(No Model.) 3 Sheets—Sheet 1.

M. MISIC.

VALVE FOR DIRECT ACTING STEAM PUMPS.

No. 504,844. Patented Sept. 12, 1893.

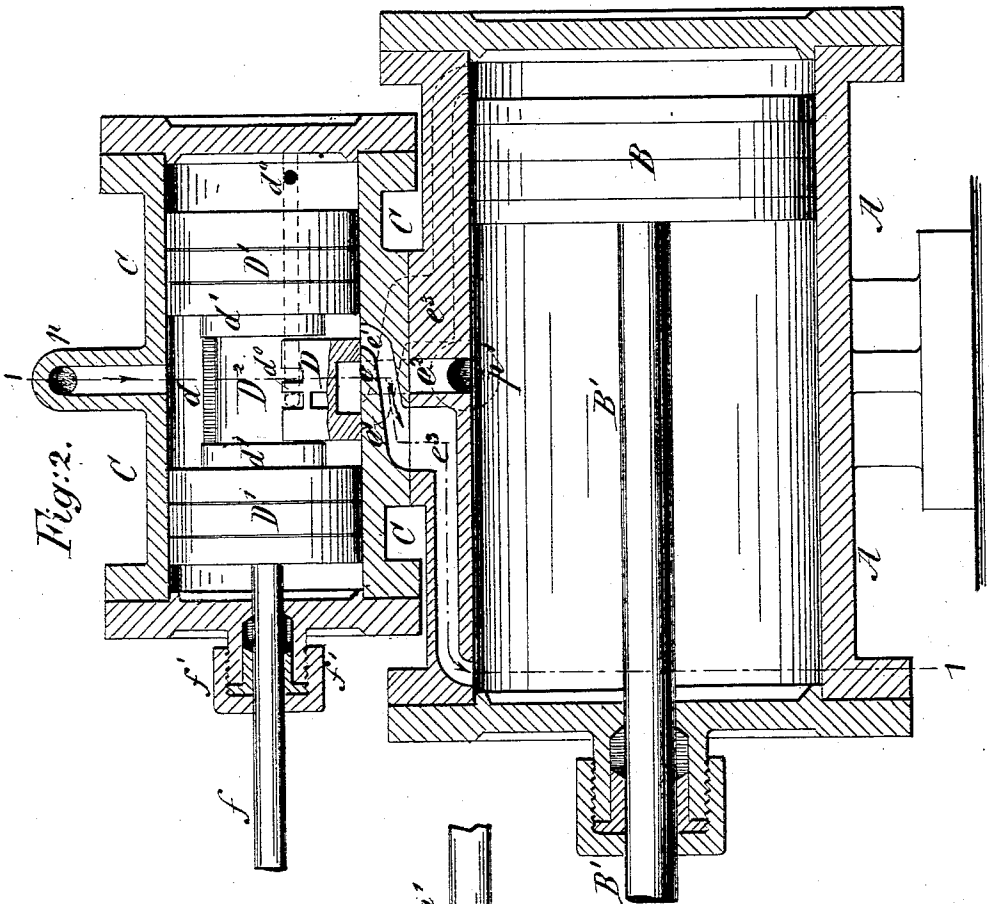

Fig: 2.

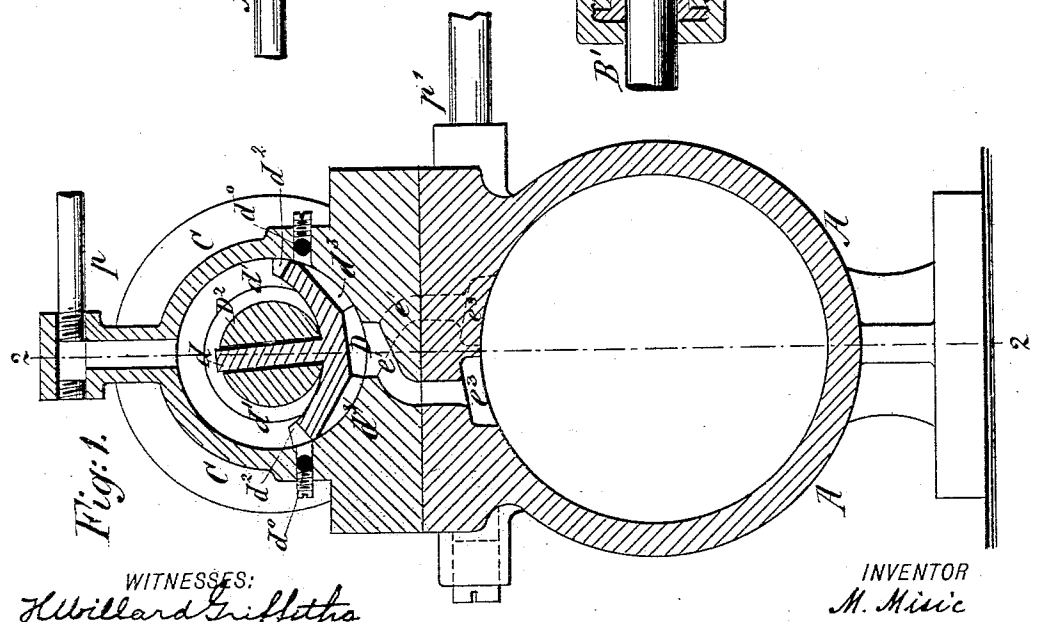

Fig: 1.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

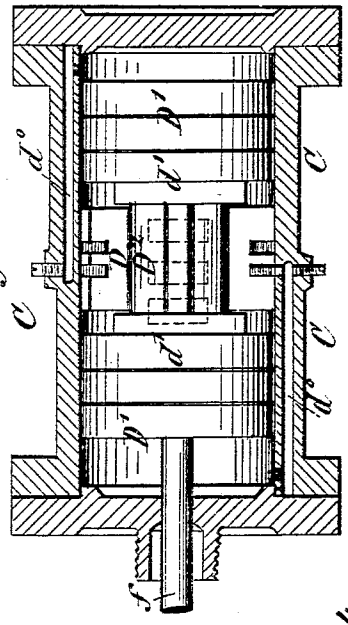


Fig. 5.

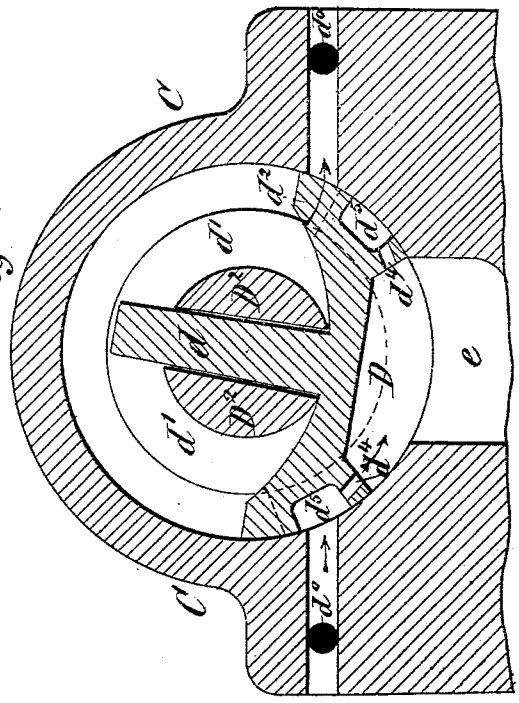
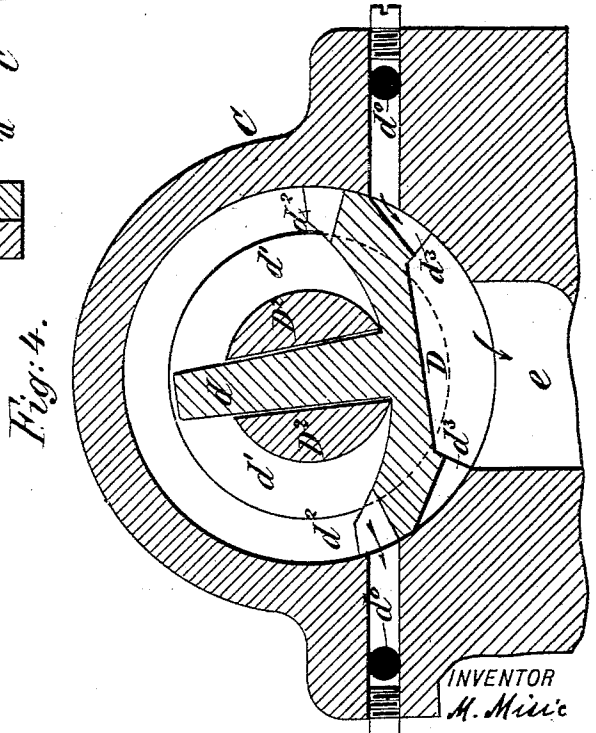


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

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VALVE FOR DIRECT ACTING STEAM PUMPS.

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Fig. 8.

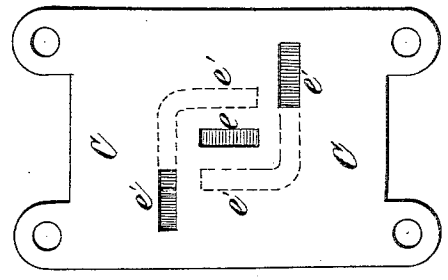


Fig. 7.

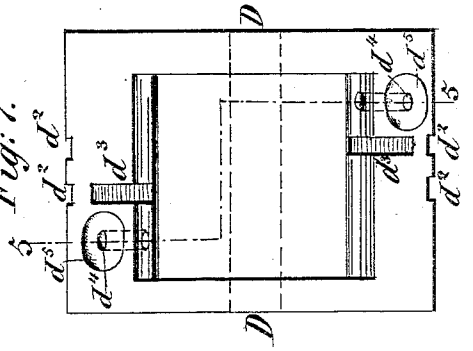
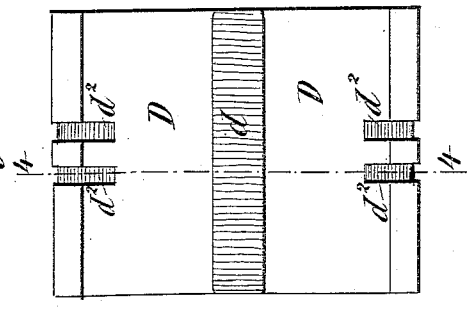


Fig. 6.



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UNITED STATES PATENT OFFICE.

MICHAEL MISIC, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE FOSTER PUMP WORKS, OF SAME PLACE.

VALVE FOR DIRECT-ACTING STEAM-PUMPS.

SPECIFICATION forming part of Letters Patent No. 504,844, dated September 12, 1893.

Application filed January 18, 1893. Serial No. 458,774. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL MISIC, a citizen of Austria-Hungary, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Valves for Direct-Acting Steam-Pumps, of which the following is a specification.

This invention relates to an improved steam-actuated slide-valve for operating direct acting steam-pumps, which slide-valve is adapted for operating with light and heavy counter-pressure, and so arranged that it performs its reciprocating motion by the action of live steam, while its oscillating motion is produced by the stroke of the piston of the steam-cylinder and suitable valve-gear interposed between the piston-rod and the spindle of the slide-valve; and the invention consists of a steam-actuated slide-valve for the steam-cylinder of direct-acting pumps, said slide-valve being composed of a valve-piston having a contracted middle-portion, shoulders at the ends of the middle portion and a diametrical recess in the middle-portion, in which recess is placed the shank of the slide-valve proper. The slide-valve is made in the nature of a D-valve and provided with notches in its ends and with recesses and channels at its under side for the exhaust-steam, the live and exhaust-steam passing to and from the ends of the steam-chest by means of longitudinal channels that extend from the center of the steam-chest at opposite sides and to opposite ends of the same.

The invention consists further in the specific construction of the steam-chest and slide-valve and of the channels connecting the ports of the steam-chest with the ports of the steam-cylinder, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1, represents a vertical transverse section of my improved steam-actuated slide-valve for direct-acting steam-pumps on line 1 1, Fig. 2. Fig. 2, is a vertical longitudinal section of the same, drawn on line 2 2, Fig. 1. Fig. 3, is a longitudinal section of the steam-chest, showing the slide-valve in top-view. Figs. 4 and and 5, are vertical transverse sections, drawn on a larger scale, of the slide-valve and its steam-chest, showing the slide-valve in different positions and respectively in section on lines 4 4, Fig. 6, and 5 5, Fig. 7. Figs. 6 and 7 are respectively a top-view and a bottom-view of the slide-valve, also drawn on a larger scale, and Fig. 8, is a bottom-view of the face of the steam-chest, the dotted lines showing the course of the steam-channels in the bottom-part of the steam-chest.

Similar letters of reference indicate corresponding parts.

Referring to the drawings A represents a steam-cylinder, B the piston of the same, B′ the piston-rod, C a cylindrical steam-chest, which is supported on the steam-cylinder A; D an oscillating slide-valve and D′ the valve-piston of the same, which is provided with packing-rings in the ends and made of less length than the steam-chest C, so that steam-spaces are formed at the ends of the steam-chest C. The valve-piston D′ is provided with a central contracted portion D^2, which is made of a smaller diameter than the piston-shaped ends, said contracted portion having a diametrical opening or recess into which the shank *d* of the slide valve D is inserted.

Between the slide-valve D and the ends of the valve-piston D′ are arranged shoulders *d*′ which are equal in width to the ports of the steam-chest and which are made of somewhat larger diameter than the central contracted portion D^2 of the valve-piston D′, so as to give free access of the steam around the same to the induction-ports of the valve-chest C and also hold the slide-valve D firmly in position so as to prevent any shifting of the same in longitudinal direction relatively to the valve-cylinder, while the lateral shifting of the valve is prevented by the diametrical opening in the contracted portion D^2 of the valve-piston D′.

The slide-valve D is made in the nature of a D-valve, its face forming one cavity which serves for exhausting the steam from the ends of the steam-chest C and as well as from the ends of the steam-cylinder A.

The steam-supply pipe *p* is arranged at the top part of the steam-chest C, while an exhaust-pipe *p*′ is arranged preferably at each side of the steam-cylinder A, so as to permit

the steam to exhaust at one side or the other of the same, according to the position of the steam-pump, the exhaust-pipe not in use being then closed by a suitable screw-plug, as shown in Fig. 1.

In the side-walls of the steam-chest C are arranged longitudinal steam-passages d^0 that extend from the middle of the steam-chest at opposite sides and in opposite direction to the ends of the same, said steam-passages communicating with the annular steam-space formed by the contracted portion of the valve-piston at the middle-portion of the steam-chest, and with the spaces that are arranged at the ends of the valve-chest, as shown clearly in Fig. 3.

The slide-valve D is provided in each end with two recesses or notches d^2 which are arranged near the center of the slide-valve and with recesses d^3 at the under side of the slide-valve, said recesses being in line with one set of notches d^2, as shown clearly in Fig. 7. The recesses d^3 are cut into the under side of the slide-valve while the notches d^2 are cut in the upper side of the ends of the same. Parallel with the recesses d^3 are arranged at the under side of the slide-valve D auxiliary passages d^4, the outer ends of which are somewhat enlarged, as shown clearly in Fig. 7, said enlarged ends d^5 serving for the purpose hereinafter to be described.

In the bottom-part of the steam-chest C are arranged two inlet-ports e' and an exhaust-port e, the latter between the inlet-ports and parallel therewith, as shown clearly in dotted lines in Figs. 3 and 8. The ports e' e communicate by the steam-passages with ports e^3 e^2 in the face of the steam-cylinder, the exhaust port e^2 of the latter being arranged vertically below the exhaust-port of the steam-chest, while the inlet-ports of the steam-cylinder are arranged at right angles to and at diagonally opposite sides of the inlet-ports of the steam-chest and connected by curved steam-passages with the same, as shown in Fig. 2 and in dotted lines in Fig. 8.

To one end of the valve-piston D′ is secured a spindle f which passes through a stuffing-box f' in the head of the steam-chest C to the outside of the same, said spindle being connected with any suitable valve-gear, such for instance as that shown in my Patent No. 461,640, dated October 20, 1891. By the valve-gear an intermittent oscillating motion is imparted to the slide-valve D, while an intermittent longitudinally-reciprocating motion is imparted to the same by the live steam that is alternately admitted to the ends of the steam-chest by the notches d^2 in the sides of the slide-valve D and its longitudinal channels d^0 in the walls of the steam-chest C.

The operation of the improved slide-valve is as follows: Live steam is admitted into the steam-chest C and conducted into the steam-cylinder A, so that the piston B of the same commences its forward stroke, which motion is communicated by the valve-gear to the valve-piston D′ and slide-valve D, which are oscillated so as to permit steam to enter through one of the notches d^2 and one of the longitudinal channels d^0 to one end of the steam-chest C, so that the valve-piston D′ is moved forward and serves to open one of the inlet ports and channels in the steam-chest and steam-cylinder, so that live steam can pass to the opposite end of the steam-cylinder A, whereby the steam-piston B is moved in opposite direction, while the steam in the steam-cylinder is exhausted through the exhaust-ports and channels. During the backward stroke of the piston, the slide-valve is again oscillated and steam admitted to the opposite end of the steam-chest, so that the valve-piston is moved in opposite direction, the steam at its opposite end being exhausted through the recess d^3 into the cavity of the slide-valve through the exhaust-ports e e^2 and exhaust-pipe to the outside. When the pump has to work against increased counter-pressure, a second supply of live steam is permitted to pass through the second notch d^2 of the slide-valve and the longitudinal channels d^0 alternately to opposite ends of the steam-chest, whereby a greater throw of the valve-piston takes place, so that the entire opening of the inlet-ports of the steam-chest and steam-cylinder takes place, so that the steam instead of being cut off so as to work by expansion is supplied in greater quantities to the steam-cylinder so as to overcome the greater counterpressure that is exerted on the pump. In this case, the exhaust of the second supply of live steam takes place alternately through the channels d^4 which are arranged alongside of the recesses d^3, the enlarged ends d^5 of the same serving to facilitate the escape of the exhaust-steam from the ends of the steam-chest and to the exhaust-port. The enlarged ends of the channel d^4 owing to their larger size are in connection with the ports of the channels d^0 for a greater length of time and permit thereby the entire and unobstructed exhaust of the steam from the ends of the valve-chest, so that the easy and reliable working of the valve-piston without any choking or throttling of the exhaust-steam from the ends of the steam-chest is secured. The change in the working of the slide-valve and from a single to a double supply of steam takes place automatically according to the degree of resistance which is encountered by the pump. When the pump works against slight counterpressure, steam is supplied through one of the notches d^2, while when heavy work is to be done by the pump, two admissions of steam are accomplished in quick succession and thereby the greater counterpressure on the pump overcome by the greater power produced by the steam-cylinder owing to the additional supply of live-steam to the same. The course of the live and exhaust-steam in the valve-chest when the pump is working against light pressure, is illustrated by the

position of the slide-valve, shown in Figs. 1 and 4, while the position of the slide-valve, shown in Fig. 5, illustrates the position of the same when the second admission of steam takes place in case the pump has to work against heavy pressure.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, of a valve-chest, having longitudinal channels at opposite sides and ends of the chest, a valve-piston having a contracted middle-portion and shoulders at the ends of the middle-portion, and a slide-valve, the shank of which is guided in a diametrical recess of the contracted portion, the slide-valve being provided with a single cavity, notches in its ends and recesses at the under side for the supply and exhaust of the steam to and from the ends of the steam-chest, said recesses being in line with one set of notches, substantially as set forth.

2. The combination, of a steam-chest, having longitudinal channels extending from the center to opposite ends of the chest, a valve-piston in the steam-chest, said valve-piston having a contracted middle-portion and shoulders at the ends of the contracted portion, a slide-valve having a shank guided in a diametrical recess of said contracted portion, said slide-valve being provided with two notches in its ends, a single cavity, two recesses at the under side and two channels having enlarged outer ends, substantially as set forth.

3. The combination, with a steam-cylinder, having inlet and exhaust-ports, the inlet-ports being arranged at right angles to and at diagonally opposite sides of the exhaust-port, of a steam-chest having ports communicating with the ports of the steam-cylinder, a valve-piston in said steam-chest, provided with a middle contracted portion and a slide-valve, the shank of which is inserted in a diametrical recess in the contracted portion of the valve-piston, said slide-valve being provided with notches at its ends, a single cavity and recesses at its under side, substantially as set forth.

4. The combination, of a steam-cylinder, having inlet and outlet-ports, the inlet-ports being arranged at right-angles to and at diagonally opposite sides of the exhaust-port, of a steam-chest having ports communicating with the ports of the steam-cylinder, and longitudinal channels at opposite sides and ends, a valve-piston in said steam-chest having a middle contracted portion, a diametrical recess in said contracted portion and shoulders at each end of the same, and a slide-valve, the shank of which is inserted in the recess of the contracted portion, said slide-valve being provided with two notches in its ends a single cavity and two recesses at the under side, and two channels having enlarged outer ends, also located at the under side of the slide-valve, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two sbbscribing witnesses.

MICHAEL MISIC.

Witnesses:
PAUL GOEPEL,
H. OBERMAYER.