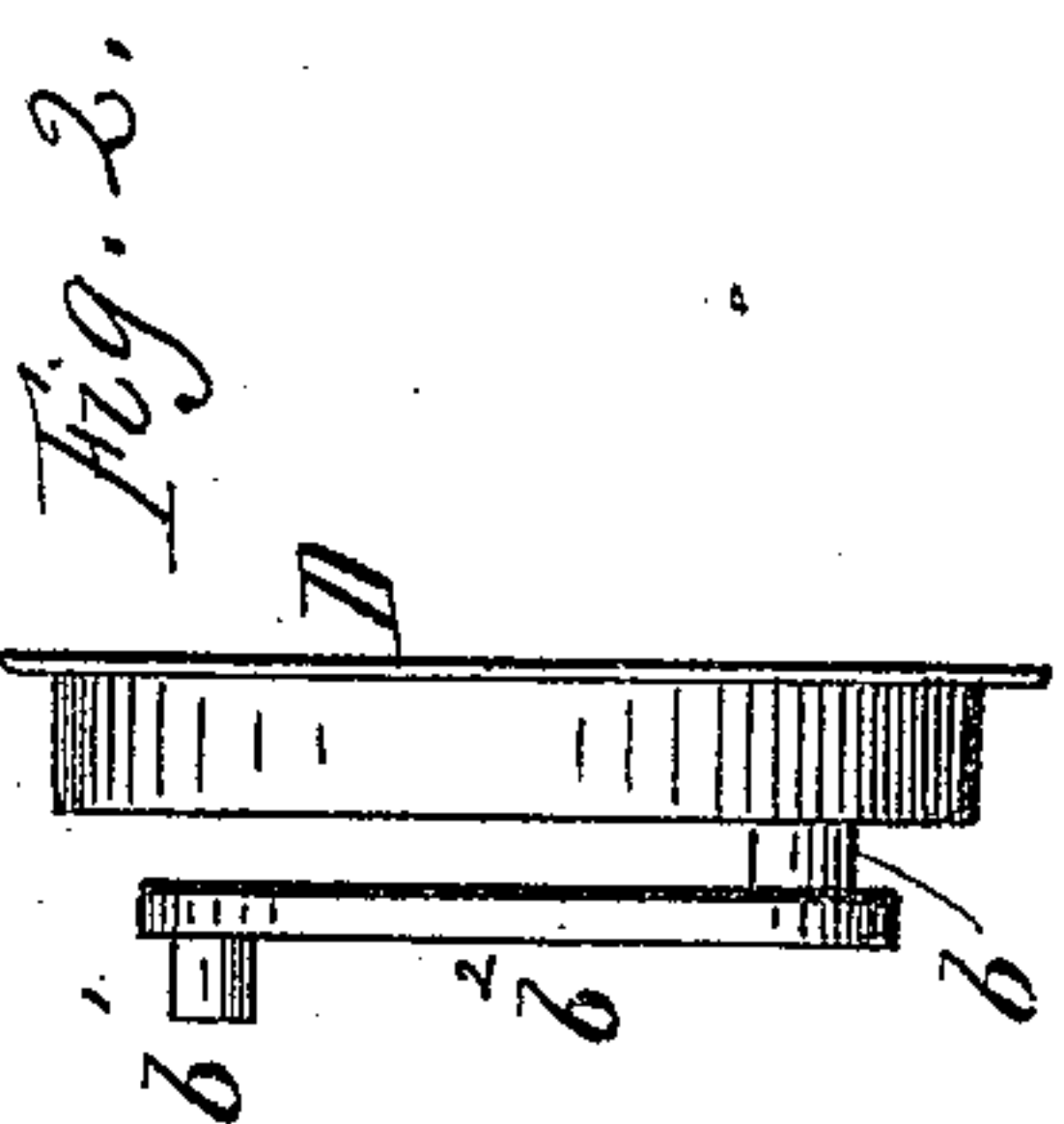
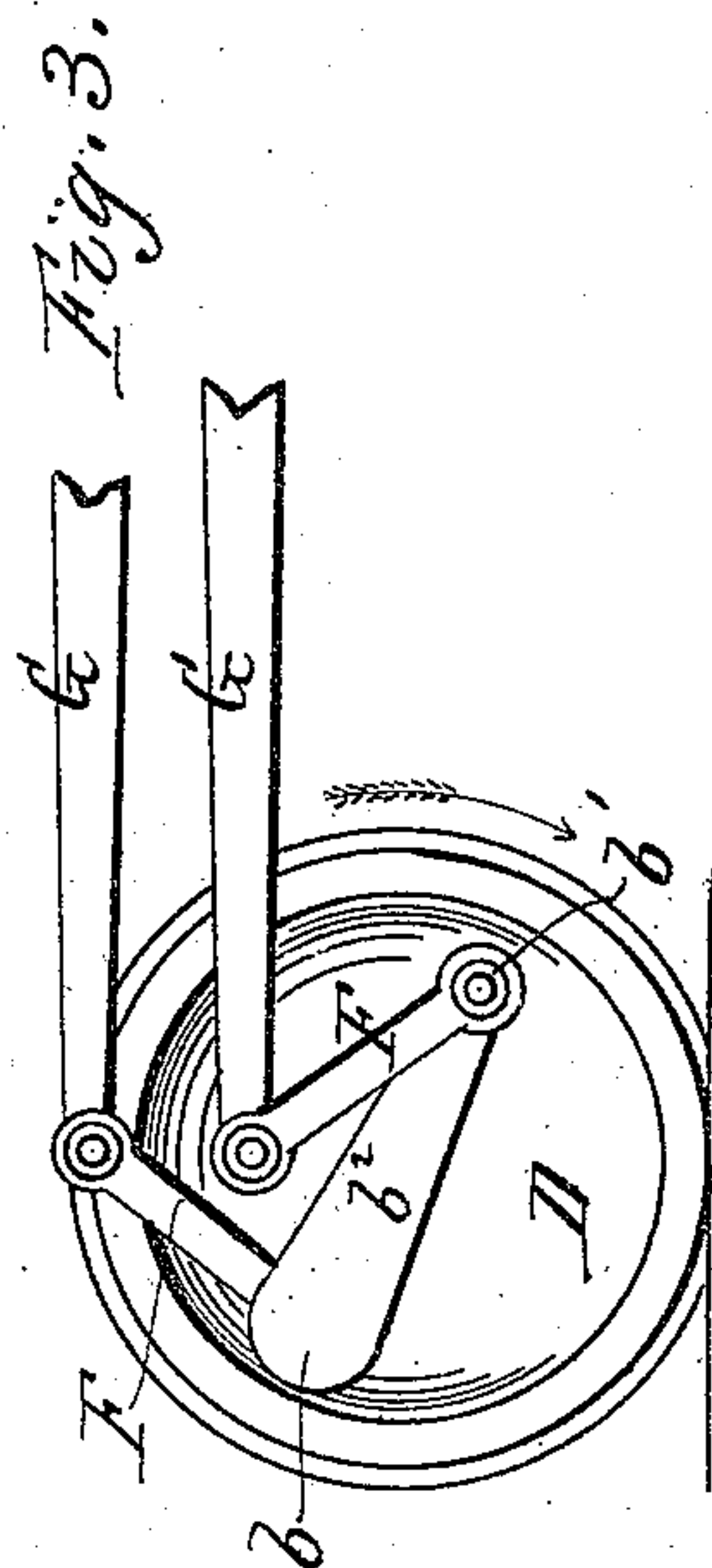
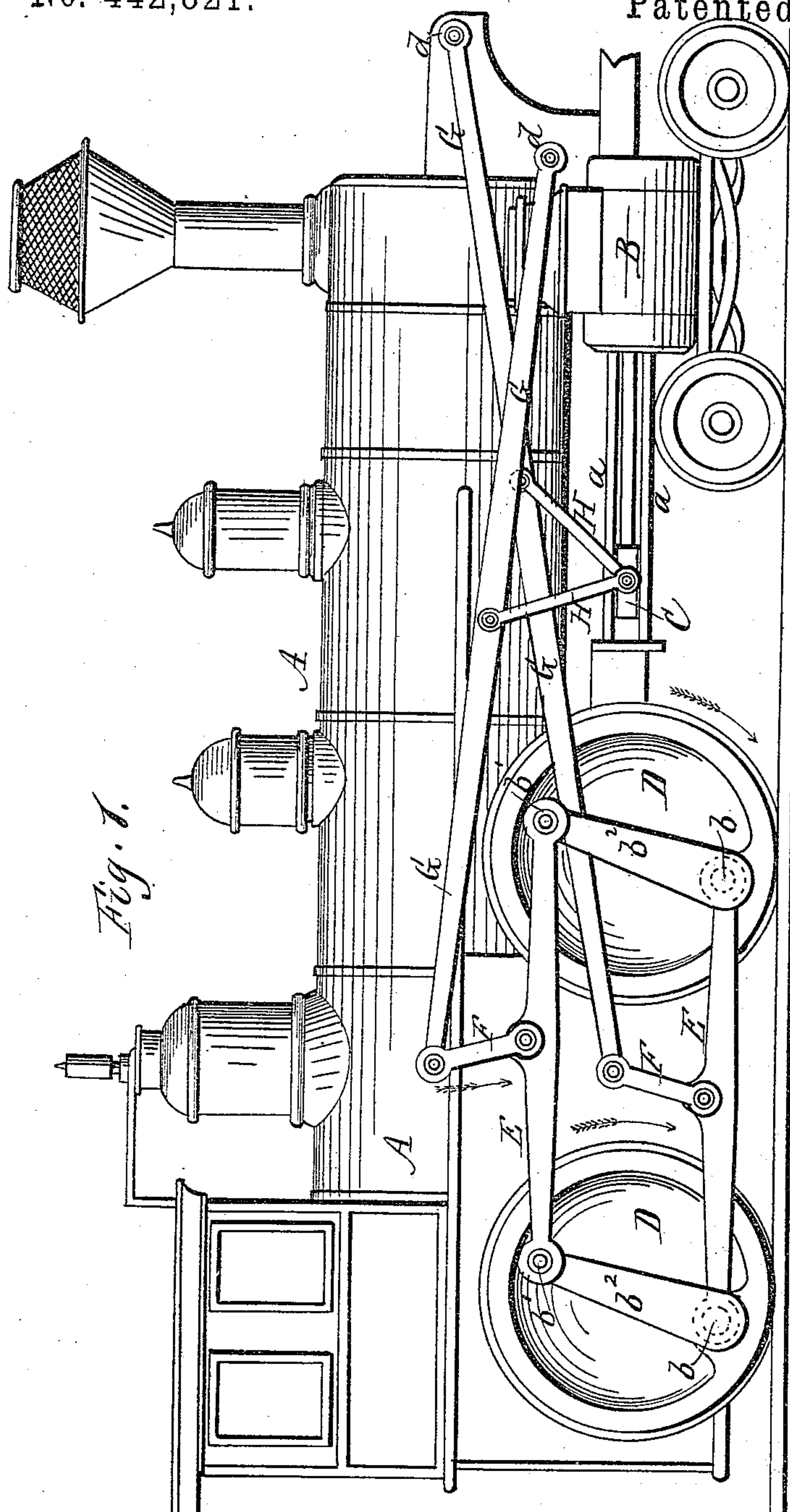


(No Model.)

J. M. McMASTER.
DRIVING MECHANISM FOR LOCOMOTIVES.

No. 442,821.

Patented Dec. 16. 1890.



Witnesses.
Geo. B. Selden,
R. F. Osgood.

Inventor.
Joseph M. McMaster

UNITED STATES PATENT OFFICE.

JOSEPH M. McMASTER, OF ROCHESTER, NEW YORK.

DRIVING MECHANISM FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 442,821, dated December 16, 1890.

Application filed September 18, 1890. Serial No. 365,412. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH M. McMASTER, of Rochester, in the county of Monroe and State of New York, have invented a certain
5 new and useful Improvement in Driving Mechanism for Locomotives; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the drawings accompanying this
10 specification.

My improvement relates to the driving mechanism of locomotives.

The invention consists in substituting for the ordinary crank and connecting-rod of the
15 driving-wheels a double crank and a set of compound levers with suitable connections, whereby the power is applied vertically downward instead of horizontally on the wheels. By this means greater adhesive power with
20 the track is obtained by reason of lifting the unbalanced part of the locomotive, which lift reacts through the levers to press the driving-wheels by so much the more on the track. Consequently a greater load can be moved.
25 Furthermore, by the application of this vertical power to the drive-wheels at two diametrically-opposite points by the use of a double crank the strain is balanced, the counter-weight of the wheel is dispensed with, and
30 the hammer blow of the counterpoise is avoided.

The invention consists in the construction and arrangement of parts hereinafter described and claimed.

35 In the drawings, Figure 1 is a side elevation of a locomotive, showing my improvement applied thereto. Fig. 2 is an edge elevation of one of the drive-wheels, showing the double crank. Fig. 3 is a diagram showing a face view of the drive-wheel and the levers connected therewith adapted to running
40 a single drive-wheel.

A indicates the locomotive.

45 B is the steam-cylinder, provided with the ordinary piston and connecting parts.

C is the slide, running forward and back in the ordinary ways *a a*.

50 D D are the driving-wheels, also of usual form, except that instead of the ordinary single-acting crank they are provided with double cranks *b b'*, Fig. 2, located exactly

equidistant from the center of the wheel, and they are carried out longer than the ordinary crank, being designed to run as close to the track as is consistent with safety. One wrist-
55 pin *b* is attached direct to the face of the wheel. The other *b'* is attached to the outer side of the arm *b²*, by which means the rods connected therewith can turn free with the revolutions of the wheel, one outside and the
60 other inside of the crank-arm.

E E are two parallel connecting-rods connecting the wrist-pins of the two drive-wheels, as shown in Fig. 1, and F F are two links pivoted centrally thereto at one end and to
65 long levers G G at the other end. Said levers extend longitudinally forward and are pivoted at *d d* to the front of the engine, either above or below the cylinder. The rear ends of the levers, to which the links are attached,
70 stand above the connecting-rods E E, and they simply play up and down vertically, their stroke being such as to rotate the wheels by making full revolutions of the cranks. Equal motion is given to both wheels by means of
75 the connecting-rods.

H H are two pitmen pivoted at one end to the slide C, either together or separately, and at the other respectively to the two levers G G in the positions shown in Fig. 1—that is,
80 so that by the playing of the slide forward and back the levers will be each in turn worked downward—one by the motion of the piston outward, the other by the motion of
85 the piston inward.

An eccentric motion is effected by proper or suitable position of pitmen H H, which, working each in an arc, give different times to successive parts of the vertical movements of the levers and enable the strains to be so
90 adjusted that the force of the piston moving backward and forward is changed into a succession of vertical downward movements alternately on each wrist-pin. The fulcrum is the ways in which the slide moves, and these
95 ways and the forward part of the locomotive, to which the ways are rigidly attached, are lifted by so many pounds pressure as causes the drive-wheel to turn, and all this lift presses vertically down through the levers on the
100 driving-wheel, pressing the driving-wheel on the track, and thus increases its adhesion ex-

actly in proportion to its resistance till it reaches the whole weight not balanced on the driving-wheels. Each wrist-pin upon being forced down, as stated, is left at the bottom and is carried up by the rotation of the wheel. (The reason is the eccentric motion of the pitmen through the levers being arranged so that they act on each wrist-pin when at the top more quickly.) This carrying up of each wrist-pin and its connections in turn adds their inertia also directly to the driving-wheel, acting against the downward pressure of the descending wrist-pin, with the track for a fulcrum and not the axle, so adding to the adhesion.

The result of the eccentric motion of the pitman above described is very slight, being only enough to change the strain from wrist-pin to wrist-pin, and is allowed for by a little looseness of the boxes.

The above describes a locomotive having two drive-wheels on each side connected by parallel connecting-rods. The invention is equally applicable to engines having a single drive-wheel on each side. In such case the connecting-rods E E are dispensed with and the levers G G and links F F are connected directly with the crank-pins of the drive-wheel, as shown in Fig. 3. Where more than two drive-wheels are used the connecting-rods are made longer and connected with wrist-pins on every wheel.

By the use of the compound lever-work above described the power is applied vertically downward on the drive-wheels by the downward motion of the links F F, instead of horizontally, as in ordinary locomotives. Power is also applied at two diametrically-

opposite points on the double cranks, by which means the strain is equalized on both sides and the hammer blow of the counterpoise is avoided. It obviates the use of the counterbalance-weight in the wheel opposite the crank and substitutes the power of live steam on both sides. The greater adhesive power of the wheels on the track, as before described, is especially useful in starting trains, where the inertia to be overcome frequently causes the wheels to slip.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a locomotive, the combination, with the drive-wheel D and piston-slide C, of the double cranks *b b'*, suitable links F F, and the levers G G, with suitable pitmen H H, connecting the levers with the slide for the purpose of changing the pressure of piston from the axle to the track, as herein described.

2. In a locomotive, the combination, with the drive-wheels D D and piston-slide C, of the double cranks *b b'*, the connecting-rods E E, connecting the cranks of the two wheels, the levers G G, the links F F, connecting the connecting-rods with the levers, and the pitmen H H, connecting the levers with the slide, as shown and described, and for the purpose specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOSEPH M. McMASTER.

Witnesses:

R. F. OSGOOD,
WM. J. MCPHERSON.