

A. D. BAKER.
 VALVE GEAR FOR LOCOMOTIVE ENGINES.
 APPLICATION FILED DEC. 19, 1910.

Patented Aug. 20, 1912.

2 SHEETS—SHEET 1.

1,036,057.

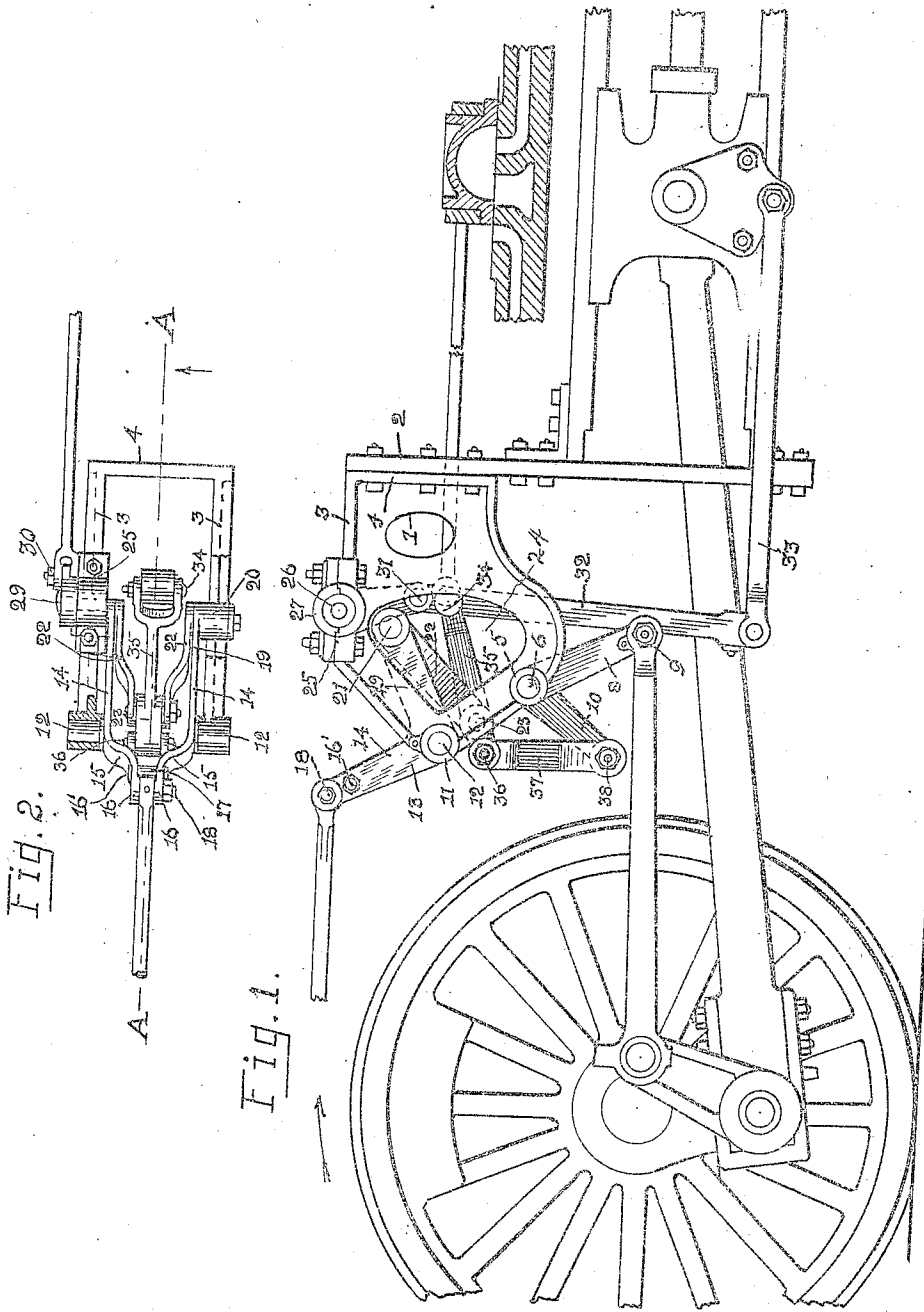


FIG. 2.

FIG. 1.

WITNESSES:

D. C. Walter
M. S. Smith

INVENTOR.

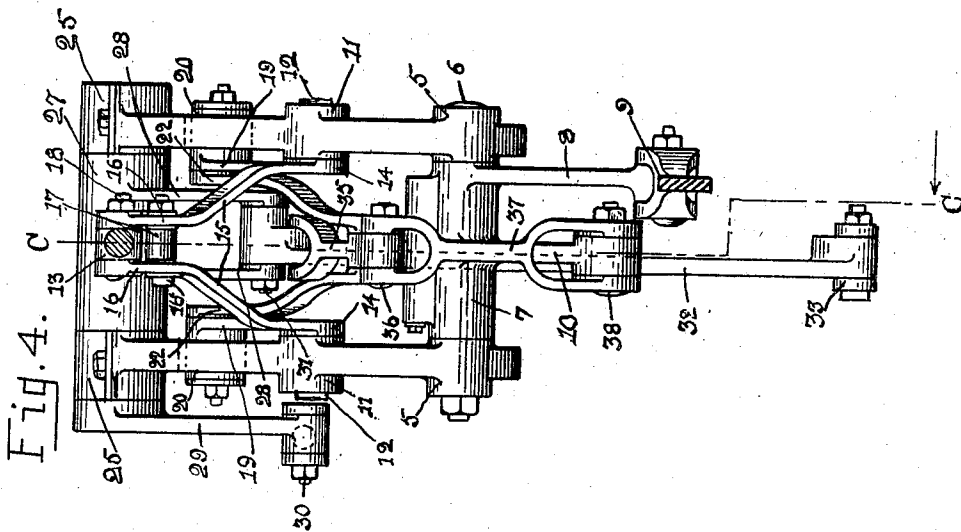
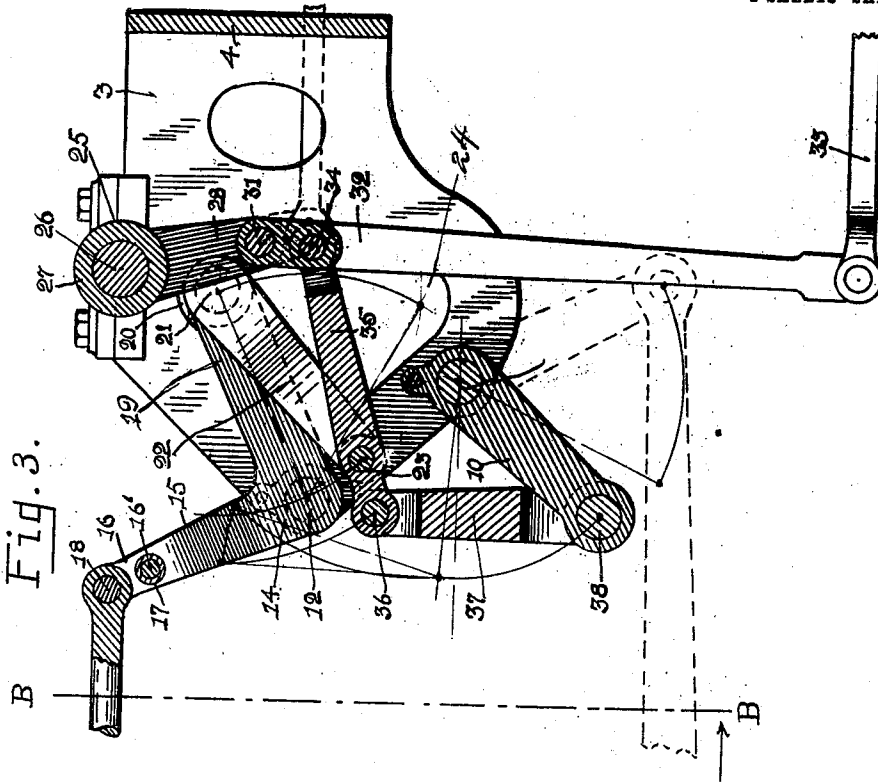
Abner D. Baker
 by *Robt. D. Wilson*
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UNITED STATES PATENT OFFICE.

ABNER D. BAKER, OF SWANTON, OHIO.

VALVE-GEAR FOR LOCOMOTIVE-ENGINES.

1,036,057.

Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed December 19, 1910. Serial No. 598,118.

To all whom it may concern:

Be it known that I, ABNER D. BAKER, a citizen of the United States, residing at Swanton, in the county of Fulton and State of Ohio, have invented new and useful Improvements in Valve-Gear for Locomotive-Engines, of which the following is a specification.

My invention relates to a variable cut-off valve gear for locomotive engines.

In application Serial No. 484,788, filed March 20, 1909, I have shown and described a gear of the kind whereby the lateral motion of the eccentric rod, as controlled, varied and effected by a radius rocker that is adjustable by the reach rod, is transmitted to the valve by a bell crank, and is so combined with the motion of the cross head by a lever fulcrumed on an arm of the bell crank and connected to the valve and the cross head, that early and full admission, (to the extent of port opening) at the beginning of a piston stroke, quick cut-off during the stroke at distances of piston travel proportioned to the extent of port opening, quick release at the end of the stroke, and equal and uniform operation of the valve on both the forward and backward strokes is attained, free from the disturbing effect of vertical vibration.

My present invention has for its object to provide a gear of the kind that is adapted to produce like results, by use of the direct instead of the lateral motion of the eccentric rod, in combination with the direct motion of the cross head, to produce the differential valve movement necessary to effect such results.

A further object is to provide a pivotal support for the forward end of the eccentric rod independent of the radius rocker.

I accomplish these objects by the construction, arrangement and combination of parts as hereinafter described and illustrated in the drawings, in which—

Figure 1 is a side view of a gear constructed in accordance with my invention and connected to the eccentric rod and cross head of a locomotive. Fig. 2 is a top view of the gear with the radius rocker and one of its bearings removed. Fig. 3 is a vertical section of Fig. 2 on line A—A of Fig. 2, and on line C—C of Fig. 4, and Fig. 4 is a section on line B—B of Fig. 3.

In the application of my invention to a locomotive, it will be understood that each

cylinder of the engine is provided with a gear constructed as hereinafter described and that one of the cranks of the drive wheels has a lead of 90° over the other, and that the parts of each gear are mounted in a bracket frame 1 secured to and supported by the supports 2 on the guide bars of the cross head, and projecting rearward therefrom, each bracket 1 comprising a pair of side brackets 3 extending parallel from and integral with the base plate 4. The side plates 3 are provided with the alined bearings 5 in which is journaled the pivot pin 6 upon which is mounted the hollow axle 7 of a bell crank having an arm 8 extending downward and pivotally connected to the forward end 9 of the eccentric rod, and an arm 10 extending rearward at less than a right angle from the arm 8. The side plates 3 are also provided with the alined bearings 11, in which are journaled the trunnions 12 of a bell crank rocker yoke 13 comprising a pair of angled arms 14 having the trunnions 12 projecting opposite in alinement from their angles, the arm portions 15 converging rearward, the portions 16 extending parallel and connected by the bolt 16' extending through the sleeve 17, and by the pivot bolt 18 on which is pivoted one end of the reach rod and the parallel arm portions 19 having the alined end bearings 20.

In the bearings 20 of the yoke 13 are journaled the trunnions 21 of a radius rocker comprising a pair of arms 22 extending rearward, and having alined end bearings to receive a pivot pin 23 at a radius from the trunnions 21 equal to the radial distance of the trunnions 21 from the trunnions 12 of the bell crank rocker yoke 13. The arms 22 converge by curves from parallel portions at the trunnions 21 to parallel end portions forming the bearings of the pivot pin 23.

The sides 3 are provided with openings 24 into which extend the bearings 20 of the rocker yoke, and the openings are of sufficient extent to permit the movement of the bearings through an arc equal distances above and below a horizontal line intersecting a line radial to the trunnions 12 of the rocker yoke at right angles.

Above the bearings 20 of the rocker yoke the sides 3 of the frame 11 are provided with the alined split bearings 25 in which is mounted a rock shaft 26 having fixedly mounted thereon between the bearings 25,

a sleeve 27 having a pair of integral rock arms 28, and on an extension of the shaft outside the bearing 25 of the inner side plate 3 is mounted a rock arm, 29, the free end of which is pivotally connected by a pin 30 to one end of the valve stem. The free ends of the rock arms 28 are provided with a pivot pin 31 upon which is pivoted one end of a lever 32, the opposite end of which is connected by a link bar 33 with the cross head.

Near the pivot pin 31, the lever 32 is fulcrumed by a pin 34 to the bifurcated end portion of a radius link 35 which extends rearward between the arms 22 of the radius rocker and is pivoted thereto by the pin 23 at a radial distance from the pin 34 equal to the radial distance between the trunnions 21 of the radius rocker and the trunnions 12 of the rocker yoke. The rear end portion of the radius link extends beyond the pin 23 and is pivotally connected by a pin 36 to the upper bifurcated end portion of a link bar 37, the lower end portion of which is also bifurcated and connected by a pin 38 to the free end of the arm 10 of the bell crank.

As shown in Figs. 1 and 3 the parts are in position for rearward movement of the engine with the piston in the middle of its forward stroke and the eccentric rod at the end of its forward movement.

Thus constructed and connected it will be seen that the direct movement of the eccentric rod is transmitted in a lateral direction by the bell crank through the link 37 to the radius link 35, which is controlled and directed by the radius rocker through an arc having a radius equal to the radius of the rocker, and produces a direct reciprocation of the radius link that varies in distance according to the distance the pivot of the radius rocker is established by the reach rod above or below the center of the arc through which it is adjustable. This reciprocation of the radius link is transmitted to the valve by the lever 32 and the arms 28 and 29 of the rock shaft, as modified by the lever 32, and produces an alternating quick and slow speed movement of the valve whereby,—according to the extent of port opening established by the reach rod,—full admission at the beginning, prompt cut-off during, and prompt release at the end, of each piston stroke is effected in all respects the same as by the gear shown and described in said application Serial No. 484,788. While, however, the ultimate valve movement and the results attained by my present gear is the same as produced by my said former gear, my present gear differs from the latter in that the variable direction of arc movement produced by the radius rocker is transferred from the forward end of the eccentric rod to the rearward end of a radius

link, whereby in my present gear the forward end of the eccentric rod is supported by the bell crank and travels through a constant arc and the radius rocker is relieved of its weight, thereby avoiding any difference in the angularity of the eccentric rod and making the adjustment of the radius rocker easier.

By the construction, arrangement and combination of parts in my present gear the direct movements of both the eccentric rod and cross head are utilized as in gears of the Walschaert type without the use of the link lever and slide block used in that type of gears to vary the length of valve stroke, and I also avoid the use of the slide block and guide ways of that type of gear to which the radius rod is pivotally attached and upon which the combination lever operated by the cross head is fulcrumed, and thereby avoid the increased friction, unequal wear, lost motion, and greatly increased cost of maintenance incident to the use of such means of varying the length of valve stroke, and of combining the motion of the cross head with that of the eccentric rod, as compared with the means employed in my gears to effect such purpose.

What I claim to be new is—

1. In a variable cut-off valve gear for locomotives, the combination with the main frame, reach rod, eccentric rod, cross head and slide valve, of a gear frame mounted on the main frame, a bell crank journaled in the gear frame, and having one arm pivotally connected to the forward end of the eccentric rod, a rock shaft journaled in the gear frame having one arm connected to the valve by the valve stem, and one arm for rocking the shaft, a lever pivoted by one end to the actuating arm of the rock shaft and having the opposite end linked to the cross head, a radius link pivoted by one end to the lever near its pivotal connection to the rock arm, a link connecting the opposite end of the radius link to the other arm of the bell crank, a bell crank rocker journaled on the gear frame and having one arm pivoted to the reach rod, and a radius rocker pivoted to the outer end of the other arm of the rocker by one end, and pivotally connected by its opposite end to the radius link at a radial distance equal to the radial distance of its pivotal connection to the rocker from the pivot of the rocker.

2. In a variable cut-off valve gear for locomotives and the like, comprising a gear frame adapted to be supported by the main frame, said gear frame having parallel side members, each provided with a plurality of bearings, aligned with corresponding bearings of the other, a bell crank journaled in one pair of bearings, having one arm pivotally connected to the forward end of the eccentric rod, a rock shaft journaled in an-

5 other pair of bearings, and having a pair of
rock arms between the sides of the frame,
and a third arm without the frame con-
nected to the stem of the valve, a lever piv-
10 oted by one end to and between the inner
pair of rock arms and link connected at the
opposite end to the cross head, a radius link
pivoted at one end to the lever near its piv-
otal connection to the rock arms, and link
15 connected at the opposite end to the other
arm of the bell crank, a bell crank rocker
yoke having angled side arms journaled at
the angles in opposite bearings of the frame,
said arms converging to a pivotal connec-
tion with the reach rod at one end and hav-

ing bearings at their opposite ends, and a
radius rocker comprising a pair of arms
journaled in the end bearings of the bell
crank rocker and converging to and jointly
pivoted to the radius link, at a radial dis- 20
tance equal to the radial distance between
the bearings of the rocker yoke and the
bearings of the radius rocker.

In witness whereof I have hereunto set
my hand, this 5th day of December, 1910.

ABNER D. BAKER.

In presence of—
WM. J. FRITSCHE,
M. S. SMITH.