June 30, 1925. 1,543,841

H. J. GRIGOLEIT

PRESSURE CONTROL SYSTEM

Filed July 2, 1923 2 Sheets-Sheet 1

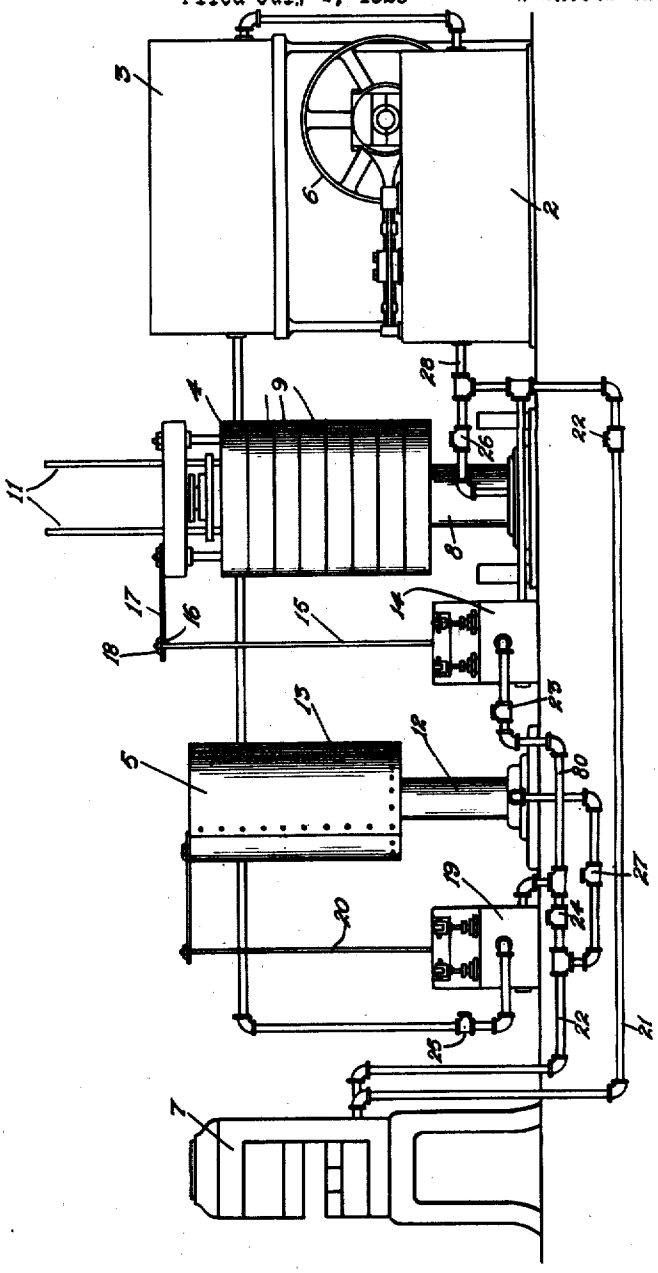


Fig. 1.

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Fig. 2.

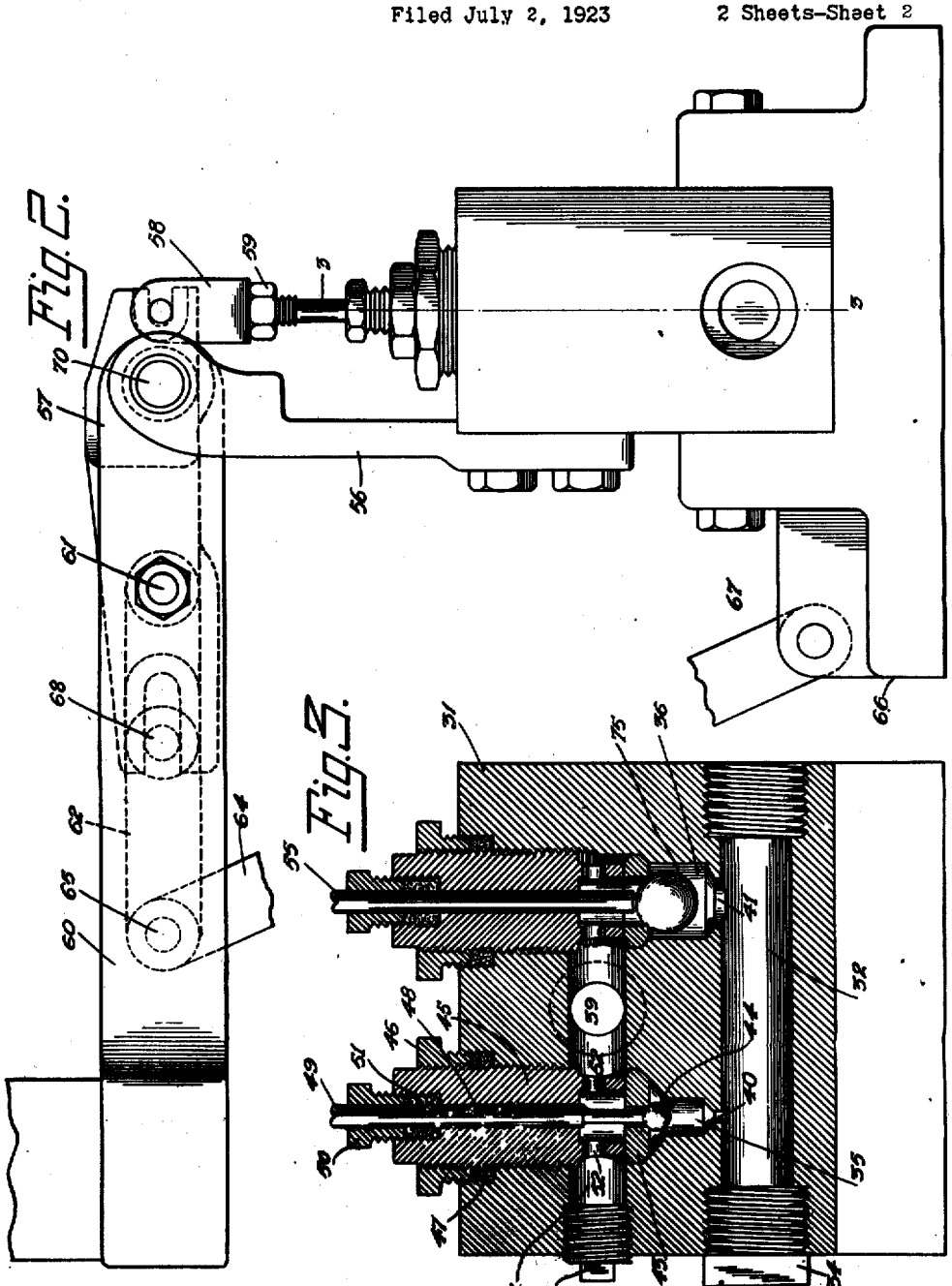


Fig. 3.

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By Curtis P. Lamb.
Attorney

Patented June 30, 1925. 1,543,841

UNITED STATES PATENT OFFICE.

HENRY J. GRIGOLEIT, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

PRESSURE-CONTROL SYSTEM.

Application filed July 2, 1923. Serial No. 649,185.

To all whom it may concern:

Be it known that I, HENRY J. GRIGOLEIT, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pressure-Control Systems, of which the following is a specification.

My invention relates to pressure feed systems and has more particularly to do with systems in which fluid under a plurality of different pressures is fed to one or more presses or hydraulic devices for forming moulded objects.

In moulding systems, a moulding compound is placed in moulds or dies which are placed in presses and then subjected to hydraulic pressure of different values to form the moulding compound into the desired shapes and objects. In hot moulding, it is customary to apply a relatively low pressure to close the halves of the mould and then, at a pre-determined time, a higher pressure is applied to further press or form the compound into the desired shape. At the desired time steam is applied to the mould to heat the compound, then subsequently the steam is disconnected from the mould, and in some instances, a cooling fluid, such as water, is applied to the mould to cool the moulded compound. In cold moulding, the mould is not heated by steam.

In the prior art system, it was customary to provide one pump to force the fluid into a high pressure accumulator, and a second pump to force the fluid into the low pressure accumulator or tank. The pumps were of the necessary capacity to maintain the accumulators substantially filled when all of the presses in the system were in use. It is at once apparent that with such systems it was necessary to automatically connect the pumps to the accumulators when the pressure in the accumulators dropped and to automatically disconnect the pumps from the accumulators when the pressure in the same raised to the desired valves. Disconnecting the high pressure pump from the high pressure accumulator and reconnecting the pump to the accumulator caused great strains to be thrown upon the high pressure pump which necessitated the continuous replacing and repairing of parts of the high pressure pump due to these sudden strains that were placed upon the same by the automatic mechanism which connected and disconnected the pump from the accumulator.

One object of my invention is to arrange mechanism so that one pump will not only supply the fluid to the high pressure accumulator, but also to the low pressure accumulator. With this arrangement, I maintain a constant pressure in the high pressure accumulator and then instead of disconnecting the pump from the high pressure accumulator, it is automatically connected to the low pressure accumulator. The back pressure on the pump, is maintained at substantially a constant pressure so that the pump at all times is operating against substantially a constant pressure, thus obviating the sudden strains thrown upon the pump in the prior systems.

A further feature of my invention is the means by which the pumping pressure applied to both, the high pressure and the low pressure accumulators is maintained substantially constant whether these accumulators are completely filled, in which event the fluid is by-passed to a supply or surge tank or whether the accumulators are receiving a supply from the pump. By the use of only one pump, it is readily apparent that I greatly reduce the horsepower required to maintain the fluid in the accumulators up to the desired pre-determined pressures.

A further feature resides in the novel valve construction which I employed to maintain the accumulators at the desired pressures while by-passing the fluid from one accumulator to the other and from the other accumulator to the reservoir tank, when the accumulators are filled. Now with pressures that run up to three or four thousand pounds per square inch, the force of the fluid very quickly cuts into the valve and valve seats of the prior valves so that the valves become leaky. I have devised a valve which has substantially an infinite number of valve seats so that the extremely high pressures do not cut into my valve mechanism as was the case with the prior art valves.

A further feature of my invention resides in the provision of a double valve having different sized valve seats. I adjust my double valve mechanism so that the smaller valve opens first and then the larger valve, and in the case of the valve controlled by the

high pressure accumulator, I adjust the smaller valve so that it is partly open at all times, by-passing part of the fluid to the low pressure tank. Even with this valve partly open and the fluid continuously surging through this opening, I am unable to find any noticeable wear or cutting on this valve after long usage. This may be due to the fact that the valve wall is kept continuously rotating as the fluid passes through.

A further feature of my invention is the provision of a plurality of cooperating control arms for my valve mechanism which permits a minute movement of the valve controlling plungers for large movements of the valve controlling rods, which rods are connected to the accumulator tanks.

The above features of my invention as well as others will be more fully pointed out and described in the ensuing specification and in the appended claims.

For a more complete understanding of my invention, reference may be had to the accompanying drawings in which like reference characters in the different views denote like parts and in which:

Figure 1, diagrammatically represents my pressure feed system,

Figure 2, is a side elevation showing one of my valves and its control parts and,

Figure 3, is a sectional view along line 3—3 of Figure 2.

Referring first to Figure 1 which diagrammatically represents my pressure feed system, 2, represents the pressure pump which pumps the pressure from the supply tank 3 to the high pressure accumulator 4 and to the low pressure accumulator 5. The pulley wheel 6 of the pump 2 is driven by a motor not shown.

At 7, I diagrammatically represent one of the moulding presses. While I have only shown the high and low pressure supply pipes connected to this press, it is to be understood that the necessary steam, air and other connections are connected to the devices, so that they may perform their proper functions

Referring to the accumulator 4, this comprises a pipe or reservoir 8 into which the fluid is pumped against the weights 9 which rise as the amount of fluid in the pipe 8 is increased. Guide rods 11 are provided for the accumulator 4 to direct its upward and downward movement. The accumulator 5 is substantially the same as the accumulator 4 and has a pipe tank 12, which after it is filled causes the weighted body portion 13 to rise.

At 14, I represent one of my double valve mechanisms which is more fully illustrated in Figures 2 and 3. The valve mechanism is controlled by a rod 15 which loosely fits through an orifice 16 in a plate 17 attached to the top of the accumulator 4.

A nut or blocking device 18 is attached to the rod 15 so that when the accumulator reaches a pre-determined height, the valve rod 15 is operated to operate the mechanism of the valve 14. The valve 19 and its control rod 20 is substantially the same as valve 14 and its control rod.

Pipe 21 is the high pressure supply lead to different presses, only one of which is shown.

The pipe 22 is the low pressure supply line to the different presses.

22′, 23, 24 and 25 represent ordinary check valves which permit the flow of fluid in one direction only.

26 and 27 represent leaky check valves which permit a free flow of fluid in one direction and a slow flow of fluid in the opposite direction. These check valves may be the regular check valves with a small hole drilled through the ball check.

The outlet pipe 28 from the pump 2 is connected through the leaky check valve 26 to the accumulator 4, to the valve 14, and through the check valve 22′ to the supply line 21. The by-pass outlet of the valve 14 is connected through check valve 23 to the valve 19, also through a check valve 24 to the supply line 22, and also through the leaky check valve 27 to the accumulator 5. The by-pass outlet of the valve 19 is connected back through a check valve 25 to the surge tank 3. Surge tank 3 is connected through pipe 30 to the pump 2.

Referring now more particularly to the valve mechanism as shown in Figs. 2 and 3, it comprises a block 31 through which extends laterally an orifice 32. In one end of the orifice is a plug 34, while the other end of the orifice is threaded to receive a pipe connection. Extending vertically into the block are the orifices 35 and 36. A second longitudinal orifice 37 is provided which intersects orifices 35 and 36. A plug 38 fits into one end of orifice 37. At right angles to orifice 37 is an orifice 39 which intersects orifice 37 and forms a by-pass for the fluid when the valves are open. It will be noted that the opening 40 extending from the orifice 35 into orifice 32 is smaller than the opening 41 which connects orifice 36 with orifice 32. Fitting into orifice 35 is a valve seat member 43 which is provided with an orifice that has a slightly chamfered opening for the valve ball 44. To hold the valve seat 43 in position a plug 45 is provided which has screw-threaded engagement with threads in the orifice 35. A packing ring 46 is provided which holds the packing 47 in position to prevent leakage between the plug 45 and the block 31. Extending vertically in the plug 45 is an orifice 48 through which extends the valve control rod 49. A packing ring 50 is provided to hold the packing 51 in place to prevent leakage between the

rod 49 and the plug 45. The rod 49 contacts against the valve ball 44 and depresses the same when the valve is to be opened to permit a flow from orifice 32 through orifice 40 into by-pass opening 39. The plug 45 is provided with several radially extending orifices 52 that open into the orifice 37.

The construction of the larger valve mechanism at the right of Fig. 3 is substantially the same as the construction of the smaller valve mechanism at the left of Fig. 3.

Attached to the side of the block 31 is an arm 56. Pivotally secured to the arm 56 is a valve controlling yoke 57 and pivotally secured to the valve controlling yoke 57 is a pair of U-shaped dependent members 58, the one member connecting to valve rod 49, and the other member to valve rod 55. Valve rods 49 and 55 are threaded and have screw threaded engagement with U-shaped members 58. Lock nuts 59 are provided for maintaining the valve rods 49 and 55 in their adjusted positions.

From the drawings it will be noted that the smaller valve at the left of Fig. 3 is adjusted to be opened before the larger valve is opened at the right of Figure 3. The smaller valve of valve 14 is adjusted so that it is always partially opened to permit a flow from the pump 2 to the accumulator 5, even though the main flow is into the accumulator 4. Pivotally secured to the arm 56 is a pair of rearwardly extending arms 60. Pivotally secured to the arms 60 at 61 is a rearwardly extending yoke 62. An arm 64 is provided that is pivotally secured to arm 62 at 65, and to the base 66 at 67. Extending cross-wise of 62 is a pin 68 which is adapted to receive the forked end of the yoke 57. When the left end of the arms 60 (which are connected together at this point) are raised they turn about their pivot pin 70 and raise the right end of yoke 62 which is pivoted at 61 to the lever 60 and at 65 to the lever 64. The raising of the right end of the lever 62 naturally raises its pivot pin 68 which causes the free end of the yoke 57, to be raised, thereby causing it to be turned about its pivot point 70, causing the right end of the yoke 57 to be lowered, thus forcing the U-shaped members 58 downwardly, to which are attached the valve rods 49 and 55. The lowering of the valve rods 49 and 55 depresses the valve balls 44 and 75, the valve ball 44 first, to open the passageway from orifice 32 through to by-pass opening 39. When the right hand end lever 60 is lowered, it causes the yoke 62 to be lowered which lowers the right end of yoke 57, causing the raising of U-shaped pieces 58, thereby permitting the valve balls 44 and 75 to seat in their valve seats, cutting off the flow of liquid to the by-pass 39.

From the foregoing it is apparent that the valve balls 44 and 75 may be adjusted to operate in any desired sequence, and they may be made to open at any desired position of the lever arms 60, or they may be adjusted to remain partly open when the lever 60 is in its upper-most position.

Returning now to Figure 1 of the drawings, when the pump 2 is started in operation, it pumps fluid through the pipe 28 and the leaky check valve 26 into the water column 8 which causes the accumulator to be raised until the valve control rod 15, which is attached to the lever 60, is raised a sufficient amount to open the ball valves of valve 14. As above mentioned, the high pressure feed line extends directly from the pipe 28, which is connected to the pump, through the check valve 22′ to the presses. The left hand ball valve of valve 14 being partially opened, even though the accumulator 4 is not in its upper position, part of the fluid pumped by pump 2 extends through check valves 23 and 24 to the low pressure line 22, and through the leaky check valve 27 to the accumulator 5 to supply liquid to the accumulator 5. Although this valve is slightly opened, the back pressure in the high pressure feed line and into the accumulator 4 is maintained at the desired amount. When the accumulator 4 has been raised to a certain position, the valve balls are opened an amount sufficient to permit a flow of the liquid through check valve 23 to the low pressure feed line 22 and to the accumulator 5, but these openings are such as to maintain a back pressure of the desired amount in the accumulator 4. As liquid is used from accumulator 4, it is lowered and valve 14 is caused to again force the liquid into accumulator 4. Assuming that liquid is not being taken from accumulator 4, and the liquid is being by-passed through valve 14 into accumulator 5, this accumulator is raised to a position where it opens its valve 19 to permit the by-passing of the liquid through check valve 25 to the surge tank, but valve 19 is not opened a sufficient amount to permit the lowering of the pressure between the valve 19 and 14 below the predetermined desired pressure.

From the above it is obvious that the pressure between the pump 2 and valve 14 is maintained at the predetermined high pressure point, and the pressure between valves 14 and 19 is maintained at the desired low pressure. The check valve 22′ prevents a surge back from the pipe line 21 into the pipe line 28, and the check valve 24 prevents a surge back from pipe line 22 into the pipe 80. The leaky check valve 26 prevents the sudden dropping of accumulator 4 if a great number of presses are operatively connected to the pipe line 21 at the same time, while the leaky check valve 27 prevents the sudden dropping of accumulator 5 if a great number of presses are simultaneously operatively connected to pipe line 22.

From the foregoing it is thus obvious that as liquid is taken from pipe line 21, the pump and valve 14 will maintain the pressure in the pipe line 21 at substantially the predetermined value. The pump will also, in conjunction with the accumulator 5 and valve 19, maintain the pressure in pipe 22 at substantially the predetermined value. These valves will operate to automatically prevent the accumulators from dropping to their lowermost positions, when the presses are in use, and will by-pass the liquid from the pump 2 to the surge tank 3 if the normal use of the liquid through pipes 21 and 22 falls below the output of the pump 2.

While I have only shown the accumulators 4 and 5, press 7, and pump 2 in diagrammatic form, these pieces of apparatus are well known in the art and their functions are well understood. The pressures maintained by accumulators 4 and 5 may be set at any desired points by the weights attached to these accumulators. By adjusting the length of the rods 15 and 20, the positions at which these rods will operate valves 14 and 19, may be controlled.

My system is entirely automatic and no matter how many presses may be suddenly turned on or off, the valves will cause the accumulators to substantially maintain the pressures at the desired values. A sudden usage of a number of presses will cause the accumulators to drop a slight amount, still the pressures will be maintained at the desired values, and the pump will again restore the accumulators to their upper positions before the pressures drop below the desired predetermined amounts in the pipes 21 and 22.

While I have illustrated only one form of my invention, I do not wish to be limited to the exact arrangement as shown, as various other arrangements may readily suggest themselves to those skilled in the art, and I, therefore, aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patents is:—

1. A fluid supply system of the character described including a pair of accumulators, a pump for supplying liquid to said accumulators, and automatic means for connecting said pump to said accumulators to maintain the desired predetermined pressures in each of said accumulators.

2. A system of the character described including a pair of accumulators adapted to supply fluid at predetermined pressures, a pump for supplying a fluid to said accumulators, and automatic means controlling the connection of said pump to said accumulators to maintain the predetermined pressures in each of said accumulators.

3. A fluid feed system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, automatic means for controlling the supply of fluid from said pump to one of said accumulators to maintain the desired predetermined pressure in said accumulator, and a second automatic device for controlling the supply of fluid from said pump to the other of said accumulators to maintain the predetermined desired pressure in said second accumulator.

4. A fluid feed system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, automatic means for controlling the supply of fluid from said pump to one of said accumulators to maintain the desired predetermined pressure in said accumulator, a second automatic device for controlling the supply of fluid from said pump to the other of said accumulators to maintain the predetermined desired pressure in said second accumulator, and a storage tank adapted to receive the excess fluid from said pump, said second automatic device controlling the supply of the excess fluid to said storage tank.

5. A fluid control system of the character described including a relatively high pressure accumulator, a relatively low pressure accumulator, a single pump for supplying fluid to these accumulators, and an automatic valve for said first accumulator for regulating the flow of fluid from said pump to said accumulator to maintain a relatively constant pressure in said first accumulator and for supplying the excess fluid from said pump to said second accumulator.

6. A fluid control system of the character described including a relatively high pressure accumulator, a relatively low pressure accumulator, a single pump for supplying fluid to these accumulators, and an automatic valve for said first accumulator for regulating the flow of fluid from said pump to said accumulator to maintain a relatively constant pressure in said first accumulator and for supplying the excess fluid from said pump to said second accumulator, a storage tank, and a second valve for controlling the supply of fluid from said first valve to said second accumulator to substantially maintain a predetermined pressure in said second accumulator.

7. A fluid control system of the character described including a relatively high pressure accumulator, a relatively low pressure accumulator, a single pump for supplying fluid to these accumulators, and an automatic valve for said first accumulator for regulating the flow of fluid from said pump to said accumulator to maintain a relatively constant pressure in said first accumulator and for supplying the excess fluid from said

pump to said second accumulator, a storage tank, and a second valve for controlling the supply of fluid from said first valve to said second accumulator to substantially maintain the predetermined pressure in said second accumulator, said second valve controlling the excess flow of fluid from said pump to said storage tank.

8. A system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluid to said accumulator, an automatic valve for controlling the flow of fluid from said pump to said first accumulator maintaining the pressure in the first accumulator at the predetermined desired point, and a second valve controlling the flow of fluid into said second accumulator thereby maintaining the pressure in the second accumulator at the predetermined desired point.

9. A system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluids to said accumulator, an automatic valve for controlling the flow of fluid from said pump to said first accumulator maintaining the pressure in the first accumulator at the predetermined desired point, a second valve controlling the flow of fluid into said second accumulator thereby maintaining the pressure in the second accumulator at the predetermined desired point, and a storage tank, said second valve directing the excess flow of fluid from said pump to said storage tank.

10. A system of the character described including an accumulator, a surge tank, a pump for supplying fluid to said accumulator, an automatic valve for controlling the supply of fluid from said pump to said accumulator substantially maintaining a predetermined pressure in said accumulator and maintaining substantially the same back pressure upon said pump even though the fluid is being by-passed through said valve to said surge tank.

11. A fluid control system of the character described including an accumulator, a surge tank, a pump for supplying fluid to said accumulator, an automatic device controlled by said accumulator for directing the supply of fluid from said pump thereby maintaining a substantially predetermined pressure in said accumulator and by-passing the excess flow that is not used by said accumulator to said surge tank but maintaining the back pressure upon said pump substantially equal to the pressure maintained in said accumulator.

12. A pressure control system of the character described including an accumulator, a pump for supplying fluid to said accumulator, a supply line leading from said accumulator, and an automatic device including a pair of operatively associated automatic valves for maintaining the pressure in said accumulator and supply pipe and the back pressure on said pump substantially at the predetermined desired point.

13. A pressure control system of the character described including an accumulator, a pump for supplying fluid to said accumulator, a supply line leading from said accumulator, an automatic device for maintaining the pressure in said accumulator and supply pipe and the back pressure on said pump substantially at the predetermined desired point, a second accumulator, a second supply line, and a second automatic device for maintaining the pressure in said second accumulator and supply line and the back pressure between said first valve and second valve substantially at a predetermined desired point.

14. A pressure control system of the character described including an accumulator, a pump for supplying fluid to said accumulator, a supply line leading from said accumulator, an automatic device for maintaining the pressure in said accumulator and supply pipe and the back pressure on said pump substantially at the predetermined desired point, a second accumulator, a second supply line, and a second automatic device for maintaining the pressure in said second accumulator and supply line and the back pressure between said first valve and second valve substantially at a predetermined desired point, and a reservoir adapted to receive the excess fluid from said pump.

15. A pressure supply system of the character described including a plurality of accumulators, a pump for supplying said accumulators with fluid, an automatic valve having a normal opening permitting a portion of the fluid being pumped to by-pass around one of said accumulators to another of said accumulators, said valve maintaining the pressure in said first accumulator at the predetermined desired pressure and subsequently operating to increase the flow of fluid to said second accumulator.

16. A pressure feed system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, an automatic valve normally permitting a small flow of fluid from said pump to said second accumulator while maintaining the pressure in said first accumulator at the predetermined desired point.

17. A pressure feed system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, an automatic valve normally permitting a small flow of fluid from said pump to said second accumulator while maintaining the pressure in said first accumulator at the predetermined desired

point, said valve adapted to permit a larger flow of fluid from said pump to said second accumulator by an action controlled by the first accumulator.

18. A pressure feed system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, an automatic valve normally permitting a small flow of fluid from said pump to said second accumulator while maintaining the pressure in said first accumulator at the predetermined desired point, said valve adapted to permit a larger flow of fluid from said pump to said second accumulator by an action controlled by the first accumulator, a return tank, and a second automatic device for directing any excess flow of fluid to the said return tank.

19. A pressure feed system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, an automatic valve normally permitting a small flow of fluid from said pump to said second accumulator while maintaining the pressure in said first accumulator at the predetermined desired point, said valve adapted to permit a larger flow of fluid from said pump to said second accumulator by an action controlled by the first accumulator, a return tank, and a second automatic device for directing any excess flow of fluid to the said return tank, said first valve maintaining the back pressure upon the pump at substantially the pressure maintained in said first accumulator and said second valve substantially maintaining the pressure between the said first valve and said second valve at the pressure maintained in said second accumulator.

20. A pressure feed system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluids to said accumulators, and automatic means for maintaining the pressures in said accumulators at the desired predetermined point.

21. A pressure feed system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluid to said accumulators, and automatic means for substantially maintaining the pressure in said accumulators at the desired predetermined points, supply lines leading from said accumulators, and means for preventing a sudden drop in the pressures maintained in said accumulators.

22. A pressure feed system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluid to said accumulators, automatic means for substantially maintaining the pressures in said accumulators at the desired predetermined point, supply lines, and means for preventing a back flow from said supply lines to said accumulators.

23. A pressure feed system of the character described including a pair of accumulators, fluid in said accumulators adapted to be maintained at different predetermined pressures, a pump for supplying fluid to said accumulators, and automatic means for preventing a back flow of fluid from said accumulators to said pump.

24. A pressure feed system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluid to said accumulators, and automatic means for substantially maintaining the pressures in said accumulators at the desired predetermined point, and means for preventing a sudden change in the pressures maintained in said accumulators.

25. A pressure feed system of the character described including a pair of accumulators adapted to be maintained at different predetermined pressures, a pump for supplying fluid to said accumulators, supply lines, and automatic means for preventing a back flow from said supply lines to said accumulators.

26. A pressure feed system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluid to said accumulators, automatic means for substantially maintaining the pressures in said accumulators at the desired predetermined point, and means for preventing a sudden change in the pressures maintained in said accumulators, means for preventing a back flow from said accumulators to said pump, supply lines, and means for preventing a back flow from said supply lines to said accumulators.

27. A pressure feed system of the character described including a relatively high pressure accumulator and a relatively low pressure accumulator, a pump for supplying fluid to said accumulators, automatic means for substantially maintaining the pressure in said accumulators at the desired predetermined point, means for preventing a sudden change in the pressures maintained in said accumulators, means for preventing a back flow from said accumulators to said pump, supply lines, means for preventing a back flow from said supply lines to said accumulators, a tank for receiving the excess flow of fluid from said pump, and means for preventing a back flow of fluid from said tank to said accumulators.

28. A fluid supply system of the character described including an accumulator, a pump for supplying liquid to said accumulator, a connection extending from said pump to said accumulator, a supply connec-

tion extending from said first connection, and a device for permitting a ready flow of fluid from said pump to said accumulator but permitting a less ready flow of fluid from said accumulator to said supply connection.

29. A supply system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, connections from said pump to said accumulators, a supply connection extending from each of said accumulators, and devices permitting a ready flow of fluid from said pump to said accumulators but permitting a less ready flow of fluid from said accumulators to said supply connections.

Signed by me at Chicago in the county of Cook and State of Illinois, this 29th day of June, 1923.

HENRY J. GRIGOLEIT.

tion extending from said first connection, and a device for permitting a ready flow of fluid from said pump to said accumulator but permitting a less ready flow of fluid from said accumulator to said supply connection.

29. A supply system of the character described including a pair of accumulators, a pump for supplying fluid to said accumulators, connections from said pump to said accumulators, a supply connection extending from each of said accumulators, and devices permitting a ready flow of fluid from said pump to said accumulators but permitting a less ready flow of fluid from said accumulators to said supply connections.

Signed by me at Chicago in the county of Cook and State of Illinois, this 29th day of June, 1923.

HENRY J. GRIGOLEIT.

Certificate of Correction.

It is hereby certified that Letters Patent No. 1,543,841, granted June 30, 1925, upon the application of Henry J. Grigoleit, of Chicago, Illinois, for an improvement in "Pressure-Control Systems," were erroneously issued to "Kellogg Switchboard and Supply Company, of Chicago, Illinois, a Corporation of Illinois," as assignees of the entire interest in said invention, whereas said Letters Patent should have been issued to the inventor, said *Grigoleit*, as sole owner of said invention; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of August, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.

Certificate of Correction.

It is hereby certified that Letters Patent No. 1,543,841, granted June 30, 1925, upon the application of Henry J. Grigoleit, of Chicago, Illinois, for an improvement in "Pressure-Control Systems," were erroneously issued to "Kellogg Switchboard and Supply Company, of Chicago, Illinois, a Corporation of Illinois," as assignees of the entire interest in said invention, whereas said Letters Patent should have been issued to the inventor, said *Grigoleit*, as sole owner of said invention; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of August, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.