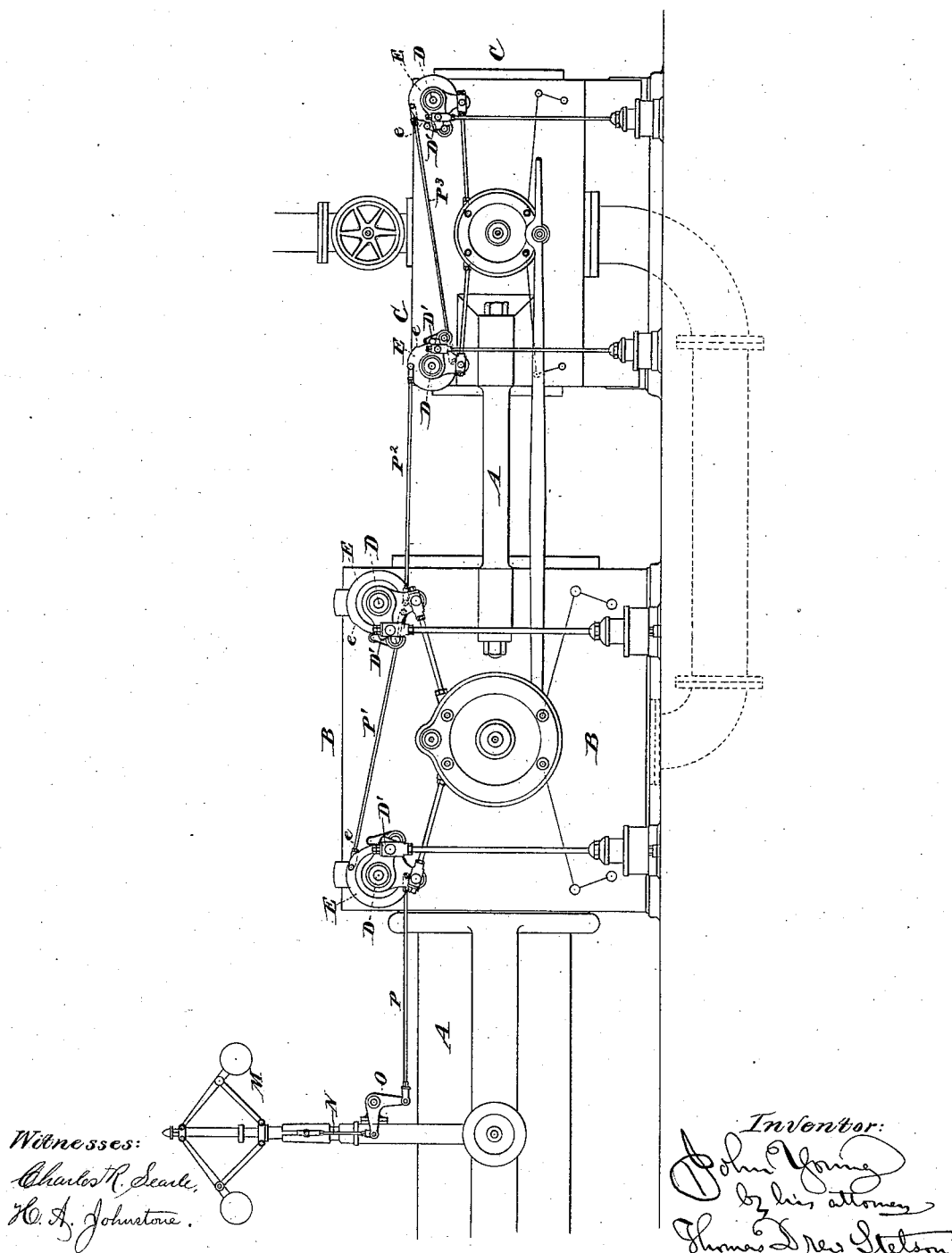


(No Model.)

J. YOUNG.
VALVE GEAR.

No. 381,747.

Patented Apr. 24, 1888.



UNITED STATES PATENT OFFICE.

JOHN YOUNG, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE WATTS CAMPBELL COMPANY, OF SAME PLACE.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 381,747, dated April 24, 1888.

Application filed October 1, 1887. Serial No. 251,169. (No model.)

To all whom it may concern:

Be it known that I, JOHN YOUNG, of Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in the Valve-Gear of Steam-Engines, of which the following is a specification.

I construct a compound engine with the cylinders arranged "tandem," and having expansion gear of the "Corliss" type, each steam-valve being rapidly opened by a positive motion at the right period and being rapidly and automatically closed at variable periods, the periods being controlled by a governor, so that when the speed rises both cylinders will cut off earlier, and when the speed diminishes too greatly both cylinders cut off later, so as by the induction of steam to each cylinder for a longer period to raise the speed to the proper point. The automatic regulation of the admission of the steam to both cylinders is important, especially in the matter of promptness when for any reason the speed gets too high. The curtailing of the admission of steam to the high-pressure cylinder will ultimately be effective in reducing the effect of the low-pressure cylinder; but such reduction of effect is more prompt if the closing of the steam-valves of the low-pressure cylinder is effected also by the governor, so that not only the supply of steam from the boiler to the high-pressure cylinder is promptly reduced the moment the speed is in excess, but also the delivery of steam from the high-pressure to the low-pressure cylinder is curtailed to correspond. Such regulation of the steam acting in both cylinders has been before effective with this class of valves; but to effect it there were required two levers, one three-armed lever with a rod connecting it to the governor and two rods leading to the cylinders being employed to control the points of release of the steam-valves for the low-pressure cylinder, and, additional thereto, a two-armed lever and two rods leading therefrom to the high-pressure cylinder being employed to control the points of release of the steam-valves for the high-pressure cylinder. I have discovered that the mechanism may be simplified and all the useful effects attained in a better manner

by dispensing with the three-armed lever and the multiplicity of connections from such, substituting a bell crank lever and a single rod therefor, and simply coupling the cams together by a single line of rods and operating one by the other throughout the entire train—that is to say, the governor, through the bell-crank lever, actuates the cam of the nearest valve, that operates the cam of the next, and that operates the cam of the next, and that actuates the cam of the last one in the series. There is no strain on this mechanism. There is less cost of construction and a smaller number of bearings to make friction and wear than with the ordinary arrangement.

The accompanying drawing forms a part of this specification, and is a side elevation of that portion of a tandem compound Corliss engine which involves this invention.

Referring to the drawing, A is the fixed frame-work; B, the large cylinder, the low-pressure cylinder, and C, the smaller, the high-pressure cylinder.

The mechanism for actuating the valves is that shown in the patent to me, dated November 10, 1885, No. 330,361; but this may be varied. It is sufficient that the arms rigidly fixed on the several steam-valve shafts are operated by the mechanism to open their respective valves always at the proper periods, and that the detaching of each arm at the proper point in the stroke depends upon the position of a cam-wheel mounted concentric to the axis thereof, which is shifted with very slight force. In the drawing each valve-shaft is marked D, and the arm rigidly fixed thereon is marked D'. The cam-wheel is marked E. The offset thereon, which effects the detaching of the valve, is marked e.

M is the governor, which may be an ordinary fly-ball governor. N are links communicating the changes of altitude of the fly-balls to a bell-crank lever, O, turning on a fixed center. The lower arm of this lever is connected by a properly-adjusted rod, P, to the cam-wheel E of the first steam-valve.

P' is a connection from a pin on the first cam-wheel E to a pin on the cam-wheel of the other steam-valve for the low-pressure cylinder. P² is a connection from a pin on the cam-

wheel of the last-named to the cam-wheel of the first steam-valve of the high-pressure cylinder. P³ is a connection from a pin on the last-named cam-wheel to the cam-wheel of the farthest wheel of the high-pressure cylinder. The strain on these connections is insignificant. On being correctly adjusted as to length, and occasionally lubricated, all work without appreciable wear or change for an indefinite period. All are shifted simultaneously by the slight force communicated from the governor whenever the speed is above or below the proper standard.

My invention serves with less parts than the ordinary system of separate connection from the governor to each engine. A point which I esteem most important is that all the rods are short, and may be light, and still will serve without tremor or vibration. The invention may be carried out in the same way for an increased number of cylinders, as triple or quadruple expansion, so long as they are arranged tandem.

Parts of the invention may be used without the whole. I can operate the valves of a single engine in the same manner; but it is especially serviceable in compound engines arranged tandem, as shown.

I claim as my invention—

1. In a Corliss engine, the adjustable cam-wheels E e, arranged concentric to their respective valve-shafts D, adapted to perform the double functions of releasing said valves at variable periods according to the positions of the cams and of serving as levers to transmit a reversed motion, in combination with the governor M and rod P, connecting said governor with the first of said cam-wheels, and

a rod, P', connecting such cam-wheel with the next cam-wheel, and with ordinary or suitable means operated by the motion of the engine for opening said valves, and with ordinary or suitable means for causing the valves to close promptly when released, all arranged for joint operation substantially as herein specified.

2. In a steam or gas engine, two or more cylinders arranged tandem, with rods P' P² P³, connecting the several cam-wheels E of the train of steam-valves directly together, so that each one actuates the next, and so on throughout the series, as herein specified.

3. In a tandem compound Corliss engine, the four steam-valve shafts D, with the corresponding cam-wheels, E e, mounted loosely thereon, adapted to release said valves at variable periods, in combination with each other and with the governor M, bell-crank lever O, rod P, connecting said governor with the first of said cam-wheels, a rod, P', connecting such cam-wheel with the next, a similar rod, P², connecting the last cam-wheel of the first cylinder with the first cam-wheel of the next cylinder, and, finally, a rod, P³, connecting the latter with the last cam-wheel, thus completing the series, all arranged for joint operation substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand, at New York city, this 23d day of September, 1887, in the presence of two subscribing witnesses.

JOHN YOUNG.

Witnesses:

CHARLES R. SEARLE,
H. A. JOHNSTONE.