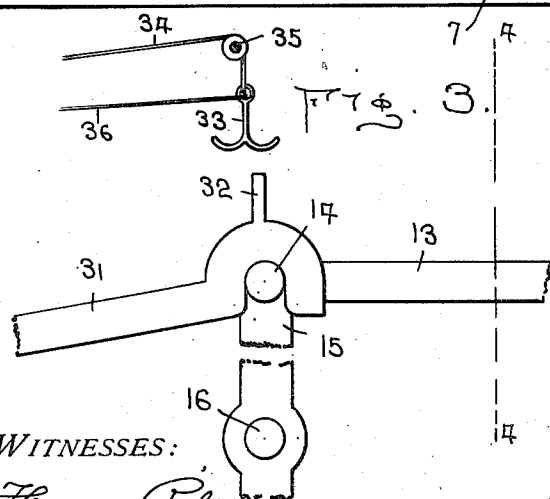
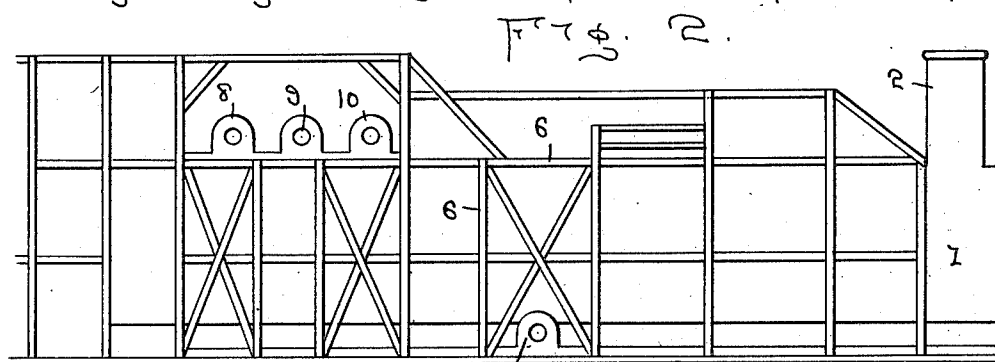
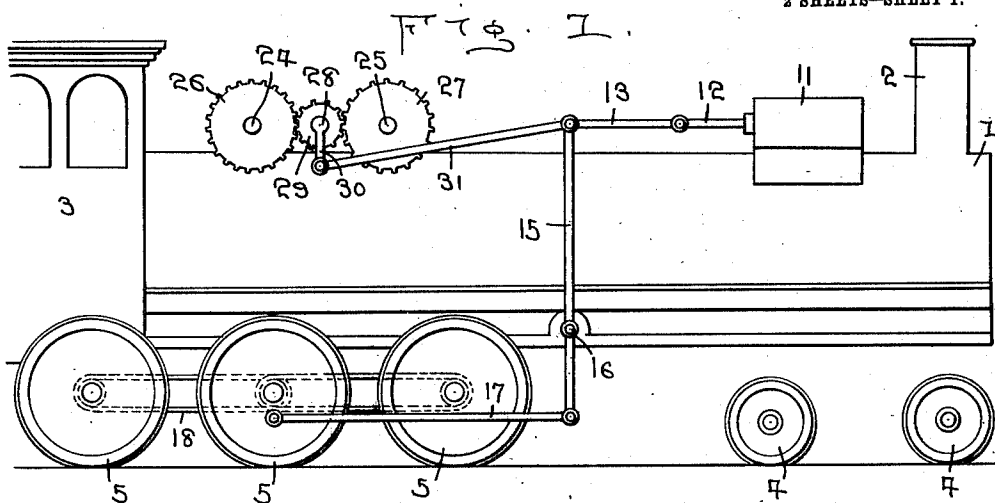


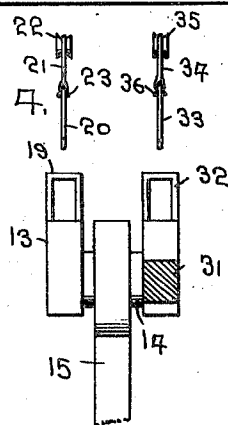
1,036,901.

2 SHEETS—SHEET 1.



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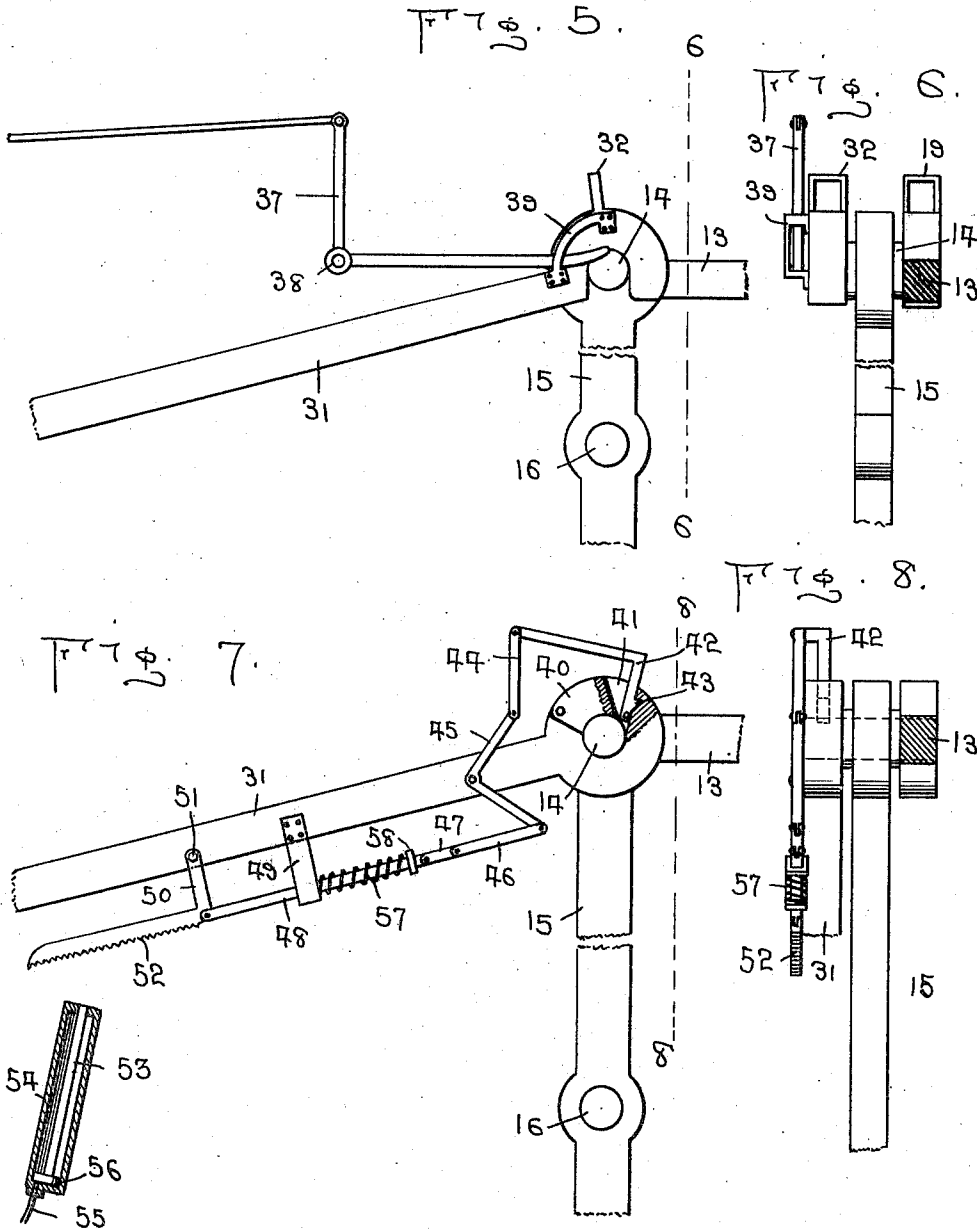
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ELECTRIC AND STEAM LOCOMOTIVE.
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JOHN F. POPE, OF CHICAGO, AND HUGH V. BENNETT, OF MORTON PARK, ILLINOIS.

ELECTRIC AND STEAM LOCOMOTIVE.

1,036,901.

Specification of Letters Patent.

Patented Aug. 27, 1912.

Application filed July 26, 1911. Serial No. 640,728.

To all whom it may concern:

Be it known that we, JOHN F. POPE and HUGH V. BENNETT, citizens of the United States, residing, respectively, at 3824 Harvard street, Chicago, and 5145 Twenty-fourth street, Morton Park, all in the county of Cook and State of Illinois, have invented new and useful Improvements in Electric and Steam Locomotives, of which the following is a specification, reference being also had to the drawings hereto annexed.

This invention relates to locomotives and more particularly to electric and steam locomotives.

15 An object of the invention is to produce a locomotive which may be operated either by steam or electric motive power, as desired.

Another object is to arrange the position 20 of the steam piston and cylinder and to also place electric motors above the boiler and connect said motors and piston with the upper end of a vertical pivoted rod to drive the locomotive either by steam or electric 25 motive power.

Another object is to so connect the various parts that the piston or the arm leading from the electric motors to the pivoted vertical bar may be readily disconnected 30 from the latter or connected therewith, as desired.

A further object is to transmit power either from the steam cylinder or from the electric motors directly to the main or central wheel shaft of the locomotive to be 35 transmitted from said shaft to the auxiliary shafts to rotate the latter.

Other objects and advantages will be hereinafter set forth and pointed out in the 40 specification and claims.

In the accompanying drawings which are made a part of this application, Figure 1 is a fragmentary side view of a locomotive with our invention applied thereto, the supporting framework being removed. Fig. 2 45 is a detail view, showing the construction of the supporting framework positioned upon either side of a locomotive for supporting the operative parts of our invention. Fig. 3 is a detail side view of one form of 50 disconnecting mechanism for the operating rods. Fig. 4 is a cross sectional view on the line 4—4 of Fig. 3. Fig. 5 is a side view of a second or modified form of disconnecting mechanism for the operating rods. Fig. 6 is a cross sectional view on the line 6—6

of Fig. 5. Fig. 7 is a side view of a still further modified form of disconnecting mechanism for the operating rods, and, Fig. 8 is a cross sectional view on the line 8—8 60 of Fig. 7.

Referring more particularly to the drawings in which similar reference numerals designate corresponding parts throughout the several views, 1 represents the boiler of a locomotive and 2 the smokestack while 3 65 is the cab. The construction of these parts may be varied, however, as they form no part of the invention but are simply shown and mentioned to more clearly illustrate the location of the various parts constituting 70 our invention. Further, it will be understood that the usual small front wheels 4 and the large drive wheels 5 are employed and mounted in the usual manner beneath 75 the boiler 1 and cab 3.

We prefer to provide reinforcing means for the locomotive and supporting means for the parts added to the locomotive comprising reinforcing and supporting strips 6 80 arranged vertically, horizontally and diagonally upon opposite sides of the locomotive and suitably connected together, as will be clearly understood by referring to Fig. 2.

Suitably positioned upon the framework 85 formed by the reinforcing and supporting strips 6 are the bracket bearings 7, 8, 9 and 10. The steam cylinder 11 is also secured upon the framework at a position preferably above the boiler 1 and a short distance rearwardly of the smokestack 2. The steam cylinder 11 is so positioned that the piston rod 12 working through the head of the cylinder extends toward the cab 3. Pivoted to the outer end of the piston rod 12 is the reciprocating arm 13, the free extremity of 95 which is curved into substantially semi-circular form and adapted for engagement over the pin 14 carried in the upper end of the oscillating pivoted bar 15 which is pivoted near its lower end, by means of the pin 16, to the framework, said pin 16 being 100 mounted in the bracket bearing 7. The lower end of the pivoted bar 15 is connected with the pitman arm 17 which is also secured to the central or driving wheel 5 to revolve said wheel when the bar 15 is oscillated. 105 Passing around the axle upon which the central or driving wheels 5 of the locomotive are mounted and around the axles carrying the wheels 5 to either side of the central wheels 5, are belts 18 for driving the 110

other wheels from the shaft of the central or driving wheels 5.

The free end of the reciprocating arm 13 carries a perforated ear 19 projecting upwardly to receive the prongs of the hook 20 carried by the cord 21 passed over the pulley 22 and having the end of the guiding cord 23 connected therewith.

Mounted in the bracket bearings 8 and 10 are the shafts 24 and 25 respectively of electric dynamos and upon the shafts 24 and 25 are the gear wheels 26 and 27 respectively. A shaft 28 is positioned between the dynamo shafts 24 and 25 and parallel with the same and upon the shaft 28 is mounted a gear wheel 29 between the gear wheels 26 and 27 and in mesh with the same.

The shaft 28 carries a crank arm 30 to the free end of which is pivoted one end of the reciprocating arm 31, the opposite end of which is curved similar to the free end of the reciprocating arm 13 and adapted for engagement over the pin 14, it being understood that the pin 14 projects in an opposite direction, from the upper end of the oscillating pivoted bar 15 and that the free ends of the reciprocating arms 13 and 31 are engaged over the pin 14 upon opposite sides of said oscillating bar 15. The reciprocating arm 31 is provided also with a perforated ear 32 within which the opposite curved arms of the hook 33 are adapted to engage. The hook 33 is suspended upon the cord 34 passing over the pulley or pulleys 34 and the hook 33 also has connected therewith a guiding cord 36 which may be entirely separate and distinct from the cord 34 or may be connected therewith, as desired.

The cords 21, 23, 34 and 36 are preferably extended into the cab 3 and secured to a lever or the like to permit of the cord being readily manipulated by the trackman within said cab.

By engaging the free ends of the reciprocating arms 13 and 31 over the pin 14 and providing the disconnecting hooks 30 and 33 with their manipulating cords, it will be seen that either one may be easily disconnected from the pin when it is desired to discontinue the use of either electricity or steam for operating the locomotive. It will be understood that the electric dynamos 26 and 27 may be connected either to an overhead trolley or a third rail, or to storage batteries or other suitable source of electric energy as desired.

In Figs. 5 and 6 we have shown a second or modified form of mechanism for disconnecting the free ends of the reciprocating arms 13 and 31 from the pin 14 which consists of a series of pivoted arms 37, one of which extends toward or into the cab of the engine, as desired. The arms 37 work upon the pivot pin 38 at the junction of the last arm with the one immediately before it and

to which said last arm is connected. The free end of the last arm is slightly curved and engaged through a curved plate 39, the opposite ends of which are secured to the free bent end of the arm 31. If desired, a similar disconnecting means may be employed for raising the free end of the reciprocating arm 13 from engagement with the pin 14. When using this form of disconnecting device, the perforated ears 19 and 32 may be caught over a suitably suspending hook to hold the free ends of said arms in elevated positions and out of engagement from said pin 14.

A third or still further form of disconnecting device is clearly shown in Figs. 7 and 8. In this form, however, the end of the reciprocating arm 31 is shown as being formed to nearly surround the pin 14, engaging the under portion of said pin and having a sector 40 pivotally secured within the cutaway portion above the pin 14 and adapted to engage the upper surface of the pin 14 when the locomotive is being operated by electricity.

The sector 40 is provided with a recess 41 within which the lower end of the L-shape locking member 42 is pivoted, the lower end having a tooth 43 for engagement within a suitable recess in the straight vertical wall of the end of the arm 31. To the opposite end of the L-shape locking member 42 is secured the upper end of the connecting bar 44 which has its lower end connected to one arm of the bell crank lever 45 which is pivoted to the reciprocating arm 31 a short distance from its curved end.

Pivotally connected to the opposite arm of the bell crank lever 45, below the reciprocating arm 31 is one end of the bar 46 which has its opposite end connected with the link 47 carried by one end of the reciprocating spring controlled bar 48 which works through the bracket arm 49 and has its opposite end secured to the toothed L-shape arm 50, the short portion of which is pivoted to the reciprocating arm 31, as shown at 51. The long portion of the toothed L-shape arm carries the teeth 52 upon its under face for engagement by the end of the piston rod 53 which works through the end of the air cylinder 54, said piston rod 53 being operated by air from the main air reservoir or any other suitable source, said air entering the cylinder 54 through the small conducting pipe 55 and working against the piston 56 carried on the end of the piston rod 53 within the cylinder 54.

The long portion of the toothed L-shape arm 50 is normally held parallel with the reciprocating arm 31 by means of a coil spring 57 positioned between the bracket arm 49 and a flange 58 near the end of the spring controlled bar 48. When it is desired to disconnect the reciprocating arm 31

from the pin 14, air is allowed to pass through the conducting pipe 55 and into the cylinder 54 to reciprocate the piston 56 and piston rod 53, causing the latter to engage the teeth 52 upon the under face of the long portion of the L-shape arm 50. This will cause the L-shape arm 50 to rock upon its pivot 51 and draw the reciprocating spring controlled rod 48 rearwardly through the bracket arm 49, against the tension of the spring 57, swinging the bell crank lever 45 and drawing the connecting bar 44 downwardly. The downward movement of the connecting bar 44 will swing the L-shape locking member 42 upon its lower pivoted end and disengage the tooth 43 from its recess and allowing the sector 40 to swing upon its pivot, permitting the curved end of the reciprocating arm 31 to drop from engagement with the pin 14.

It will be understood that the same form of disconnecting device may be connected with the reciprocating arm 13, if desired and it will be evident that the arms 13 and 31 may be readily connected with or disconnected from the pin 14 to operate the locomotive by either steam or electricity or both, as desired. It will further be evident that by pivoting the oscillating pivot bar 15 near its lower end, an increase of power is obtained and by connecting the pitman arm 17 to the central wheels 5 and driving the wheels in front of and rearwardly of these wheels from the central axle, a more even and satisfactory movement of the locomotive is assured.

What we claim as our invention is:

1. The combination with a locomotive boiler; of a steam cylinder, a piston within the cylinder, a piston rod connected with the piston and working through the head of the cylinder, a wheel beneath the boiler, a pivoted oscillating bar positioned vertically upon the side of the boiler, connections between the lower end of the bar and the wheel, electric dynamos above the boiler, detachable

connections between the dynamos and the upper ends of the bar, detachable connections between the piston rod and the upper end of the bar, and means for detaching the detachable connections.

2. A combined steam and electric locomotive including a piston rod, an arm leading from the piston rod, a pivoted oscillating bar pivoted near its lower end, a wheel, a pitman arm connected with the lower end of the oscillating bar and with the wheel to revolve the latter, electric dynamos, a gear adapted to be operated by the dynamos, an arm connected with gear and adapted for detachable engagement with the upper end of the oscillating bar, said arm carried by the piston rod being adapted for detachable engagement with the upper end of said bar, said arms being adapted to oscillate the pivoted oscillating bar, and means for disengaging either arm from the oscillating bar.

3. A combined electric and steam locomotive comprising a boiler, a framework positioned over the boiler, a steam cylinder carried by the framework, electric dynamos carried by the framework, an oscillating bar pivoted near its lower end to the framework, axles beneath the boiler with wheels upon their opposite ends, detachable connections between the dynamos and the upper end of the oscillating bar, a piston working within the steam cylinder, detachable connections between the piston and the upper end of the oscillating bar, connections between the lower end of the oscillating bar and a wheel carried by the central axle beneath the boiler to drive said central axle from the oscillating bar, and connections between the central axle and the axle forwardly and rearwardly thereof.

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