Nov. 21, 1944. A. L. BRICE 2,363,389

STOKER OPERATING MECHANISM

Filed Jan. 23, 1942 4 Sheets-Sheet 1

Fig. 1

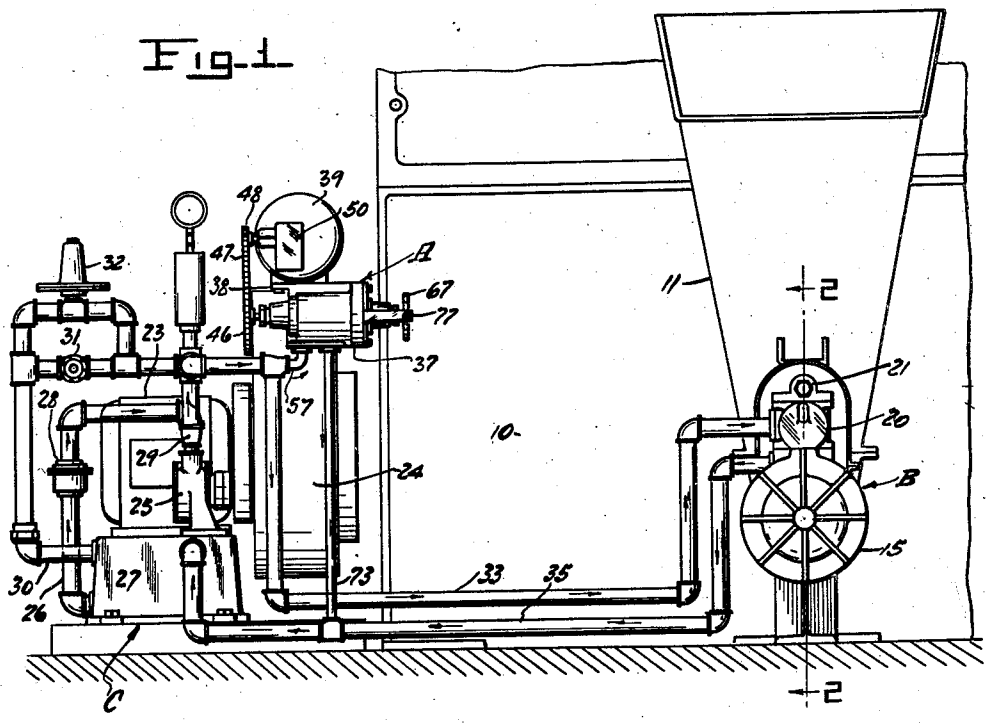
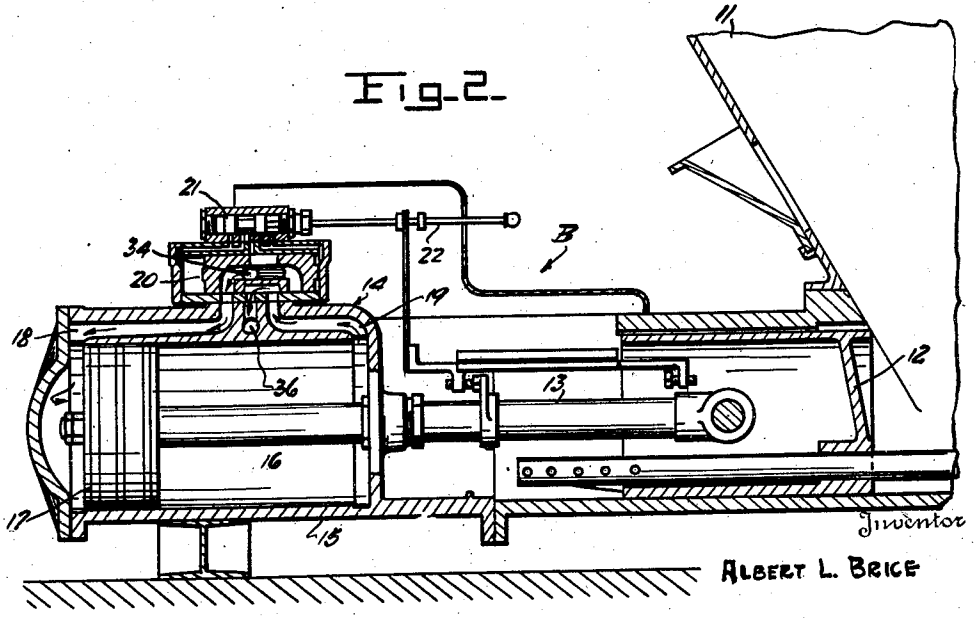


Fig. 2



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STOKER OPERATING MECHANISM

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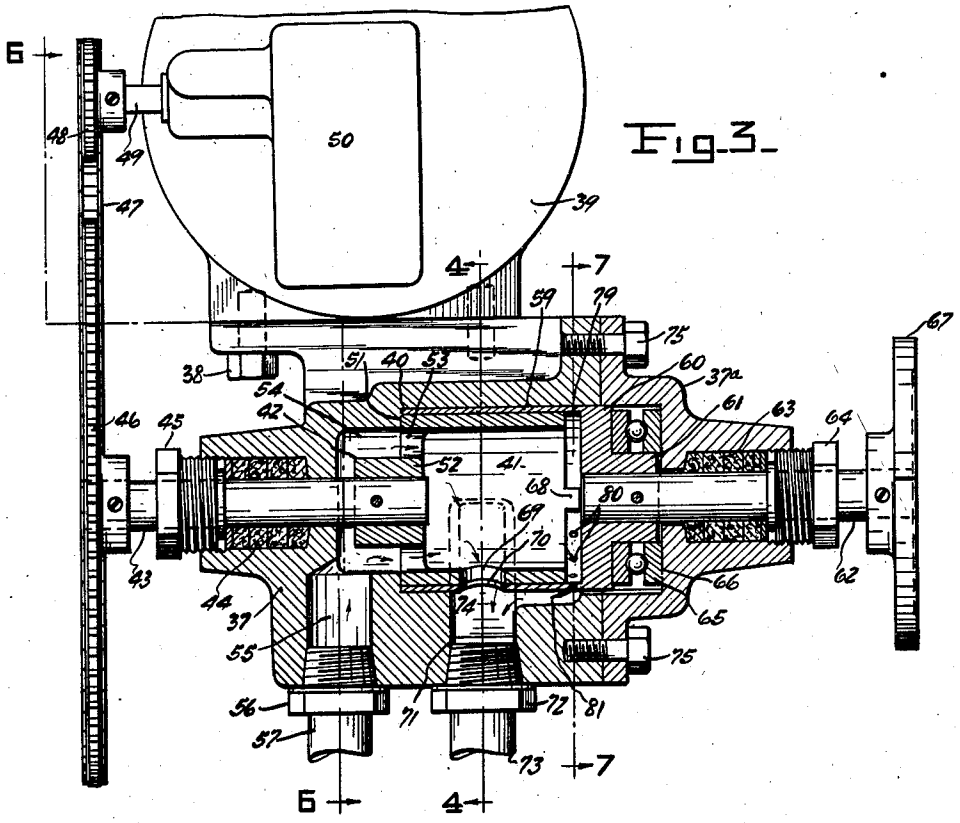


Fig. 3.

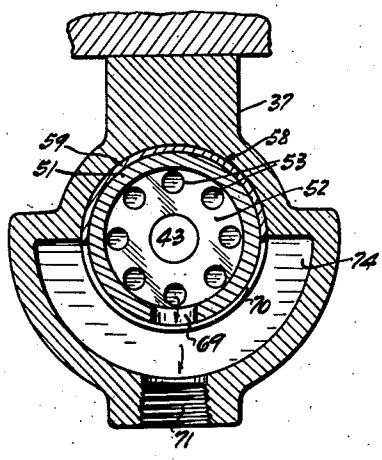


Fig. 4.

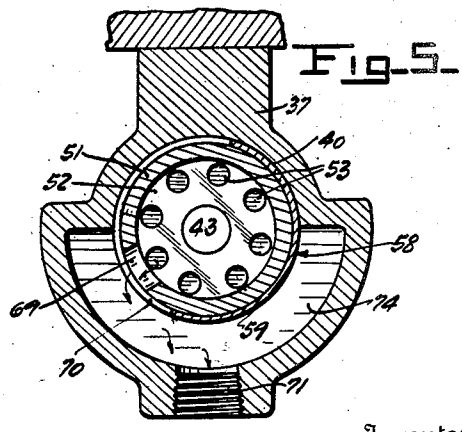


Fig. 5.

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STOKER OPERATING MECHANISM

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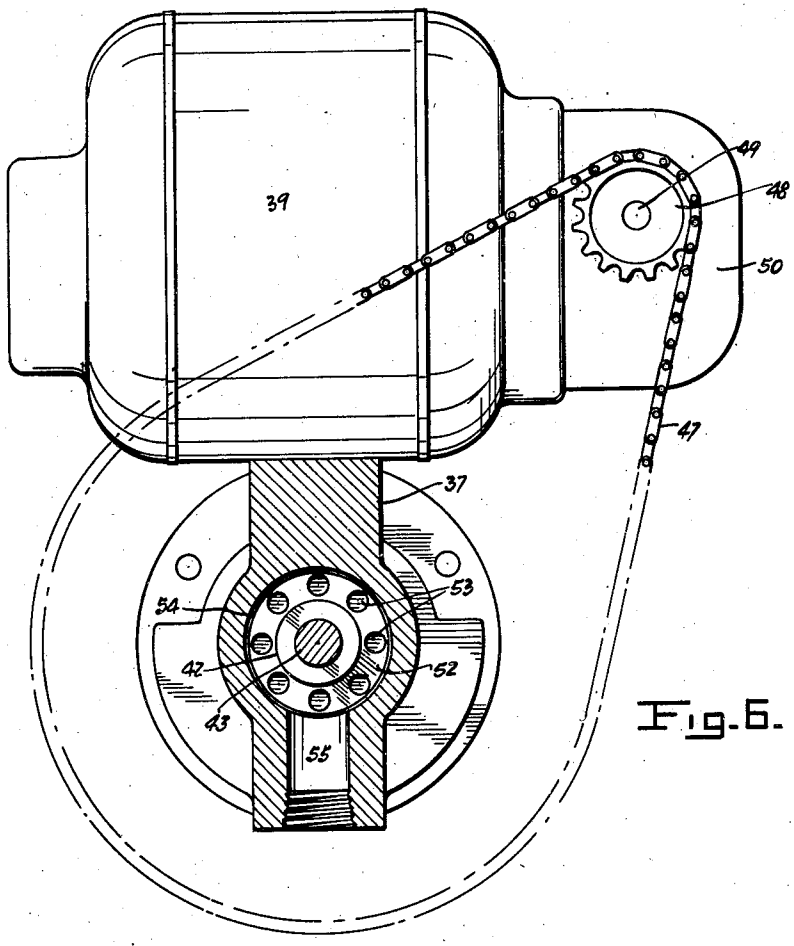


Fig. 6.

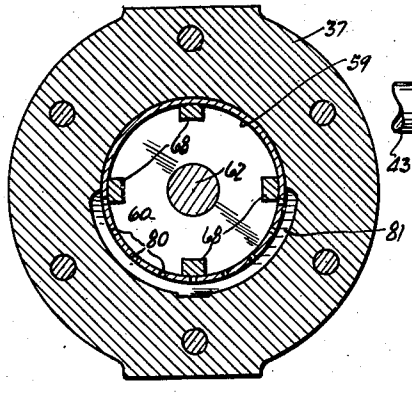


Fig. 7.

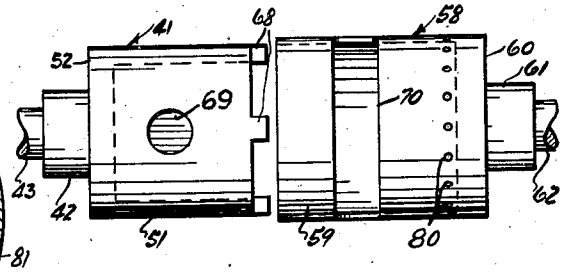


Fig. 8.

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STOKER OPERATING MECHANISM

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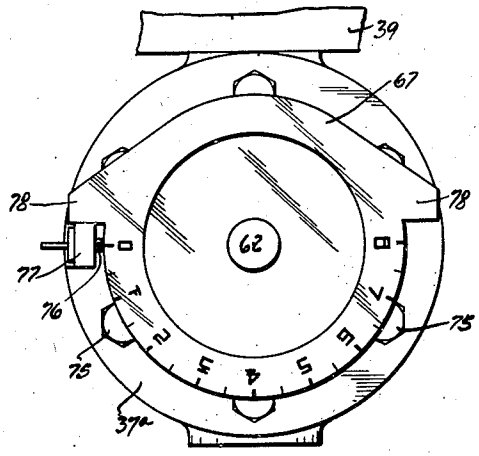


Fig. 9.

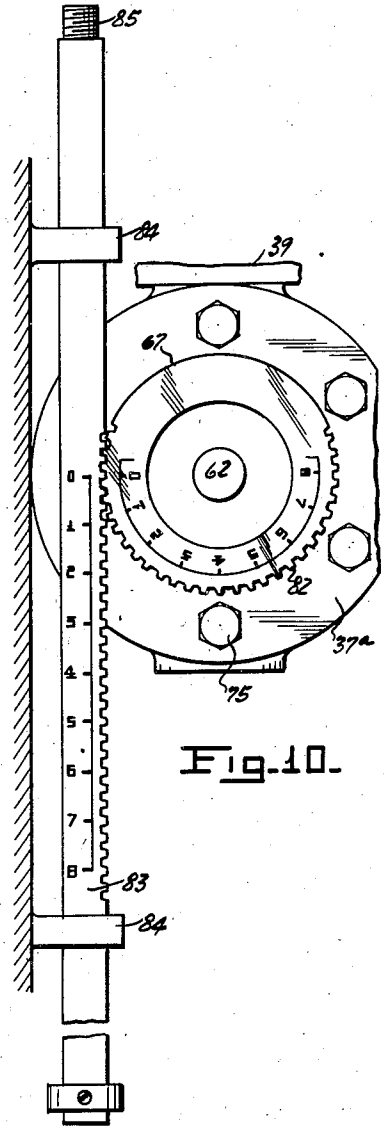


Fig. 10.

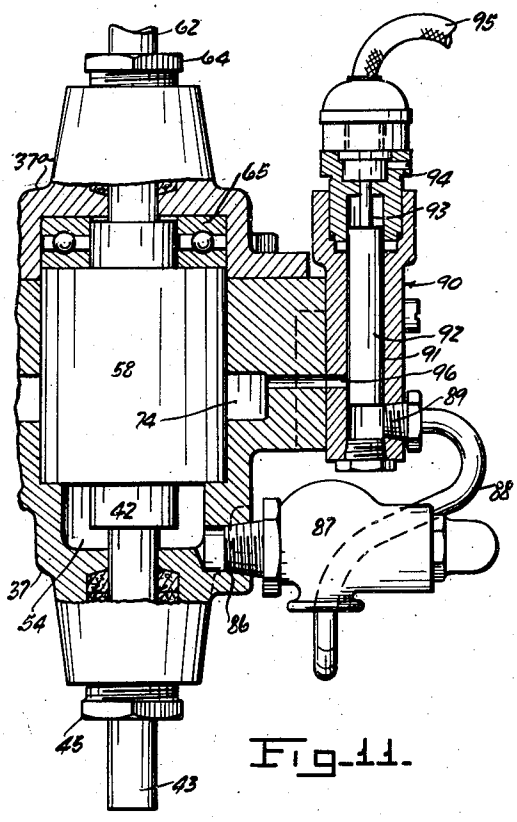


Fig. 11.

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Patented Nov. 21, 1944 2,363,389

UNITED STATES PATENT OFFICE

2,363,389

STOKER OPERATING MECHANISM

Albert L. Brice, Frederick, Md., assignor to Frederick Iron and Steel Company, Frederick, Md., a corporation of Maryland

Application January 23, 1942, Serial No. 427,970

20 Claims. (Cl. 60—52)

This invention relates generally to improvements in stoker operating mechanisms and more specifically to a valve means for varying and controlling the feeding rate of such mechanisms.

The usual stoker system and assembly of the type here in mind comprises a hydraulically operated, reciprocating motor and a ram arranged for controlled alternate forward, or charging, and return strokes, or movements. On the charging stroke the ram feeds the coal or fuel from a hopper into the retort of the boiler or heating plant and the return stroke of course brings the parts back to position for the next such operation. Control of the rate of fuel feed is usually obtained then by varying the frequency of the effective working strokes per unit of time, the piston of the motor, and the ram, having pause, or dwell, intervals between movements, and such intervals being varied in length or time. The actual speed or rate of movement of the parts is usually independent of the frequency of such movements.

My invention has as its primary object the provision of a timing or regulating valve of simple, durable and conveniently controllable construction, for thus controlling the stoker motor by varying the admission of the hydraulically actuating fluid thereto and bringing about any desired number of charging and return strokes per given unit of time. The valve thus acts to feed the fluid from the pressure source to the motor for a desired interval and to by-pass the fluid for the desired interval to thus pause the piston and ram and control the frequency of operating movements.

Another and important object of my invention is to provide a valve of this nature which will not only vary the frequency of the operations of motor and ram but will also permit of concomitant and proportional variations in the actual speed of such movements to thereby make it possible to vary the fuel feeding rate over a wide range and in selected degrees from maximum to an absolute minimum or zero.

These and other more detailed and specific objects will be made apparent in the course of the following specification, reference being had to the accompanying drawings, in which—

Fig. 1 is a frontal elevation of a portion of a boiler front showing a stoker mechanism and system and with my control means connected thereto.

Fig. 2 is an enlarged fragmentary vertical section along the line 2—2 in Fig. 1 showing the stoker motor, ram and associated parts.

Fig. 3 is a greatly enlarged longitudinal sectional view through the valve means of my invention.

Fig. 4 is a cross section along the line 4—4 in Fig. 3 showing the valve parts as adjusted for minimum fuel feeding rate.

Fig. 5 is a similar view but showing the parts in adjusted positions for increasing the fuel feeding rate.

Fig. 6 is a cross section along the line 6—6 in Fig. 3 showing a part of the drive chain in broken lines.

Fig. 7 is a cross section along the line 7—7 in Fig. 3.

Fig. 8 is a detail side elevational view of the valve rotor and timing member partially disassembled.

Fig. 9 is an end elevational view of the valve showing the control wheel therefor.

Fig. 10 is a similar view but showing a mechanism for adjusting the control wheel in accordance with temperature effects, steam pressure or the like.

Fig. 11 is a fragmentary longitudinal sectional view of the valve mechanism showing the connection thereto of an automatic overload protection device.

Referring now more particularly and by reference characters to the drawings, A represents generally my improved valve mechanism, the same being shown as arranged in connection with a stoker assembly B and motor and pump unit C. The latter parts and their operation will be first described in order to clarify the functioning of the valve itself.

The stoker unit B is arranged at the front of the boiler or furnace 10 at which is located the fuel hopper 11, said unit including a ram 12 connected by a rod 13 to the reciprocating motor 14. The parts are arranged in a housing 15 including a cylinder 16 in which the piston 17 of the motor reciprocates. Hydraulic fluid is admitted selectively to opposite ends of the cylinder 16 by ducts 18—19 under control of a reciprocating float valve 20 and pilot valve 21, the latter being operated in conjunction with the motor and ram assembly by rod 22. This structure is well known in the art and need not be detailed further herein.

The unit C, also of generally conventional form, acts as prime mover or primary power source for the stoker and comprises a motor 23 driving a fan 24 which supplies air to the boiler or furnace. Also, through a chain drive, the motor operates a pump 25 of the positive displacement type which has a connection through a suction line 26 to a fluid reservoir 27, a strainer 28 being placed in

this line as usual. The discharge 29 from the pump is connected by a by-pass line 30 back to the reservoir 27 and a hand controlled valve 31 is placed in this line. Also connected across this valve 31 is a pressure responsive relief valve 32.

A feed pipe or line 33 connects the discharge of the pump 25 to an inlet port 34 in the stoker motor 14, while an exhaust line 35 connects the reservoir 27 to an outlet port 36 in the motor. Obviously the pump and fan unit C may be located at any desired remote point from the stoker by suitable arrangement of the piping.

In the operation of the system as thus far described, the pump 23 taking the oil or hydraulic actuating fluid from the reservoir 27 normally will feed it through line 33 to the inlet port 34 at stoker motor 14. The valve 20 will control the admission of this fluid through one or the other of ducts 18—19 to the cylinder 16, the valve also connecting one end of the cylinder through outlet port 36 to the exhaust line 35 back to reservoir. As here shown (Fig. 2) the valve 20 will admit fluid to the cylinder through duct 18 while exhausting fluid from the other end through duct 19. The piston 17 will thus move to the right, or forwardly toward the furnace, causing ram 12 to move forward beneath the hopper 11 and feed a charge of fuel therefrom into the retort (not shown) of the furnace. When the piston and ram reach the limit of this movement actuation of the rod 22 will shift the pilot valve 21 admitting fluid to valve 20 and shifting it to the left (Fig. 2) thus shifting the duct connections to ports 34 and 36, the fluid from the pump being now admitted to the motor cylinder through duct 19 and fluid being exhausted through duct 18. The piston 17 and ram 12 will thus move rearward, or on the return stroke, back to the position shown whereupon the valve 20 will again reverse the fluid flow for the next charging stroke. So long as the fluid pressure and supply remains constant this intermittent reciprocating action will maintain, as will be understood.

Manual control of this operation is provided by the by-pass valve 31 which, when opened, will permit the fluid to flow directly from the pump 25 back to the reservoir 27 instead of operating the stoker motor as described above. On the other hand by partially opening and closing this valve 31 the effective fluid pressure for operating the motor may be controlled at will, thus roughly varying the effective feeding rate of fuel to the furnace.

Should the ram 12 strike an obstruction, or other working parts become clogged for some reason, the pressure in the feed line 33 will of course build up and may then actuate the pressure responsive valve 32 causing it to open and by-pass fluid back to the reservoir, thus preventing injury to any working parts.

My control valve A is designed to permit control of the fuel feeding rate by varying the frequency and speed of the charging and return strokes of the ram 12. This valve comprises a housing or body, designated generally at 37, which is mounted as at 38 upon (or near) an electric motor 39 which actuates the valve. Within this housing a valve recess 40 of cylindrical shape is formed and the valve member or rotor 41 is rotatably arranged therein, said rotor being secured by a hub 42 upon a valve shaft 43 which extends outwardly through an end of the housing. Packing 44 and a gland nut 45 are arranged in the housing end around the shaft to seal against the escape of fluid thereat and the exposed end of the shaft carries a sprocket gear 46 which is connected by a chain 47 to a sprocket pinion 48 on the driven shaft 49 of the motor 39. Obviously when thus connected the motor will rotate the valve rotor 41 at a speed dependent on the gear reduction 50 at the motor, and the ratio of the sprockets 46 and 48, and by varying these elements the valve rotor speed may be set at any desired value. Gears or other driving means may of course be substituted for the sprockets and chain.

The valve rotor 41 is as here shown of cup-shaped form having an annular barrel portion or wall 51 and a closed end 52, whereat is located the hub 42, said end however being pierced by a series of inlet openings 53 which afford communication between the interior of the valve and an inlet chamber 54 formed in the valve housing at the end of valve recess 40 and surrounding the hub. An inlet port 55 is formed in the housing 37 opening into the chamber 54 and at its outer (here shown as lower) end is tapped to receive a pipe fitting 56 by which connection is made through a pipe 57 to a point somewhere along the feed line 33 or to the discharge of the pump 25.

Telescopically and rotatably surrounding the valve rotor 41 is a timing device or shell 58 having a thin, annular barrel or sleeve 59 which rotatably and nicely engages the peripheral wall of the recess 40, same being sufficiently large to accommodate this sleeve over the rotor. The shell 58 is also cup-shaped, having a closed end 60 with a hub 61 by which it is secured to an operating or adjusting shaft 62 extending outwardly through the housing end in the opposite direction to, but on a common axis with, the aforesaid valve shaft 43. Packing 63 and a gland nut 64 here also seal around the shaft while a thrust bearing 65 braced between a shoulder 66 formed at the end of the recess 40 and the shell holds parts in alignment while permitting free movements thereof. A control or hand wheel 67 is provided on the outer end of shaft 62 as, and for a purpose, to be described.

In assembling the valve rotor 41 and timing shell 58 their open ends are of course telescoped but the closed end of the shell is prevented from closing off the open end of the rotor by means of lugs 68 extended at spaced positions therefrom.

The valve rotor 41 has an opening or port 69 in its barrel portion and in the same plane the shell 58 has a slot 70 which is elongated and extends substantially half way around the periphery thereof. Obviously the arrangement is such that, if the valve rotor is rotated within the timing device the opening 69 will register with the slot 70 through about one half of each revolution and will for the balance of each revolution be closed by the shell or sleeve of said timing device. Formed in the valve housing in alignment with the plane of the opening 69 and slot 70 is an exhaust port 71 tapped at its end to receive a fitting 72 by which a pipe 73 is connected to the valve, this pipe being in turn connected to some part of the exhaust line 35 (or reservoir) as seen in Fig. 1. This port 71 communicates with the recess 40 through a flared semicircular, cored outlet opening, channel or passage 74 (Figs. 4 and 5) curved around and exposing that portion of the timing shell 58 having the slot 70.

To facilitate fabrication of the valve housing

and assembly of parts therein it is, as shown in Fig. 3, made in two parts with an end cap 37ª secured over the end at which bearing 65 is located by means of cap screws 75.

In the operation of the valve as thus far described it is understood that the motor 39 will rotate the valve rotor 41 within the timing shell 58 which, for purposes of example, may be adjusted and fixed so that its slot 70 registers with the outlet channel 74 throughout its entire length as seen in Fig. 4. It is also assumed for this example that the rotor 41 is rotated one complete turn per minute although this, as aforesaid, is subject to variation and the rotor may make any number of revolutions per time unit.

Now so long as the outlet opening 69 in the valve rotor 41 is closed by the timing shell 58 the operation of the stoker will be as previously described, the fluid flowing from the pump 25 alternately to the ends of the motor cylinder 16 and reciprocating the piston 17 and ram 12 through charging and return strokes in sequence. However, such condition will maintain only during one half revolution of the rotor 41 since when this is completed the opening 69 will come into registry with the slot 70 and will remain in such communication during the remainder of that revolution of the valve. Fluid under pressure from the pump is at all times present in the interior of the valve rotor, since it flows from the pipe 57 through port 55, chamber 54 and openings 53, and during such time as the opening 69 and slot 70 register the fluid may escape therethrough into the channel 74 and thence through port 71 and pipe 73 back to the reservoir. The result is to by-pass the fluid from pump to reservoir during one-half revolution of the valve rotor thus halting the operation of the piston 17 and ram 12 since the fluid necessary to operate same will not be furnished at this time from the positive displacement pump.

It will be seen therefore that fluid will be supplied to the stoker motor for intermittent intervals and (in the example thus far discussed) will be by-passed for intervening intervals of similar duration and the result is to cause the ram to pause, or dwell, for a period of time between each stroke, assuming that during such time as the fluid is supplied a sufficient quantity will be furnished to move the piston through one stroke.

The duration and time length of the pauses or dwells between deliveries of fluid to the pump may be varied by oscillating the timing shell 58 to expose a varying length or area of the slot 70 to the channel 74. Obviously when the timing shell is turned to move a part of the slot past the end of the channel 74 (as in Fig. 5) the opening 69 will be in communication with the outlet port 71 for a shorter period of time and the by-pass may be almost or entirely shut off by proper adjustments, if so desired.

It will be noted in this connection that even with the slot 70 partially covered by being turned to reduce the by-pass time (Fig. 5) that there will be some by-pass or leakage effect as the opening 69 traverses the full length of the slot. Thus while the opening 69 is passing that part of the slot 70 exposed to the outlet channel 74 the fluid will be by-passed to fullest extent causing the ram to pause or dwell. As the opening then passes along the covered part of the slot there will continue to be a comparatively minor fluid leakage through the slot back to the outlet but this leakage will not be sufficient to prevent the building up of sufficient pressure to operate the ram. It will be recognized that in constructing the valve, the shell 58 may have a wall thickness of one thirty-second of an inch or even less so that this leakage will be very minor or of no practical effect on the operation of the valve. On the other hand, when the slot 70 is completely hidden its ends may be closed off from the outlet 74 and no by-pass whatever will be provided at this point.

For so adjusting the timing shell 58 the hand wheel 67 is employed and it is graduated around one half of its periphery as seen in Fig. 9 to indicate corresponding positions of the shell or, more properly, of the slot 70. An index for this scale is provided by a screw 76 disposed in an arm 77 extending outwardly from the valve housing alongside the wheel and this screw may be brought to bear upon the periphery of the wheel to lock it in adjusted positions. Lugs 78 on the wheel also will contact the arm 77 to limit the movement of the wheel to that extent which will permit movement of the slot 70 from full exposure to channel 74 to a completely closed position.

It will be evident from the foregoing that my valve will provide for convenient control of the rest or dwell periods between piston and ram movements and obviously variations in such periods will regulate the fuel feed from hopper to retort. However my valve further has means for varying the actual speed of movement of the piston and ram, as well as the frequency of such movements, thus enabling a nicety of control and wider range of fuel feeding variations than heretofore possible, to my knowledge.

To this end that portion of the sleeve of the timing shell 58 exposed to the interior of the valve rotor by the space 79 which is formed between the rotor barrel 51 and sleeve end 60 (by the lugs 68) is provided with a series of fine openings or bleeder ports 80 which are spaced in a line around about half the diameter of the sleeve and on the same side thereof having slot 70. These ports of course then communicate with the interior of the valve and they will also, when the slot 70 is fully exposed to the channel 74, communicate with a passageway 81 which is both substantially semi-circular and coextensive with channel 74 and connected thereto.

The motor cylinder is of the displacement type and therefore a certain quantity of fluid is required to move the piston (and ram) through either charging or return strokes, no matter how slow or how fast this necessary quantity is supplied. Now when the timing shell is set to by-pass the fluid to greatest extent this required volume of fluid would ordinarily be supplied within a certain time, but as the opening 69 is closed to initiate this supply and start the operation of the stoker the ports 80 (remaining open) will leak or bleed off a small quantity of the fluid from the pump back to the discharge or outlet 71 thus requiring a longer time to complete delivery of the required fluid volume. The result is to slow down the speed of movement of the ram and thus at this setting not only is the maximum rest period between movements provided but the speed or rate of such movements is at a minimum. On the other hand, as the timing shell is adjusted to reduce the exposure of the slot 70 and thereby decrease the rest periods of the piston the ports 80 are gradually moved away from passageway 81 and closed off decreasing the amount of fluid bled off and thus speeding up the movement of the parts.

It is thus seen that the speed of the strokes is varied proportionally to the rest intervals or length of time the ram pauses and it is thus possible to vary the number of strokes per unit of time over a wider range than possible by pausing the ram alone.

Obviously the setting of the handwheel **67** will control the fuel feeding rate to a fine degree and this wheel may be controlled from some heat responsive source such as a steam valve, thermostat or the like to vary the feed automatically according to requirements. As one example of such control the handwheel may have gear teeth **82** around its periphery as shown in Fig. 10 and may be rotated by a gear rack **83** slidably supported in bearings **84** in position to mesh with said teeth. This rack may then be connected at one end **85** to a conventional steam pressure responsive valve (not shown) to increase or decrease the fuel feeding rate in accordance with steam pressure.

Automatic overload protection may be built into the valve A to either displace or supplement the valve **32** as shown in Fig. 11. Here a tapped opening **86** is provided in the valve housing or body **37** at any desired point and in communication with the chamber **54**. A pressure responsive relief valve **87** of conventional form is placed in this opening and is thus subject to the fluid pressure existing in chamber **54** so that, when this pressure exceeds the setting of the valve, it will open said valve admitting fluid to a discharge pipe **88**. This pipe is connected at **89** to a cylinder housing **90** secured to the valve housing **37** and communicates with a cylinder **91** therein in which is slidably mounted a plunger **92**. Said plunger has a stem **93** extending to a conventional electric switch unit **94** arranged in the end of the housing **90** and from which leads a cable **95** for connection to the motor **23** driving the fluid pump **25**.

Thus when the fluid pressure builds up in the pressure lines to a certain point, as would occur should the ram become stalled, the flow of fluid into the cylinder **91** will urge the plunger **92** endwise to disconnect the switch **94**, breaking the electrical circuit to the motor **23** and stopping the operation entirely until the ram may be cleared and at the same time permitting fluid to flow into outlet **74** through a duct **96** which is opened when the plunger is thus operated. When the switch is again closed and the plunger **92** returned to normal position the little oil in the cylinder **91** may be compressed in the pipe **88** to permit such return.

My valve as will be readily appreciated operates entirely independently of the position of the motor piston and fuel feeding ram and is time controlled to positively regulate the relative durations of fluid feed to, and by-pass around, the motor to thus regulate the frequency of the ram movements strictly with regard to time intervals. The valve may operate at constant speed with all necessary adjustments provided by the time device and no throttling means whatever is needed to control the admission of fluid to the valve to regulate the pause intervals.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. The combination with a reciprocating stoker motor having a hydraulically actuated piston, a fluid source and means for selectively applying fluid under pressure to opposite sides of the piston, of a regulating valve operative to periodically relieve the piston of fluid pressure on either side and thereby cause it to pause at intervals in its reciprocating movements, said valve being operated independently of the movements of the piston to cause pause intervals in any position thereof.

2. In a stoker operating mechanism including a hydraulic motor piston and a fluid source for selectively supplying fluid under pressure to either side of the piston to reciprocate the same, a regulating valve having means for periodically rendering said fluid source ineffective upon the piston and thereby causing the piston to dwell at corresponding intervals in its reciprocating movements, and means for actuating the valve to cause said dwell intervals to occur at predetermined timed intervals independently of the position of the piston in its reciprocating movements.

3. In a stoker operating mechanism including a hydraulic motor having a piston and a fluid source for selectively applying fluid pressure to opposite sides of the piston and imparting reciprocating movements thereto, a timing valve operatively arranged to periodically by-pass the fluid and relieve the piston of fluid pressure on either side to thereby cause the piston to dwell at intervals in its reciprocating movements, and an electric motor arranged to actuate the valve and to thereby control the frequency of said dwell intervals.

4. In a stoker operating mechanism of the character described, a hydraulic motor having a piston, a fluid source for supplying fluid to the motor and a control means for selectively admitting fluid to opposite sides of the piston to impart intermittent reciprocating movements thereto, a regulating valve operable independently of the motor and of the movements of the piston to periodically relieve the piston of pressure and thereby cause the piston to pause at intervals in such movements, and means for controlling the duration of such pause intervals.

5. The combination with a hydraulic stoker mechanism including a motor, a pump for supplying fluid to the motor, and a reservoir to receive fluid from the motor, of a regulating valve having a rotating member operative to periodically by-pass the fluid from pump to reservoir and thereby cause controllable dwell intervals in the operation of the motor, means separate from said motor for rotating said member, and means for varying the duration and frequency of said by-pass periods.

6. The combination with a hydraulic stoker mechanism including a motor having a reciprocating piston, a pump for supplying fluid to the motor, and a reservoir to receive fluid from the motor, of a regulating valve having separate inlet and outlet means connected to said pump and reservoir, a continuously rotating member operative to connect said inlet and outlet means during a part of each complete revolution of the member and thereby by-pass the fluid from pump to reservoir and cause the motor piston to dwell at intervals in its reciprocating motion, and means for adjusting the duration of such by-pass intervals.

7. The combination with a hydraulic stoker mechanism including a motor having a reciprocating piston, a pump for supplying fluid to the motor, and a reservoir to receive fluid from the motor, of a regulating valve having a rotor member and means for connecting the fluid supply

from the pump thereto, said valve having also an outlet means connected to the reservoir and said outlet means being elongated in the direction of movement of the rotor member, said rotor member having an opening adapted to be exposed to said outlet means to by-pass fluid from pump to reservoir during a part of each revolution of the member, and adjustable means for varying the effective length of said outlet means to thereby adjust the duration of the exposure of said opening thereto during each revolution of the rotor member.

8. The combination with a hydraulic stoker mechanism including a motor having a reciprocating piston, a pump for supplying fluid to the motor, and a reservoir to receive fluid from the motor, of a regulating valve having a rotor member and means for connecting the fluid supply from the pump thereto, said valve having also an outlet connected to the reservoir and said outlet being elongated in the direction of movement of the rotor member, said rotor member having an opening adapted to be exposed to said outlet to by-pass fluid from pump to reservoir during a part of each revolution of the member, and adjustable means for varying the effective length of said outlet to thereby adjust the duration of the exposure of said opening thereto during each revolution of the rotor member, said adjustable means being also adjustable to entirely close said outlet and prevent by-passing of the fluid during any part of the revolution of the rotor member.

9. The combination with a hydraulically operated stoker motor having a piston, a pump for supplying fluid under pressure to said motor to reciprocate the piston, and a reservoir for the fluid, of a regulating valve having a body and a rotor member and means for rotating the member in the body, said rotor member being arranged to receive fluid from the pump and having an opening to pass said fluid, said valve body having an outlet opening connected to the reservoir and adapted to communicate with the opening in the rotor member during a part of each revolution of the said member to thereby by-pass the fluid from the pump to the reservoir, a timing device movably mounted adjacent the rotor member and having an opening, and said timing device being adjustable to move its opening with respect to said outlet opening and thereby vary the effective area of the outlet opening exposed to the opening in the rotor member.

10. The combination with a hydraulically operated stoker motor having a piston, a pump for supplying fluid under pressure to said motor to reciprocate the piston, and a reservoir for the fluid, of a regulating valve having a body and a rotor member rotatable therein, said rotor member being arranged to receive fluid from the pump and having an opening to pass said fluid, said valve body having an outlet channel connected to the reservoir and adapted to periodically receive fluid from said opening during rotation of the rotor member and by-pass such fluid to the reservoir, a timing device adjustably mounted in the valve body and movable to vary the effective area of the outlet channel exposed to said opening in the rotor member, and both the rotor member and timing device having annular portions telescopically arranged for independent rotating and adjusting movements.

11. In a stoker motor control means for a hydraulic reciprocating motor mechanism including a pump and a reservoir for supplying fluid to and receiving fluid from the motor, a regulating valve having a ported rotor member and an outlet means communicating with the pump and the reservoir and adapted to by-pass fluid therebetween at periodic intervals as said member rotates, a timing device adjustable in the valve to vary the effective size of, or entirely close, said outlet means with respect to the rotor member to control the duration of said by-pass intervals, and a control member arranged exteriorly of the valve for adjusting said timing device.

12. In a stoker motor control means for a hydraulic reciprocating motor mechanism including a pump and a reservoir for supplying fluid to and receiving fluid from the motor, a regulating valve having a ported rotor member and an outlet means communicating with the pump and the reservoir and adapted to by-pass fluid therebetween at periodic intervals as said member rotates, a timing device adjustable in the valve to vary the area of said outlet means exposed to the rotor member and thereby to control the duration of said by-pass intervals, a control member arranged exteriorly of the valve and connected to said timing device for adjusting the same, and means connected to said control member for adjusting the timing device from a remote point.

13. In a stoker motor control mechanism for a hydraulic motor having a reciprocating piston, a pump for supplying fluid to the motor, and a reservoir; a valve adapted to periodically by-pass fluid from pump to reservoir to dwell the piston at intervals, means for varying the duration and frequency of such dwell intervals, and said valve also having means for varying the speed of the reciprocating movements of the piston in accordance with variations in the frequency of such movements.

14. In a stoker motor control mechanism for a hydraulic motor having a reciprocating piston, a pump for supplying fluid to the piston, and a reservoir; a regulating valve for regulating the effective admission of fluid to the motor and operative to render said motor piston inactive at dwell intervals of variable duration and to thereby control the frequency of the piston movements, and said valve being also operative to increase and decrease the rapidity of the piston movements in proportion to the corresponding variations in the frequency of such movements.

15. The combination with a hydraulic stoker motor, a pump for supplying operating fluid to the motor, and a fluid reservoir, of a regulating valve connected between the pump and reservoir and having means for periodically by-passing the fluid providing for direct flow from pump to reservoir and rendering the motor inoperative, timing means for varying the duration of said by-pass intervals, and said valve also having means for leaking a variable, comparatively small quantity of fluid from pump to reservoir when the motor is operating to thereby control the speed of movement of the piston.

16. The combination with a hydraulic stoker motor, a pump for supplying operating fluid to the motor, and a fluid reservoir, of a regulating valve including a rotor member having an opening connected to the pump, said valve having an outlet connected to the reservoir and adapted to receive fluid from said opening during a part of each rotation thereof to thereby by-pass such fluid for direct flow from pump to reservoir and dwell the motor piston for corresponding intervals, an adjustable timing device having means for varying the area of said outlet exposed to

said opening to thereby vary the duration of such dwell intervals, and said timing device also having relatively smaller openings adapted to leak off a portion of the fluid from pump to reservoir between such dwell intervals, said smaller openings being arranged to be progressively closed as the timing device is adjusted to decrease the duration of said dwell intervals.

17. In a hydraulic stoker motor operating mechanism, a pump for supplying operating fluid to the motor, an electric motor for operating the pump, a fluid reservoir, a regulating valve connected between pump and reservoir and adapted to by-pass fluid for direct flow therebetween at adjustable intervals to thereby halt the operation of the motor at corresponding intervals, an overload protection device arranged on the regulating valve and including a cylinder, a pressure responsive valve for admitting fluid to said cylinder from the pump, a plunger in the cylinder adapted to be actuated by fluid entering the same, and an electric switch unit controlling the operation of the pump motor and adapted to be opened when the fluid enters said cylinder.

18. A regulating valve for a stoker motor mechanism including a pump for supplying fluid to the motor and means to receive fluid from the motor, comprising a valve body having an outlet connected to the receiving means and a valve rotor mounted for rotation in the body and connected to receive fluid from the pump, the said rotor having an opening adapted to register with said outlet to pass fluid directly from the pump to the receiving means, the said outlet extending substantially half way around the rotor and thereby adapted to register with the opening in the rotor during approximately one-half of each revolution thereof, and a timing device surrounding the rotor and having a slot adapted to connect the opening in the rotor with the outlet to control the fluid flow therebetween, the said timing device being rotatable about the rotor and the said slot being of substantially the same length as the outlet.

19. A valve for a stoker motor mechanism including a pump for supplying fluid to the motor and means for receiving fluid from the motor, comprising a valve body having a recess, a hollow valve rotor mounted for rotation in the recess and having an inlet connected to receive fluid from the pump, the said body having an outlet in the wall of the recess communicating with the rotor and connected to the fluid receiving means, the said rotor having a discharge opening adapted to register with the outlet during a part of each revolution of the rotor, and a timing sleeve rotatably surrounding the rotor within the recess and having an opening adapted to be moved with respect to said outlet to thereby vary the flow from the discharge opening and through the outlet while the latter is exposed to the opening in the rotor during each revolution thereof.

20. A valve for a fluid actuated stoker motor for periodically by-passing the fluid and causing the motor to dwell, comprising a body having fluid inlet and outlet means, a valve rotor mounted for rotation in the body and having a port adapted to connect the inlet and outlet means during a part of each revolution of the rotor, and a timing device operatively arranged adjacent the rotor for varying the angular part of each complete revolution during which the rotor port is effective to by-pass the fluid between the said inlet and outlet means.

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