H. Boynton.

Crank Paddle.

No. 13,078. Patented Jun. 19, 1855.

Fig. 1.

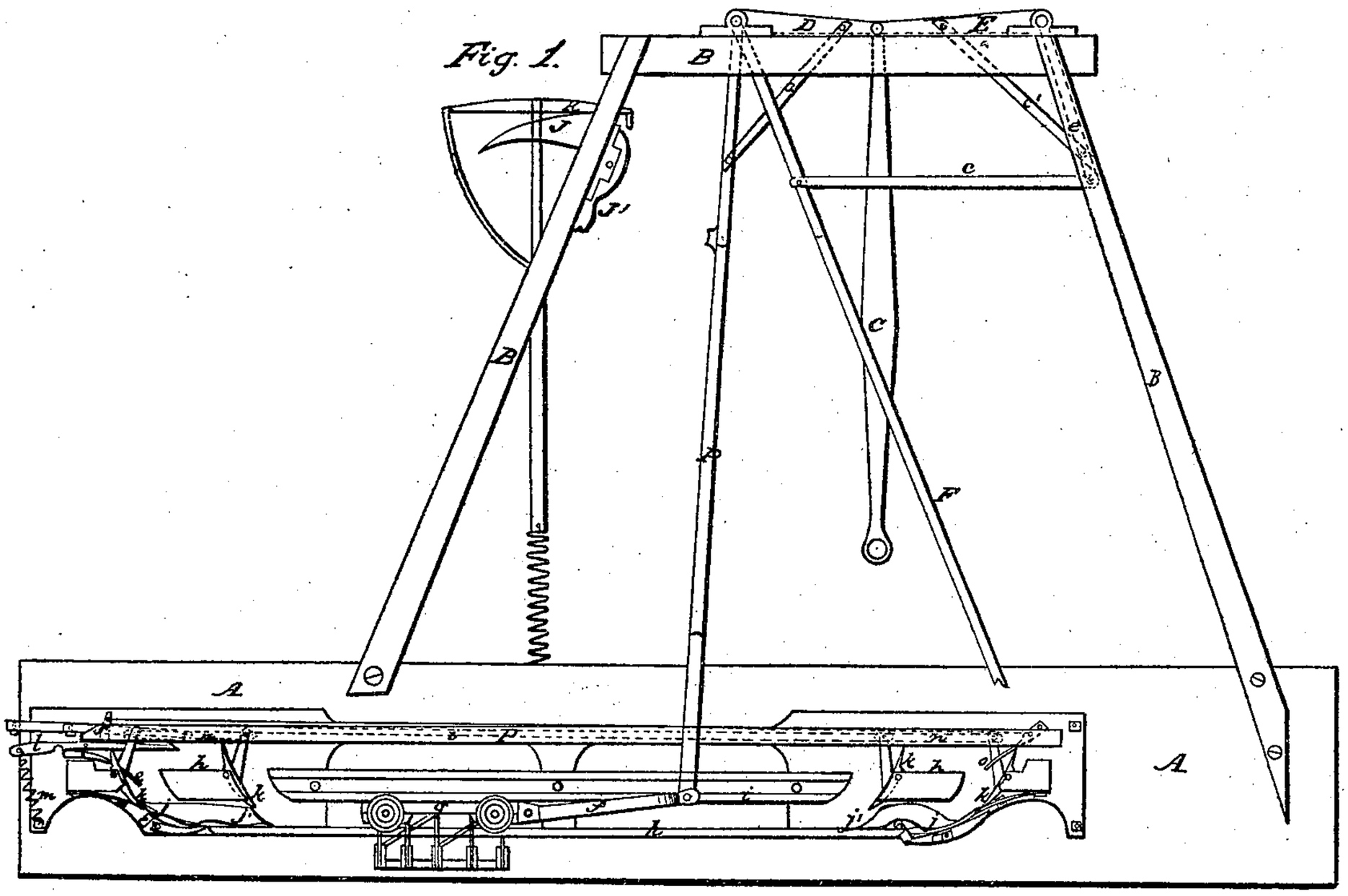

Fig. 2.

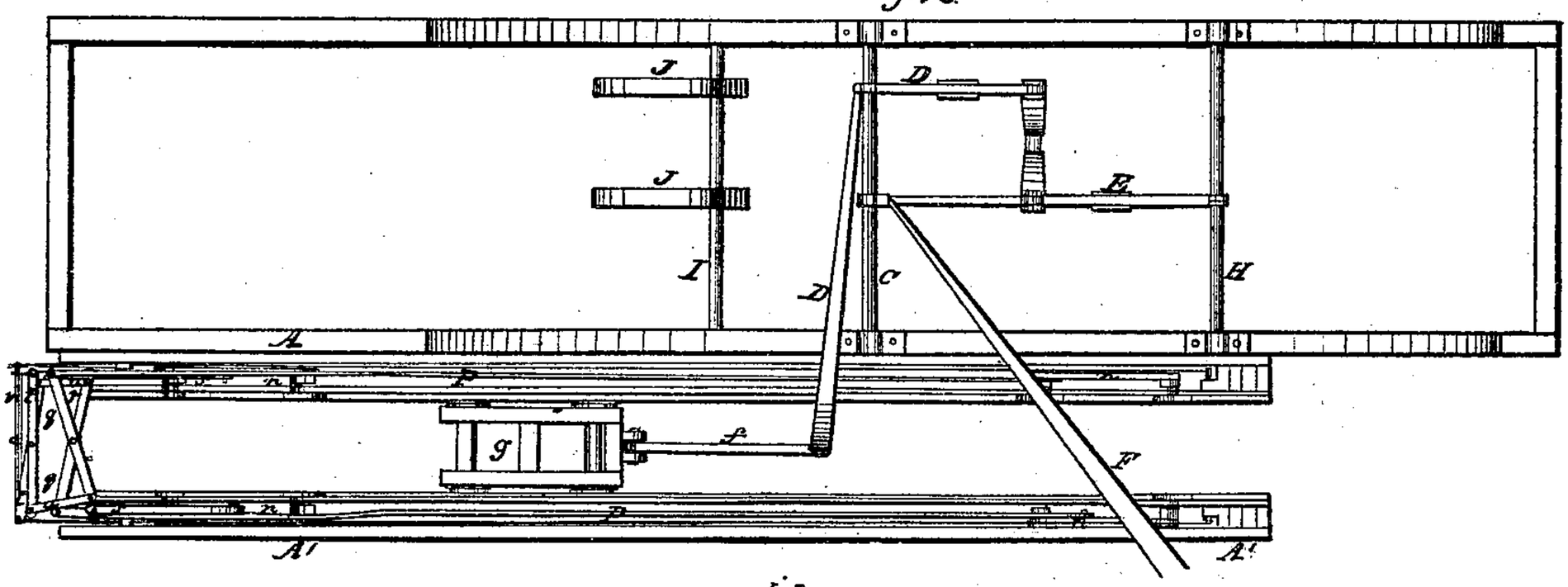

Fig. 3.

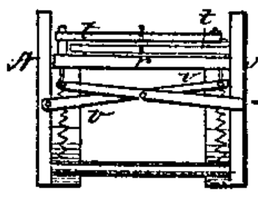

Fig. 4.

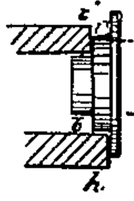

Fig. 5.

UNITED STATES PATENT OFFICE.

HENRY BOYNTON, OF HINESBURG, VERMONT.

RECIPROCATING RAILWAY-PROPELLER.

Specification forming part of Letters Patent No. **13,078**, dated June 19, 1855.

To all whom it may concern:

Be it known that I, HENRY BOYNTON, of Hinesburg, county of Chittenden, State of Vermont, have invented a Longitudinal Railway-Propeller; that it is a new, useful, and improved application of any rectilineal reciprocating motive power to the propelling of vessels or water-craft, it being by levers in simple mechanical connection with the piston, which oscillates them longitudinally to the vessel and which are by lengthened arms connected with oar-trucks driven upon railways lengthwise of and upon the side of the vessel; and I hereby declare the following is a full, clear, and exact description of the operation and construction, reference being had to the accompanying drawings, making a part of this specification.

Figure 1 is a side elevation with sectional railway view. Fig. 2 is a vertical view. Fig. 3 is a sectional end elevation of lever attachments. Fig. 4 is a sectional end view of rails and truck-wheels. Fig. 5 is a perspective view of vibrating rails.

The opposite side and parts, being similar to the shown and described parts as right and left and opposite ends of the railways, are similar.

In its general construction for a single engine it consists of two connecting-rods, match-jointed or compass-locked at the piston-joint, extending vertically up to two triangular working-beams, from the lower arm of one of which branch laterally over each side of the vessel one set of truck-levers, which are connected with the inside oar-trucks, there being two oar-trucks, with their respective railways, side by side upon each side of the vessel. The other working-beam is attached by connecting-rods from each side of its driving-arm to levers which have an oscillating motion upon the same shaft of the first set, and one upon each side of them, both of which branch laterally and connect with the outside oar-trucks. The working-beams are supported on strong frames and are situated longitudinally alike, but transversely distant from and facing to each other, so that their receiving-arms work vertically in similar relations to the piston, and the driving-arm to the outside levers works them in corresponding stroke to the inside levers. Double engines may be coupled by the working-beam shafts or by diagonally-braced cross-heads to central working-beams. Another arrangement (not shown by drawings) producing similar results, or an equivalent to the former, may be made by which both sets of railways are attached to the sides of the vessel, one being before the other, and by which but one piston connecting-rod and but one connecting-rod from the first to the second set of levers are required.

It consists of a three-armed single-fulcrum vertical working-beam, its middle or side arm being nearly at right angles to the other arm, one of which extends vertically above and the other vertically below the fulcrum. Its middle arm is by a connecting-rod attached to the piston, and its oscillating arc is vertical to the vessel and gives to the other arms a longitudinal oscillation. From the lower arm the first set of levers branch laterally over each side of the vessel, and are in relation to the railways and trucks situated as levers D in the other plan. The upper arm is by a connecting-rod attached to the main arm of the second set of levers, which may be considered duplicates of the first set, and which are so far distant from the first set as may be required by the lengthened position of railways. Thus connected both sets oscillate in the same manner, though in opposite directions, at the same time. The rod connecting the two sets of levers should be so arranged as to give it at all times a motion parallel to itself, or the radii of its connecting-arms should be at right angles to itself when the piston is just at half-stroke. For this purpose a short arm or projection from the main arm of the second set of levers should extend in its oscillating arc toward the first set, so that the radius from its connecting-joint at half-stroke will cut the center of its own axis and be at right angles to the connecting-rod. The lever-frames should be similar to the river working-beam frame. Double engines to this plan may be placed one before the other lengthwise of the vessel and the connecting-rod to the second piston attached to an extra arm from the same working-beam opposite and similar to the first middle arm, or they may stand side by side and be coupled as for the first plan.

The operations are such that at each stroke of the piston one oar-truck on each side of

the vessel moves on the lower railways with oars immersed, and the other trucks are at the same time returning upon the upper railways with oars above the water, and the oar-trucks at all times govern their designed motion and changes, propelling forward or backward and reversible at any time during the stroke, and are at the extreme end of the piston-stroke at its change above the water and upon the upper railway level, the propelling-oars being immediately immersed by the first motion of the piston. The movements of the oar-trucks and position of the oars are such that the oars are at all times vertical to the water, and a line drawn through the truck-axles at any position when upon the end connecting-railways will be parallel, or nearly so, to a line similarly drawn at any position upon the main rails. This railway-propeller being adapted to the "Cornish engine," so called, or to a direct lever application of the piston power to the oar-trucks without the intervention of a crank, I have designed an improved retarding and stopping apparatus to the piston-stroke known as the "curved toe-lifting rock-shaft to the crank-engine and an oscillating riding weight or resisting-bar."

The same letters referring to same parts in different figures, A A show a sectional side of the vessel; A′ A′, middle or outside rail-frame; B B, the working-beam frame; C, piston connecting-rod; D D *d*, the triangular working-beam with extended oar-truck lever; E, *e′*, and *e*, (shown by dotted lines,) the second triangular working-beam attached at end of arm E by a second connecting-rod to the piston, and at end of arm *e* by connecting-rod C to truck-lever F. F has a free bearing or oscillating motion upon the working-beam shaft G.

The truck-lever D is attached to the oar-truck *g* by connecting-rod *f*. The bearing or running wheels *a*, as seen in Fig. 4, move upon the railways *h h* and are confined by guide-wheels *b* under the over railways *i i*, making over and under railways, with double-wheeled truck in simultaneous duty or action. The truck moving upon the vibrating rails *j j′* the wheels nearest the end of the railway pass the rails *j′* and the bearing-wheels move upon the rails *j*, which are a little longer than *j′*, and vibrate *j′* outward for the other wheels, so that the truck moves up parallel to the main rails onto the pivot-rails *k k*, the guide-wheels passing under the catch-levers *o*, which are short levers operating to detach the catch-levers *l*. The bearing-wheels as they pass the pivot-center act upon the upper part of the rails *k k*, pressing them at once into horizontal line with the upper main rails *p p*, and are there fastened by catch-levers *l*, which are held by springs *m* to bars *n*, (shown by dotted lines as back of rail *i*,) in which is a catch-recess, and bar *n* is attached to the standards of the rails *k k* by pivot-bolts. The pivot-rails at the opposite ends of the railway are connected by rods or bars P, as seen by dotted line in Fig. 1, and bar in Fig. 2, to levers *q q*, fastened by a central pivot-bolt to cross-bar *r* and attached by short bars *s s* to *n n*, so that as the pivot-rails at either end are moved those at the opposite end of the railway are similarly moved and fastened by the catch-bars. The truck being upon the upper railways is free to move either way, and in descending at either end the guide-wheels pass over the catch-levers *o* and at the end disengage the catch-bars *l* from rail-bars *n* and the truck descends freely to the lower ways. The levers *t t* and *v v* are attached as safety-levers, and are so combined that if either one of the pivot-rails is moved all the others are similarly moved, and if either one of the catch-levers is operated to detach the catch-bars all the others will be detached. The levers *t t* are each pivot-fastened at one end to the side frames A A′ and centrally to each other, and at the opposite end by the short bars *u u* to the levers *q q*. The levers *v v* are each pivot-fastened at one end to the side or side ends A A′ and centrally to each other and opposite ends to catch-bars *l*.

So far as the described railways or parts have been sectional, the opposite or additional sides and parts are to correspond.

I is a shaft with curved lifting-arms J J and two arms projecting below J′, which are at their lower ends adapted and in line to meet the spurs seen upon the edge of the levers D F, one or the other of which at every piston-stroke meeting one of the lower arms J′ will move up the lifting-arms J J, upon which are riding weight-bars K, as seen in Fig. 1, connected by rods or flexible fixtures to weights or strong springs at the deck or hold of the vessel, such as may be necessary to retard and stop the piston-stroke in connection with the condensing and steam-letting arrangements.

The construction of the working-beam frame should be similar to those in present use, the height being governed by the required length of truck-levers and extended lengthwise of the vessel, so as to admit the two opposite triangular working-beams, and widened to admit side by side upon the same shaft all the truck-levers, the outside levers having free bearings unless the general arrangement is changed, as before described. The triangular working-beams are similar to those in use, except the extended truck-lever arms, which should be lessened toward the truck ends, as the strain is lessened by increased length of leverage.

The car-truck frame should be of strong sides and cross-bars and of such length and width as to give sufficient number and area of oars. It is attached to connecting-rod and lever at the end cross-bar center by pivot-bolt. The oar-arms extend vertically below to the required length and are diagonally braced, and has oar-blades, as in present use.

The bearing-wheels and axle-trees are made and attached, as to common railroad-trucks,

with four bearing-wheels and deep flanges. The axles are extended outside of each bearing-wheel sufficient for a guide or friction wheel, with free rotary motion upon the shaft, and which makes a double-wheeled and double-acting truck, the outer wheels in opposite revolving motion to the bearing-wheels, and acted upon by over-railways. The guide-wheels may be less, the same, or greater than the bearing-wheels in diameter.

The railways next to the side of the vessel may be laid upon timbers slightly projecting or may be bolted to the side, and the other railways, if both tracks are side by side, laid upon middle timbers and outer guard-timbers supported by end frames to the vessel and diagonal braces above and below to the vessel. The main rails may be laid level or in slight downward-curved lines, the upper ways being sufficiently high to free the returning oars from the water.

The lower rising vibrating rails are curvilinear and parallel to each other and give the truck an easy change to its rising motion and an easy descent to its driving-stroke. They are firmly attached to triangular projecting arms from the same straight shaft supported by end bearings lying parallel to the upper and lower parts of the end rising rail it supports, and back of it close into the side of the vessel (or out from on opposite side) its longer arm projecting from it obliquely to the other rail, which rails are distant from each other to correspond to the wheels upon the side of the truck. These rails may each have two or more supporting-arms from the shaft. The short-armed or end rail is a little longer than the long-armed or inner rail and reaching farther to meet both the lower and upper rails, so that the end wheels will always move upon it, ascending or descending, sufficient to move laterally forward the other rail into line with the main rail before its wheel reaches it. It will be observed that the longer-armed rail is always held laterally back by a suitable spring or elastic fixture to give at all times a free passage to the forward wheels from the main track and in either direction. When the truck is upon these rails, they should rest upon solid fixtures at their ends, which are easily adapted, or the main bearing-rail *h* may be extended whole, being curved or inclined from the lower to the upper level, having a recess each for rails *j* and *k*.

The pivot-rail is made by a short rail and a fixed standard set back from the rail on a side projection, so that the wheels pass the standards freely. The standards rising above the wheels and behind the over rails are set at such an angle to the short rails as to be perpendicular to the upper track when the rail is midway in its oscillating arc, and the two for each side end are attached by connecting-bars at their upper ends. It will be observed by the nearness of the upper and lower level railways that they are shown in drawings as designed for river-steamers, whereas for ocean-steamers the upper level tracks should be much higher.

The levers, in connection with the pivot-rails, are simple in their form, and their operations and designs, as combined, have been shown by the drawings and purposes before described. Their positions are not necessarily as shown, but may be varied to suit convenience in building, retaining the essential connections and operations. Thus the levers *q q*, by which the pivot-rails at both ends of the railways are similarly moved at the same time by the truck-wheels, may be placed midway of the main railways, and behind them, one on each side, vertically upon the sides of the railway-frames or supports. The pivot-rail connecting-bars may be extended (from one end of railways) and attached to the upper end of the levers, which levers should be fastened at their centers upon the same right line that cuts the axis of motion to the pivot-rails, their lower end being connected by bars to the pivot-rails at the other end of railways, and in the manner hereinbefore described, to give parallel motion to connecting-rod from first to second set of truck-levers. This plan operates by each lever the pivot-rails upon one side of the railway, and are connected to the safety-levers, as in the other plan.

The guide-wheel levers which operate the catches (or to which the catches may be made, rendering but one lever necessary in substitution for levers *l* and *o*) should be so placed that the rising-truck guide-wheels will pass under them, allowing the catches to hold the rails, as designed, and the descending-truck guide-wheels pass over them and detach the catches, and the ends that come in contact with the wheels should be thin or pliable.

The curved-toe rock-shaft is constructed as in general use, with increased strength, and is only worked up at or near the extreme end of the stroke of the piston, so as to give necessary retarding and stopping resistance. It may be so placed as to be worked direct from the piston connecting-rod, which rod should have spurs to match the working-arm near its lower end for the rising stroke and near its upper end for the downstroke.

I disclaim as any part of my invention the working-beam stopping apparatus as now used upon Cornish engines, commonly called the "bumper."

I claim—

1. The double-wheeled oar-truck, provided with wheels rotating in opposite directions on the same axis and running between upper and under simultaneous-acting railways, constructed and applied substantially in the manner and for the purpose described, by which a longitudinal propeller for water-craft is held or confined to its designed railways.

2. In combination with two sets of railways, one for the forward and the other for the back stroke, the ascending and descending railways so arranged that the fore wheels of the truck run upon one track and the after

wheels upon another truck, whereby the truck is free to ascend and descend at either end of the main railways in such a manner that a line drawn through its axles will be always parallel, or nearly so, to the main horizontal rails, substantially in the manner and for the purpose described.

3. The lower rising vibrating rails and the upper pivot-moving rails, constructed and applied substantially as herein set forth.

4. The combination of levers in their adaptation to railway-propellers, by which the upper pivot-rails at either end of the railways being moved by the truck-wheels, those at the opposite end are similarly moved at the same time and the addition of safety-levers, by which if the pivot-rails upon either side end are moved all the others are similarly moved at the same time.

5. The combination of levers by which the catch-bars or fastenings to the upper pivot-rails are governed and disengaged by the truck-wheels, and by which if either one is disengaged the others are also at the same time.

6. The combination of the curved-toe rocking shaft with the oscillating riding bar sustaining a weight or spring with any reciprocating arm attached to the engine for the purpose of gradually and rapidly retarding the piston and bringing it and the oar-truck to a state of rest, as herein described.

New York, June 2, 1851.

HENRY BOYNTON.

In presence of—
EDWARD BOYNTON,
C. B. WHEELER.