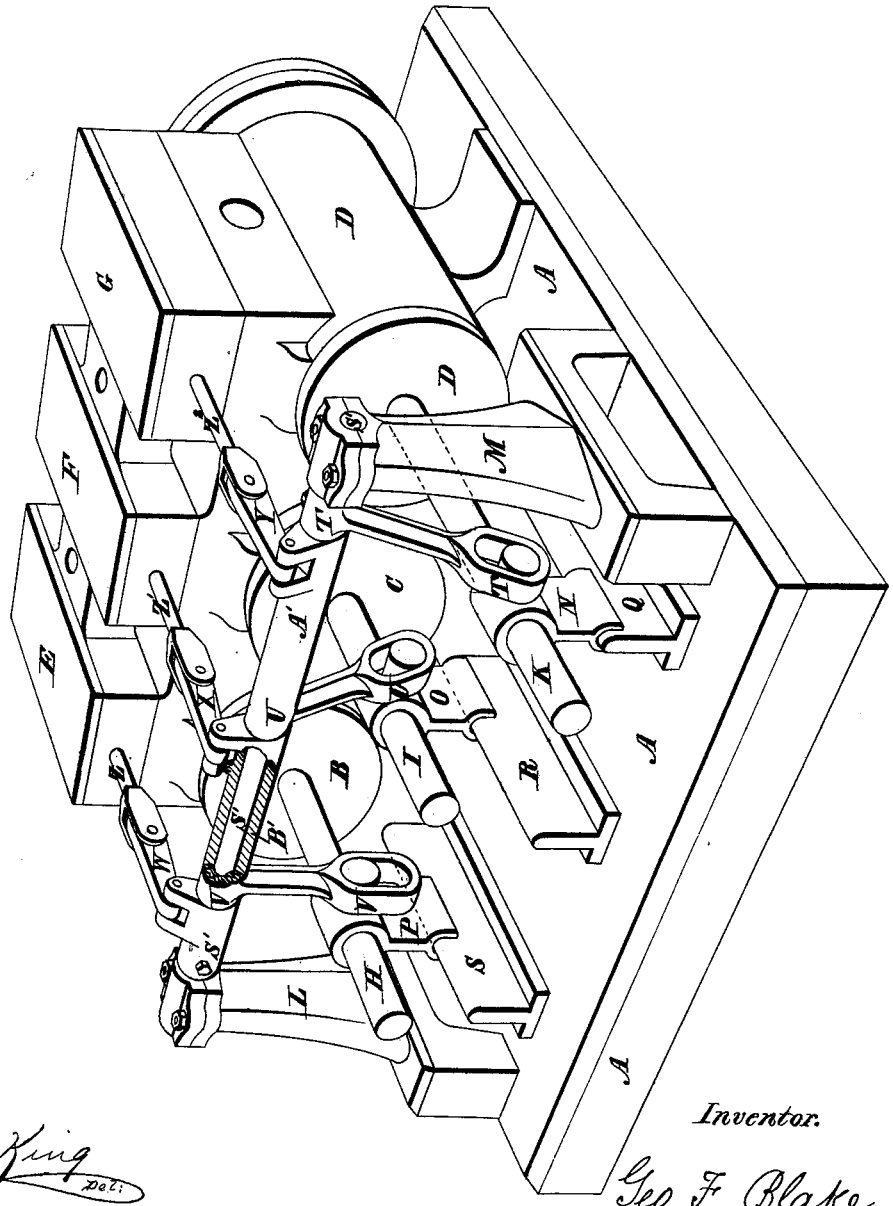
2 Sheets—Sheet 1.

G. F. BLAKE.

Steam Pumping-Engines.

No. 200,890. **Patented March 5, 1878.**

Fig. 1.



Witnesses

Harry King
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D. P. Cook

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Geo. F. Blake,
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2 Sheets—Sheet 2.

G. F. BLAKE.

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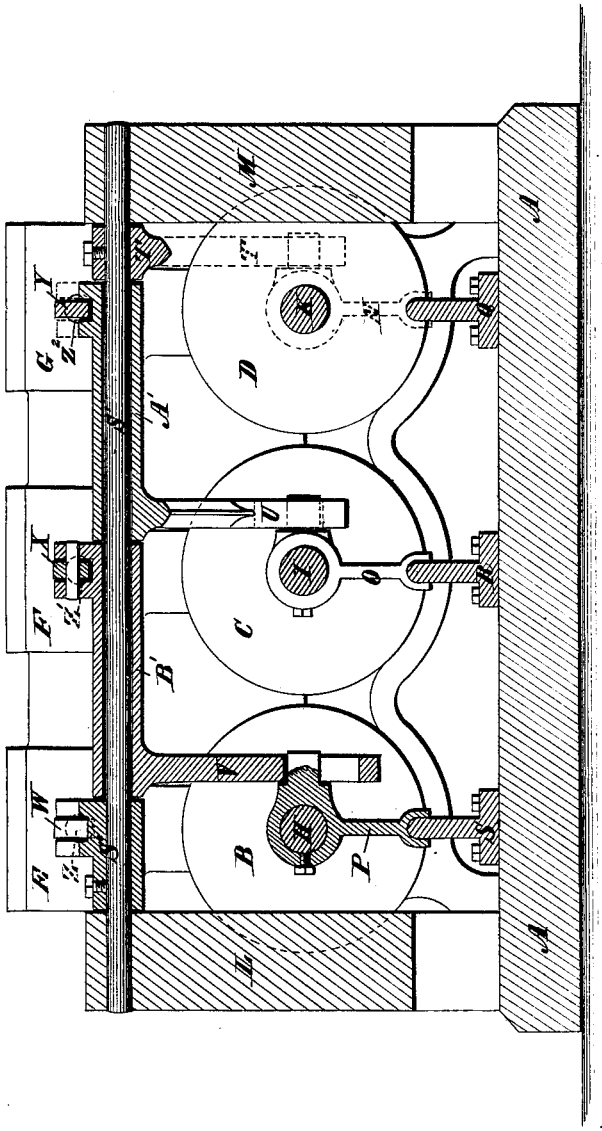

Fig 2.

Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE F. BLAKE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN STEAM PUMPING-ENGINES.

Specification forming part of Letters Patent No. **200,890**, dated March 5, 1878; application filed February 21, 1878.

To all whom it may concern:

Be it known that I, GEORGE F. BLAKE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Steam Pumping-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view of my triple engine. Fig. 2 is a vertical section through the rocker-shaft, looking toward the steam-cylinders.

The same letter indicates the same part in both figures.

The nature of my invention consists in the combination, in one machine, of three double-acting engines whose pistons have no mechanical connection with one another, and connecting mechanism whereby each engine is adapted to actuate mechanically the valve of one of the other engines in such order of time that no two engines shall reverse together, in combination with three pumps, each of which is directly connected, without crank or fly-wheel, with one of the three engines, the whole forming a three-cylinder direct-acting pumping-engine, constructed and operating in the manner hereinafter more fully set forth.

The new results and advantages of my invention are, the avoidance of dead-points; simplicity of construction of valve mechanism, the valves and ports of each engine all being of the same character, and the levers operating the valves of these engines all being of the same class; the reduction of the size, and consequent cheapening of the construction, of the cylinders; the relief of the shock on the pipes; and the prevention of pounding of the pump-valves, arising from the fact that no two engines reverse at the same time.

In the accompanying drawings, A marks the bed-plate of the machine, upon which it is supported. B C D are the three steam-cylinders, surmounted severally by the connected steam-chests E F G, in which the steam-valves operate.

The cylinders, steam-chests, ports, and valves may be of any usual or suitable construction, they constituting no part of the present invention.

H I K are the piston-rods, attached to slides N O P moving on guides Q R S. Piston-rod K is provided with a wrist-pin, which enters a slot in the lower end of lever T, the upper end of which is fixed to a rock-shaft, S′, whose journals are supported by the stanchions L M. To the opposite end of shaft S′ to that to which arm T is fixed is pivoted link W, operating valve-rod Z, attached to the valve of cylinder B. Piston-rod H is pivoted to arm V, attached to sleeve B′, rocking freely on shaft S′, and operating valve-rod Z^1 of cylinder C. Piston-rod I is pivoted to arm U, attached to sleeve A′, rocking on shaft S′, and operating the valve-rod Z^2 of cylinder D.

It will thus be seen that the valve of engine B is actuated by engine D; next, the valve of middle engine C is actuated by engine B; and then the valve of engine D is actuated by engine C, and so on continuously in the same order, each engine in succession pausing during a portion of the stroke of the other two. These successive pauses have the important advantage of allowing the pump-valves of each of the pumps in succession to become well-seated before the engine is reversed, thus tending to greatly lessen the pounding of those valves and waste of water resulting from the water passing through the openings before the valves have time to close.

Unless precautions were taken to obviate it, a disadvantage would arise from these pauses when steam is used as a motive power, viz., that each cylinder, during the pause of its piston, would fill with steam at the boiler-pressure, resulting in a serious loss of heat and fuel, for, when using steam as a motive power, the boiler-pressure ought to be much above the working-pressure in the cylinder, in order that the steam may be dry. To prevent the loss which would result from this cause, I propose to attach to the steam-chest a regulator connected with the supply-pipe, and set to cut

off the ingress of steam to the chest at the desired working-pressure, irrespective of the pressure in the boiler. Such a regulator I purpose making the subject of a separate application, and do not claim it here.

It is obvious that, as there are three engines, there can be no dead point or center, and the engine, consequently, can be started at any point of the stroke. There being three pump-cylinders, it is not necessary to have them so large to pump the same amount of water in a given time as in case of a single or duplex pumping-engine.

The engines are herein shown with their cylinders parallel; but they may be otherwise placed, the valve-operating mechanism being adapted to any such change.

What I claim is—

The mechanism for successively operating the steam-valves, the same consisting of the rock-shaft S′, levers T U V, and sleeves A′ B′, constructed and arranged as described, and combined with the valve-rods Z Z^1 Z^2 and piston-rods H I K, in the manner stated.

In testimony that I claim the foregoing as my own I hereto affix my signature in presence of two witnesses.

GEO. F. BLAKE.

Witnesses:
GEO. F. GRAHAM,
CHAS. F. STANSBURY.