it is usually necessary to speed up by the use of gearing applied for this purpose.

Where common spur-gears are used for the purpose of increasing the speed, or "gearing up," as it is called, in these endless-chain horse-powers, it has been done with great loss of power from the friction of the cogs in the gearing, and the horse-power becomes inadequate to perform the work to the best advantage.

To enable us to increase the speed with as little loss of power as possible from the friction of the cogs, we construct a spur-gear, G, which we place on the outer end of the main shaft $S^1$. The main shaft $S^1$ is extended out on both sides of the main frame, if desired, so that the gearing can be changed from side to side. The shaft $S^2$ turns in boxes in the tracks T, and is extended through the machine and out upon both sides of the power, so that a belt-wheel can be applied to either side of the machine without changing the gearing.

On the pinion-shaft $S^2$ we place the pinion-gear H. This pinion-gear H we construct with rolling cogs *v v*, which are formed of hardened tubes, which are constructed to turn upon the bearings or pivots *u u*. The pivots or bearings *u u* pass through the rolls *v v*, and are supported and held in position by flanges on both sides of the pinion-gear H. The pivots or bearings *u u* are riveted in position through the side flanges of the gear H, and the cogs *v v* are allowed to turn freely on them. Thus as the cogs of the gear G engage with the cogs of the pinion-gear H the cogs *v v* will roll on their bearings as they pass in and out, and thus cause much less friction than is occasioned by common spur-cogs, which slide and frictionize on each other. As these are high-speeded gears, the saving of friction from this device is of great importance in this position, and is much greater than if the gears were used only where the motion was slow.

We do not claim, broadly, the use of rolling cogs, however used or however applied to horse-power machines, nor the gearing for multiplying motion, as shafts driven by the chain acting on a pulley of the main shaft, having been connected by gearing with the counter-shafts; nor do we claim the use of truss-rods, for they are very common. Our invention is limited to the special adaptation of the device shown; but

What we do claim as new, and desire to secure by Letters Patent, is—

1. In combination with the platform and rack attached thereto, and spur-wheel *b*, meshing into said rack above and below, the shaft $S^1$, spur-wheel G, and pinion H, having rolling cogs, and counter-shaft $S^2$, for giving rotation to the driving-pulley B, substantially as set forth.

2. The links L L′, cast with an open rack, leaving open spaces between the cogs, substantially as described, and for the purpose set forth.

3. The combination and arrangement, with the link L, of the posts *p p* on the upper face and near the two extremities of the link, and the rib *r* on the inner edge of the link, both being formed to fit into grooves in the lags to hold the links in position, substantially as described.

4. In combination with the tread *t* of an endless-chain horse-power platform, the truss-rods *q*, passing through the ends of the tread and outside of the path of the horse, and support for supporting the tread at the middle, substantially as set forth.

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