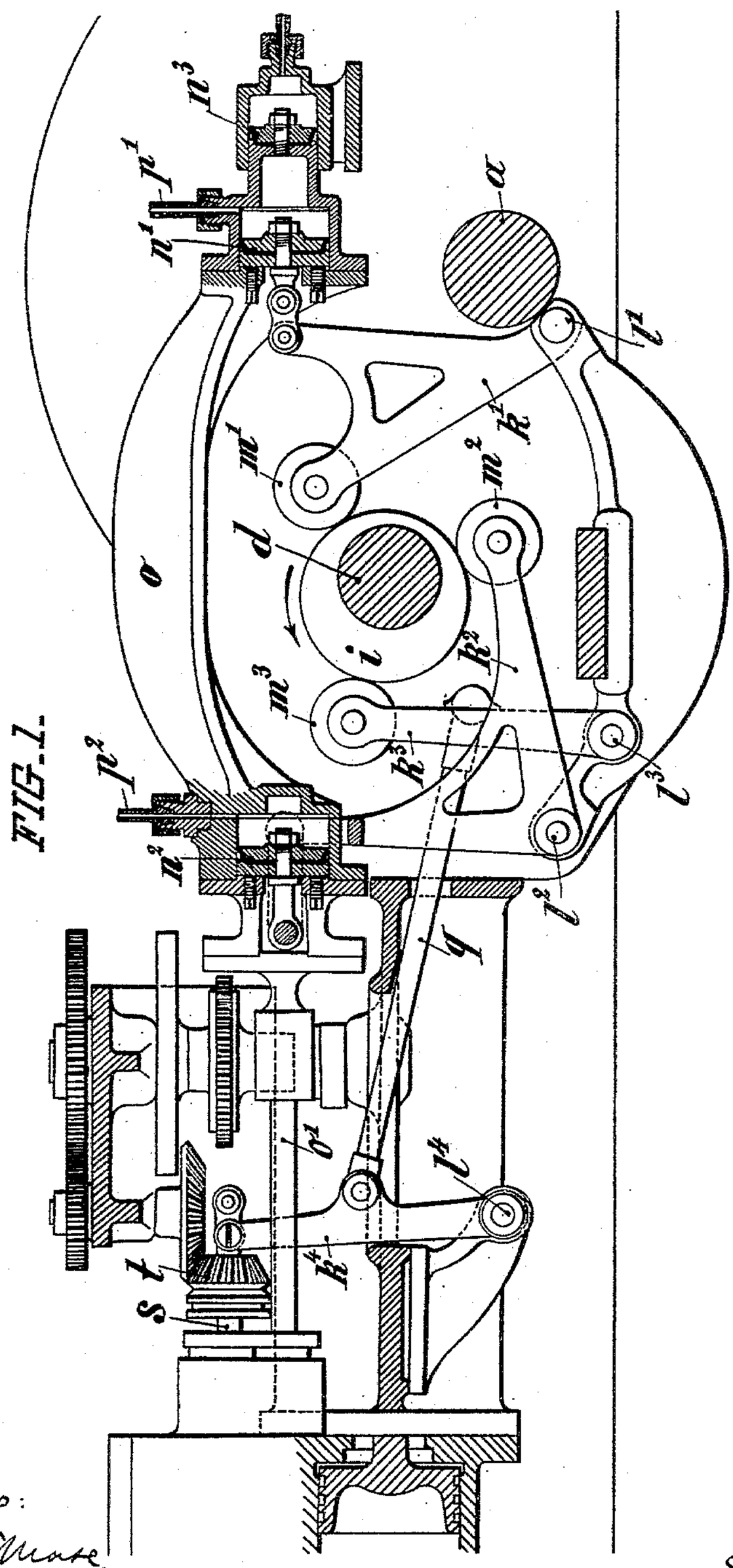
(No Model.) 2 Sheets—Sheet 1.

J. T. F. CONTI.

SLIDE VALVE GEAR.

No. 562,804. Patented June 30, 1896.

FIG. 1.



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(No Model.) 2 Sheets—Sheet 2.

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SLIDE VALVE GEAR.

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FIG. 3.

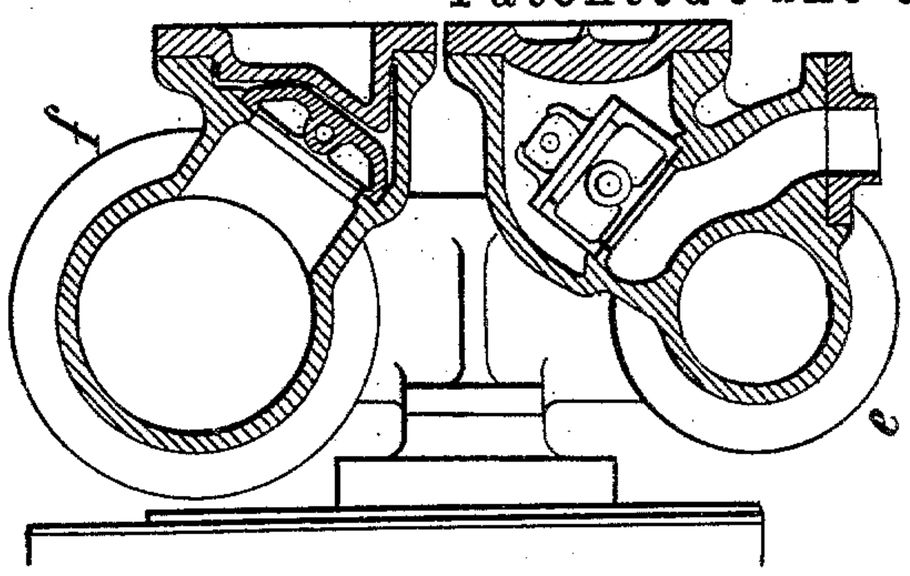
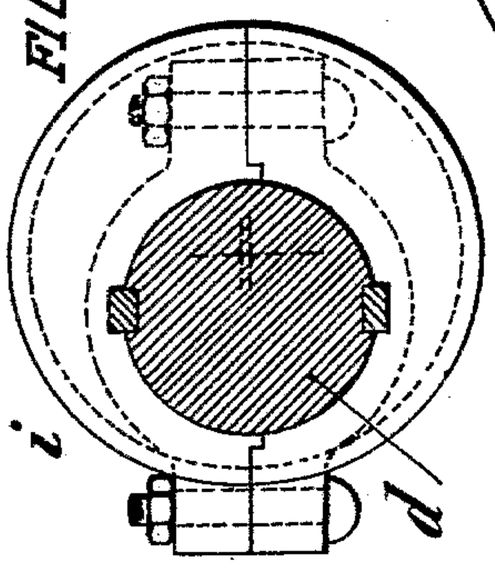


FIG. 2.

FIG. 4.



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UNITED STATES PATENT OFFICE.

JAMES TIBURCE FELIX CONTI, OF PARIS, FRANCE.

SLIDE-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 562,804, dated June 30, 1896.

Application filed April 8, 1896. Serial No. 586,678. (No model.)

To all whom it may concern:

Be it known that I, JAMES TIBURCE FELIX CONTI, of the city of Paris, France, have invented an Improved Slide-Valve Gear, of which the following is a full, clear, and exact description.

This invention relates to an improved slide-valve gear with reversing-gear and cut-off variable by hand.

My invention has for its object to reduce the length of the crank-shaft and to render the engine more compact, while retaining the advantages of the ordinary Meyer expansion valve-gear with three eccentrics and reversing-link. The action within the valve-chest is exactly the same as if the main slide-valve were actuated through a link in one or other of its two extreme positions only and the expansion-slides were operated by a special eccentric, these different actions being, however, obtained by a single cam producing the same effects as the three eccentrics generally employed.

My improved valve-motion is illustrated in the accompanying drawings as applied to the two-cylinder engine of a compressed-air tramway-locomotive, in which—

Figure 1 is a longitudinal section, and Fig. 2 a plan, of the valve-gearing. Fig. 3 is a transverse section of the cylinders, showing the respective positions of the valve-chests. Fig. 4 is a detail view of the cam.

The same letters of reference denote like parts in all the figures.

The driving-wheel axle *a* supports a frame *b*, carrying the bearings *c* of the crank-shaft *d*, actuated by the pistons of the two cylinders *e f*, and geared with a pinion *g*, with a toothed wheel *h* keyed on the axle *a*. In this example the two motor-cylinders are supposed to be coupled chiefly for working compound, the cut-off to the larger cylinder being fixed and the smaller cylinder only having a variable expansion, whereby the speed of the vehicle is regulated. The distribution-valve of each cylinder *e f* is controlled each by a special cam *i j*, keyed on the crank-shaft *d*, the two valve-motions being identical, except that the large cylinder has no provision for variable expansion, and the description will therefore be confined to the small cylinder, Fig. 1, and its cam *i*. This cam acts on two bell-crank levers k' k^2, pivoted, respectively, at l' l^2, and bearing by rollers m' m^2 against the cam *i*, the other arms of the levers being coupled by means of short links with the rods of pistons n' n^2 working in cylinders carried by a frame *o*, attached to the rod *o'* of the main slide-valve, and guided at its free end by a piston n^3, compressed air under pressure being admitted behind said piston to act as a cushion, constantly tending to force the slide-valve inward. If compressed air be admitted behind the piston n', (which is made of sufficiently large area to be pressed constantly against its abutment, whatever may be the resistance to be overcome in order to move the valve-rod,) the piston n' will be fast with the part *o*, and consequently with the valve-rod. Moreover, by the compressed air acting upon the back of the piston n^3, the roller m' will be constantly held against cam *i* in all positions of the latter, the compressed air behind the piston acting as a spring. When, therefore, shaft *d* is rotated, the cam *i* moves lever k' backward, and through it the valve-rod, the relative movements being similar to those produced by an eccentric suitably arranged.

Suppose the engine to be in backward gear, as indicated by the arrow, and the slide-valve to be moving by the action of the cam and that it is desired to reverse the direction of motion. According to the ordinary theory of reversing, it is only necessary to shift the eccentric, that is to say, to give the cam *i* another position on shaft *d*, but I have found that it is simpler to change the position of the roller, which amounts to the same thing. In other words, in order to change from backward to the forward gear, I disconnect the lever k' from the valve-rod, and connect the lever k^2 thereto, by allowing the compressed air behind the piston n' to escape and admitting compressed air behind the piston n^2, whereby piston n^2 will be held against its abutment and roller m^2 be constantly pressed against the cam *i*, whatever may be its position. Thus by the mere operation of a four-way cock controlling the pipes p' p^2 reversal of motion can be effected at will by bringing the slide-valve under the action of the one or other lever. The cam *i* also controls the rod which operates the variable expansion

valve. In an ordinary Meyer expansion-gear the eccentric which operates the expansion-valve is keyed exactly at one hundred and eighty degrees to the crank, and in order to obtain the same result a lever k^3 is pivoted to a fixed point l^3 and bears by a roller m^3 at a suitable point against cam i. The lever k^3 is coupled by rod q to a lever k^4, pivoted at l^4, and terminating in a fork coupled by two short links with a collar r, in which the expansion-valve rod s is free to turn. The rod s receives longitudinal motion from lever k^4 and slides through a bevel-pinion t, actuated through a train of gearing suitably arranged, whereby the expansion may be varied at will. The sectional area of the rod s is such that the air-pressure in the valve-chest which tends to force said rod outward will suffice to constantly maintain the roller m^3 against cam i. Thus by suitably arranging the three rollers m' m^2 m^3 the cam i alone will operate the main slide-valve both in forward and backward gear, and also the Meyer expansion-valve, and thus fulfil the functions of the three eccentrics generally used. The valve-gear of the large cylinder would be similarly operated, and the same four-way cock may serve to reverse the motion for both cylinders.

It has been stated that the cam i produces movements similar to those of an ordinary eccentric, but geometrical considerations will show that if the cam is circular the valve diagram will not be the same as with an ordinary eccentric, and in order to obtain a diagram as good as, or even better than, that of an ordinary eccentric I make the cam i of the following form, that is to say, as shown in Fig. 4, of two symmetrical parts, each slightly greater than a semicircle, the centers from which they are described being a very slight distance apart, whereby an excellent diagram is obtained which even allows for the disturbance due to the small radius of the driving-crank.

My improved valve-motion may be easily adjusted for wear of the rollers, the abutments of pistons n' n^2 being formed by screw-stops against which the pistons bear.

To adjust the gear, the crank is placed at the dead-point, Fig. 1, the slide-valve is brought opposite a mark inside the valve-chest, and the rollers then brought against the cam by means of the adjusting-screws. The rod q and the slide-valve rod may also be provided with screw-couplings for exactly regulating their lengths.

My improved valve-gear may be applied to all kinds of engines of which the foregoing is only given as an example, the dimensions and details of arrangement being variable to suit the case.

I claim—

1. The herein-described reversing and variable-expansion slide-valve gear consisting in the combination with a single cam on the crank-shaft of three levers k' k^2 k^3 of which two k' k^2 operate the one in forward and the other in backward running, and of pistons n' n^2 respectively connected to said levers and movable within cylinders attached to the slide-valve rod but capable of being fixed therein by fluid-pressure admitted to the one or other cylinder according as the one or other lever k' or k^2 is to be connected with the slide-valve rod for forward or backward gear and the lever k^3 being connected to the expansion-slides, all substantially as specified and illustrated in the accompanying drawings.

2. In a slide-valve gear herein described the combination with the pistons and cylinders for coupling the valve-operating levers with the valve-rod, of adjustable stops for regulating the position of the pistons n' n^2 and levers k' k^2 upon which the valve-operating cam acts as described.

The foregoing specification of my improved slide-valve motion signed by me this 16th day of March, 1896.

JAMES TIBURCE FELIX CONTI.

Witnesses:

CLYDE SHROPSHIRE,

ALBERT MOREAU.