

Jan. 3, 1956

B. E. PREVOST
MULTIPLE SYNCHRONIZED PNEUMATIC
PAPER STOCK CONTROL DEVICE

2,729,147

Filed Jan. 26, 1953

4 Sheets-Sheet 1

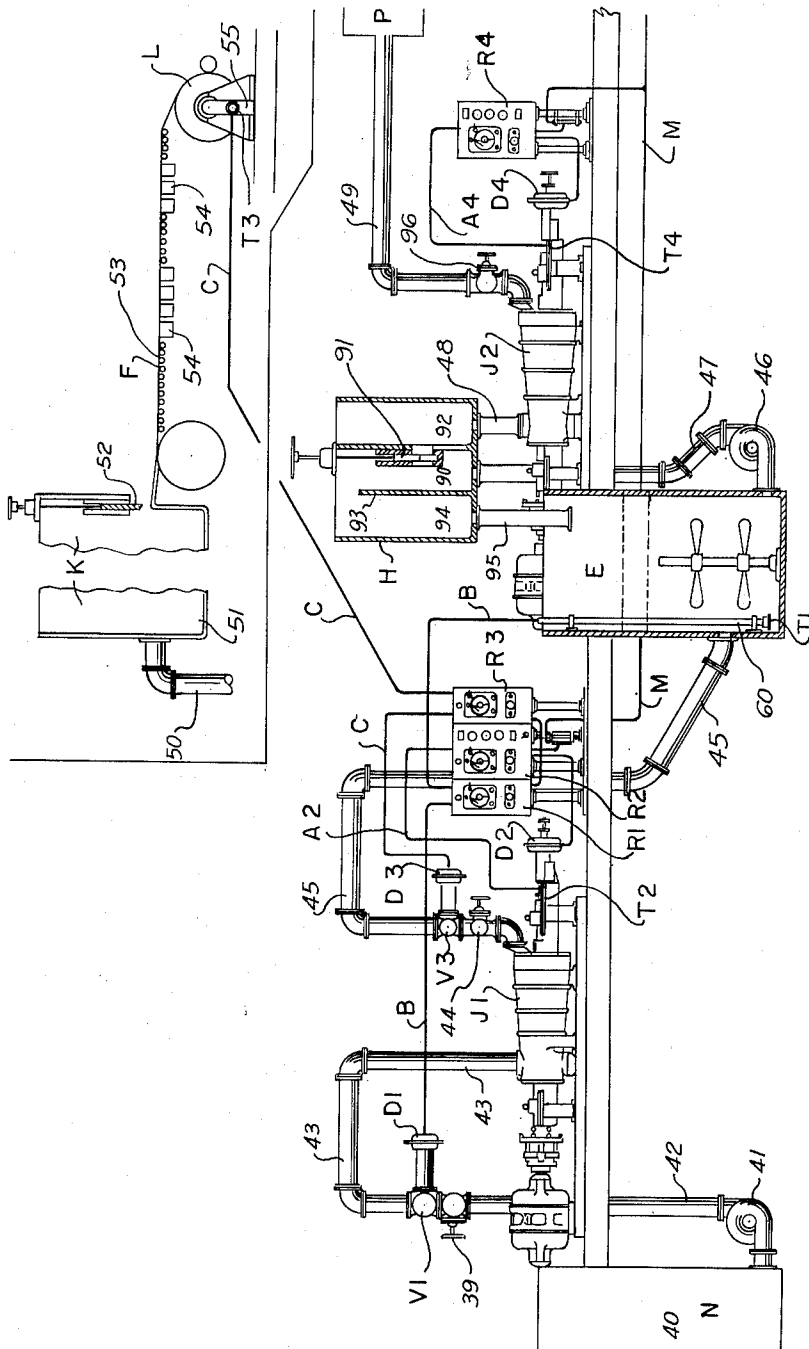


Fig. 1

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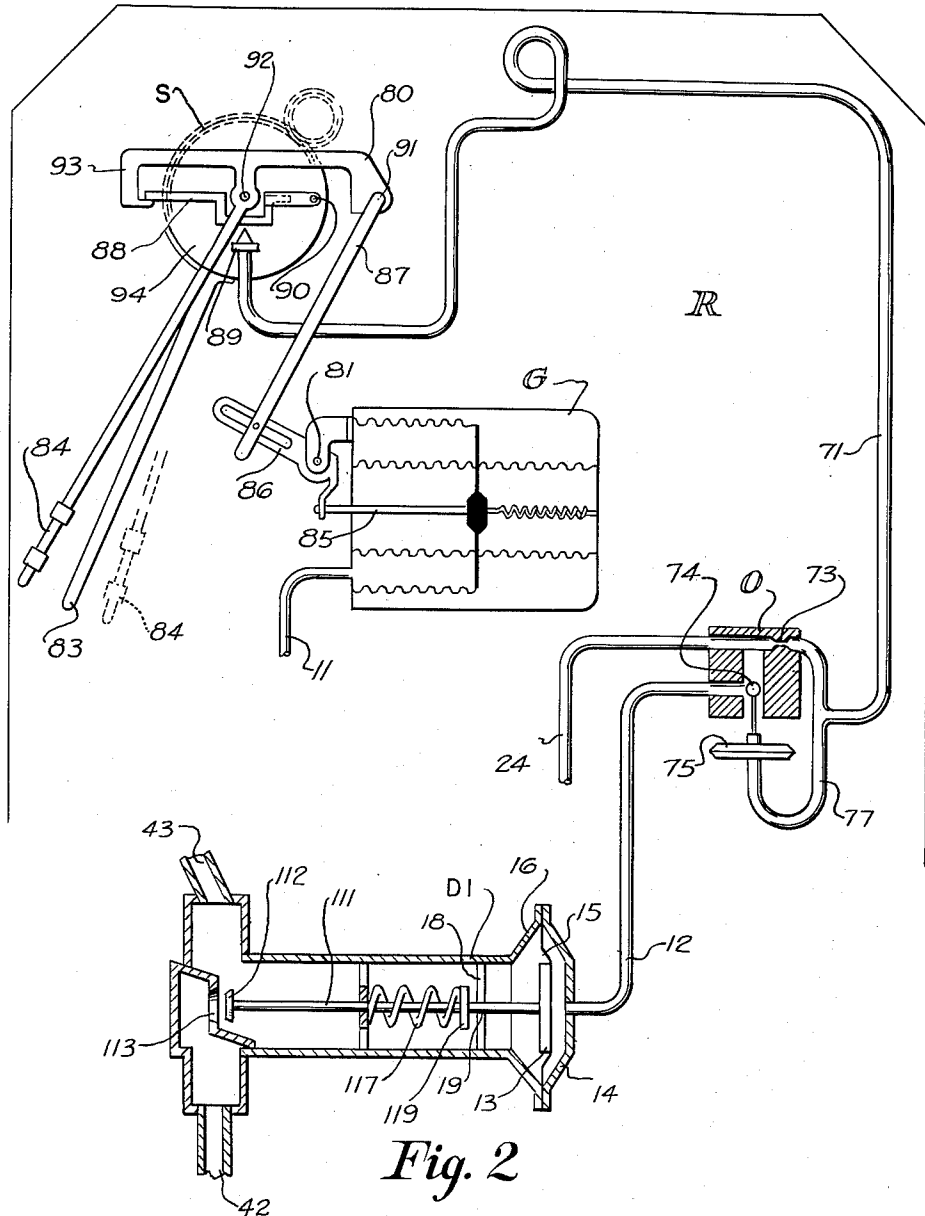
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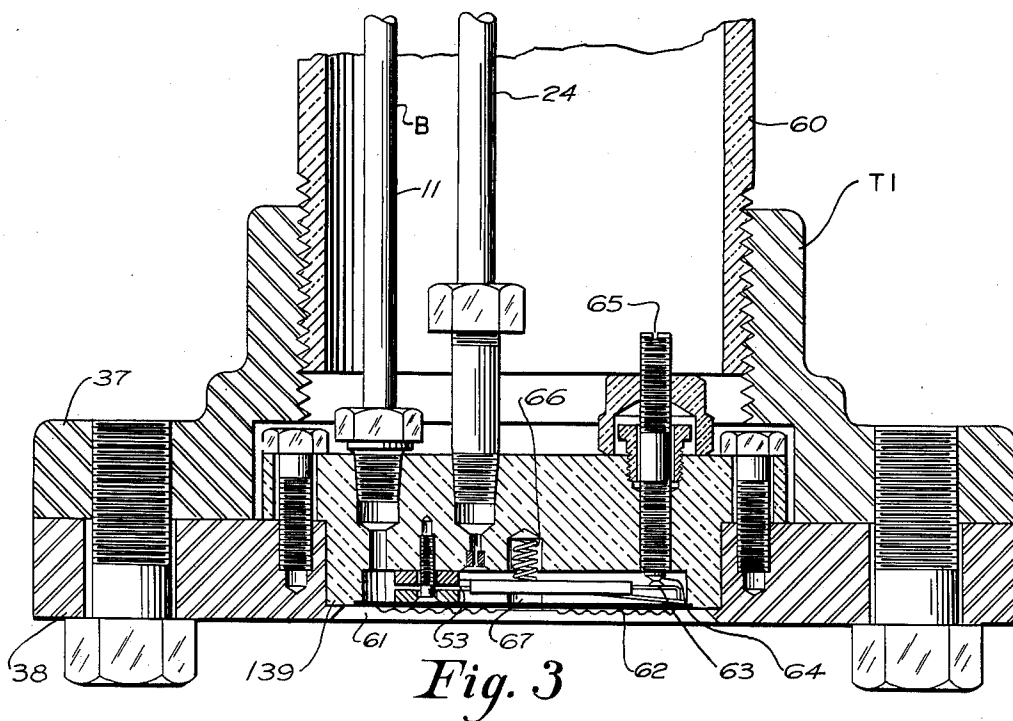
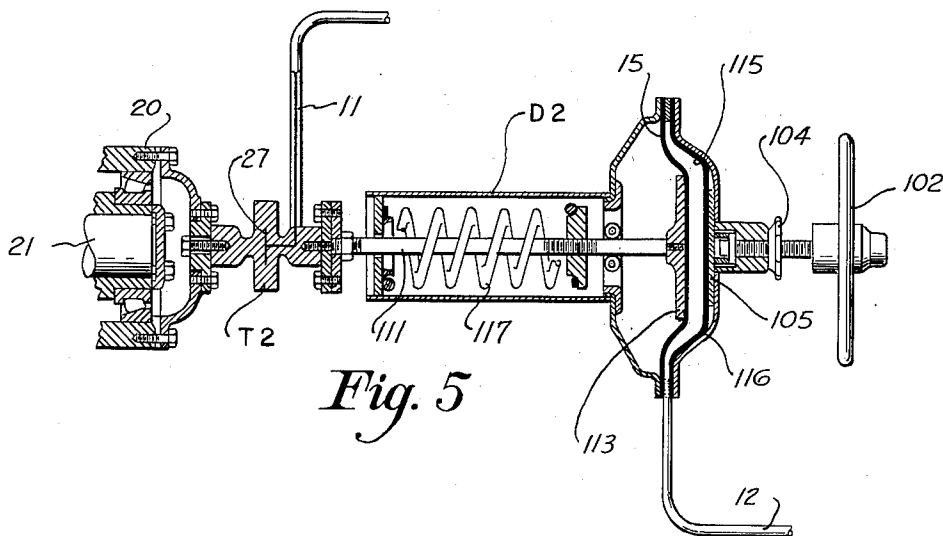
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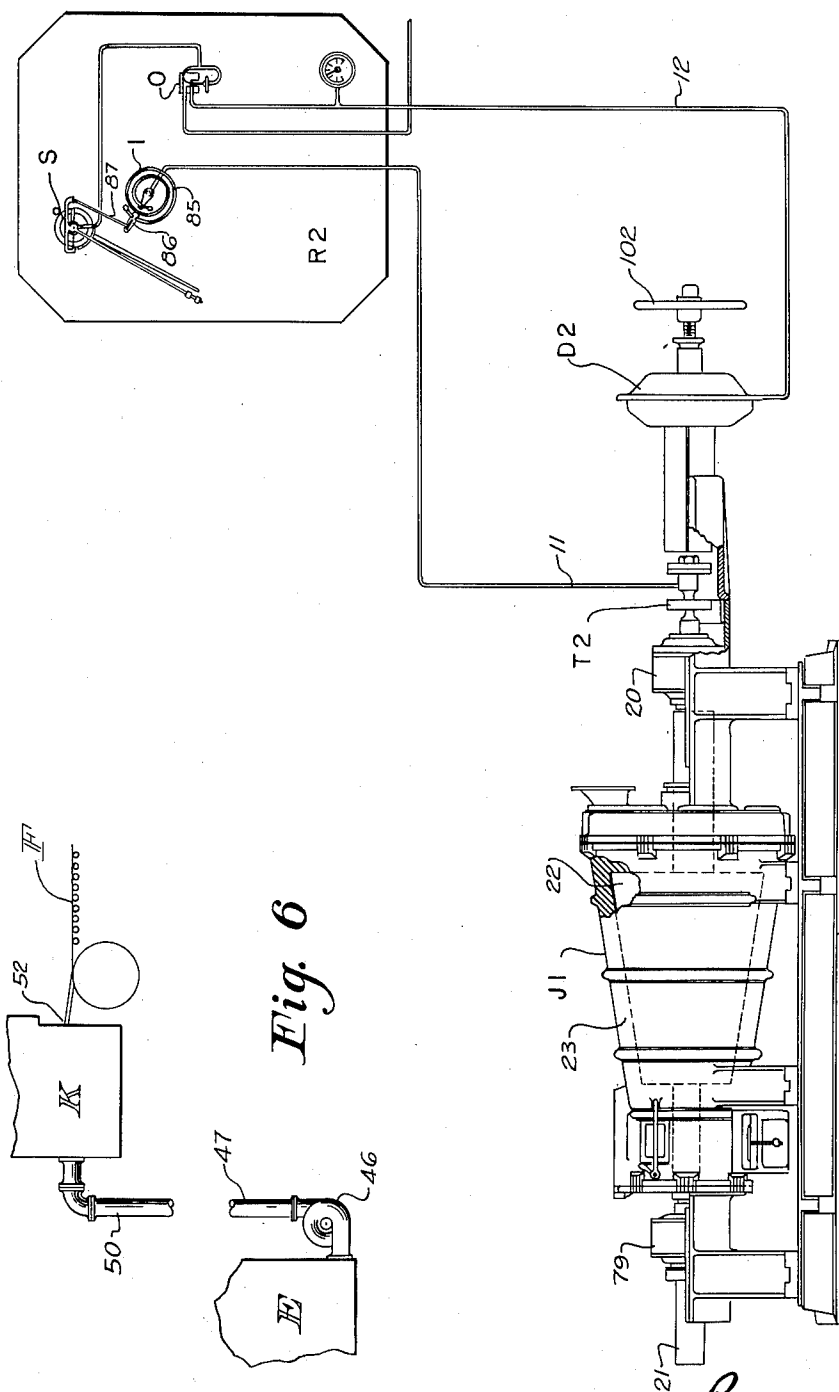


Fig. 4

Fig. 6

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MULTIPLE SYNCHRONIZED PNEUMATIC PAPER STOCK CONTROL DEVICE

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Application January 26, 1953, Serial No. 333,049

6 Claims. (Cl. 92-46)

This invention is a stock controlling device for making more uniform the paper stock in a paper making machine as delivered from a beater chest and caused to pass through a primary Jordan and from there to an intermediate or machine chest from which it is pumped into a secondary Jordan from which Jordan, the flowable liquid paper stock passes to the receiving end of a machine, such as the well known head box of a Fourdrinier machine, for converting the paper stock into a sheet of paper.

It also regulates the pressure in one or more Jordans between the plug and shell so as to make the stock more uniform when it enters the Fourdrinier head box and again checks and regulates its consistency as it leaves the Fourdrinier wire and goes on to a suction couch roll with regard to the arrangement and closeness of its fibres and other characteristics which increase or decrease its resistance to the liquid being sucked out by the vacuum in the couch roll.

I interpose three or more valves or their equivalents in the course of the stock from the beater to the couch roll, each of the type operable by an air pressure diaphragm motor of the pneumatic pressure type, each controlled by a substantially similar controller and recorder interposed between each valve and a sensitive member responsive to the level of the stock in the machine chest, the pressure between the plug and shell or the consistency of the stock at the suction couch roll.

By controlling and regulating automatically by over atmospheric air pressure the stock while passing at least the above indicated stations to conform as nearly as possible to predetermined requirements and by the use of air pressure which is clean if it leaks into the mill, while the motors have few moving parts and require little oiling and which cannot have short circuits, the resulting paper is greatly improved in uniformity and quality and the device as a whole runs with very little attention and if certain unusual accidents happen, no serious harm is done to the mechanism.

A paper making machine equipped with my air pressure diaphragm motors to control the flow and consistency of the stock by automatically moving valves, and a Jordan plug or plugs, in accordance with the variations in conditions at different stages as indicated by suitable sensitive members between a stock chest and a couch roll of the vacuum type preferably through suitable recorders and controllers, operates without sudden stops and starts, and produces a sheet which when delivered from the couch roll is always more uniform within narrow variations than can be produced with existing devices either electrically or manually operated and controlled.

This invention is a continuation in part of my application filed April 24, 1951, Serial Number 222,650 on Synchronized Stock Control Device, now Patent No. 2,686,462.

In the drawings,

Fig. 1 is a diagrammatic side elevational view of a paper making machine of the Fourdrinier type with all of my controls in place.

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Fig. 2 is a diagrammatic elevational view of a motor and a controller and recorder such as I prefer to use in my systems B and C.

Fig. 3 is a sectional detail view of my preferred type of sensitive member for use in my system B.

Fig. 4 is a diagrammatic side elevational view of a Jordan engine, its motor and recorder and controller such as I prefer to use in my systems A2 and A4.

Fig. 5 is a sectional detail view of my sensitive member, motor and connection to a Jordan engine plug such as I use in systems A2 and A4.

Fig. 6 is a diagrammatic detail view of a direct pipe connection between a machine chest and a Fourdrinier head box.

For clearness and conciseness, we will indicate the three necessary and one desirable system by the connecting conductors shown in the diagrammatic drawing Fig. 1, and consecutively, as the first or stock level system by B; the second or primary plug pressure system A2; the third or stock flow system by C and the 4th or secondary Jordan plug pressure system by A4.

These connecting conductors tie or bind together a sensitive member such as are indicated by T1, T2, T3 and T4 with a panel or recorder and controller indicated by R1, R2, R3 and R4 and air pressure diaphragm motors D1, D2, D3 and D4 which respectively control the opening or closing more or less, valves V1, Jordan J1, valve V3 and Jordan J2.

This control system is shown as applied to the combination of devices which are shown in Fig. 1 as follows.

N is a beater or dump chest.

J1 is a primary Jordan engine and may be of the cutting or other type.

J2 is a secondary or finishing Jordan.

E is a machine or intermediate chest between them.

H is a head box for the machine chest and the secondary Jordan.

P indicates a pump or machine pit from which is fed K, the head box from which stock is fed to the wire 53 of

F, a Fourdrinier machine from a pipe 50 and through a slice outlet gate 52. On wire 53 it travels to a couch roll such as L.

L is a suction couch roll with a leg 55 at the end of the wire.

M indicates a main or common air pressure line from which air is fed to the motors.

D1, D2, D3, D4 of the pneumatic diaphragm type which control the movements of valves or similar devices.

V1, J1, V3, J2 are valves or Jordan plugs interposed in the pipes, machines, chests, wire etc., to the suction couch roll L.

R1, R2, R3, R4 indicate panels of the recorders and controllers of the Jordan plug pressure control systems A2 and A4, the stock level control system B and the stock flow control system C.

For convenience in tracing them, I have marked the conductors for these systems successively as B, A2, C and A4.

Sensitive members are marked T1, T2, T3 and T4.

In Fig. 4, S is an automatic air pressure varying mechanism. In Fig. 2, O is a so-called relay valve and G is a bellows converter in panels R1 and R3 which cooperates with automatic mechanism S.

In Fig. 4, I is a Bourdon spring which cooperates with automatic mechanism S in panels R2 and R4 and motors D2 or D4, Figs. 1 and 5.

The flow of the stock from the beater chest N to the primary Jordan is regulated by valve V1 which is controlled by the stock level control system B through panel R1.

I call this the first stage marked B. As shown, the stock goes from chest N through pump 41 in pipe 42, through hand shutoff valve 39, automatic valve VI, pipe 43, Jordan J1, hand valve 44 and automatic valve V3 in pipe 45 to machine chest E then pump 46 in pipe 47 to the head box H for the secondary Jordan J2 through pipe 49 to a pump P in a machine pit then through pipe 50 to the head box K for Fourdrinier machine F and from there to a suction couch roll L from which as a sheet, it is removed in the well known way.

The pressure between the plug and shell knives in the primary Jordan is regulated by means of the plug pressure control system A2, the plug of the primary Jordan indicated by J1, actually operating like a valve.

This stage I call and mark system A2. The air pressure recorder and controller indicated by a panel marked R2 is operated from a sensitive member T2 described in Figs. 4 and 5.

The flow of the stock from the primary Jordan to the machine chest is regulated by valve V3 which is controlled by the stock flow control panel R3 from the couch roll L.

I will call and mark this the third stage and mark it system C. The third stage is to regulate the treatment of the stock in Jordan J1, by means of the vacuum pressure in leg 55, which is conducted through conductors C, to controller and recorder R3, wherein the vacuum is converted to air pressure, which is fed, through conductor C, to air motor D3, which operates valve V3.

The pressure in secondary Jordan J2 is regulated in the same way as in Jordan J1 by secondary plug pressure system A4.

The fourth stage, system A4, which may or may not be used, is to control the pressure in the secondary Jordan J2 through a recorder and controller indicated by a panel R4 and an air pressure operable diaphragm motor marked D4.

In Fig. 2 is shown an air pressure diaphragm motor such as D1, D3 and in Fig. 5 one such as D2 and D4.

The four air pressure operable diaphragm motors D1, D2, D3 and D4 are all of substantially the same construction.

Motors D1 and D3 are each formed with a casing 16, an air chamber 14 in which is a diaphragm 15 into which chamber on one side of the diaphragm 15 the right amount of compressed air is conducted from the appropriate recorder and controller R1 or R3 by an air conductor, such as 12.

On the other side of the diaphragm 15 is a plate 13 which operates a rod 111 which passes through a bearing hole 19 in a partition 18 and is provided with a stop 119 and a returning spring 117 which tends to counteract the air pressure in chamber 14.

Rod 111 carries a closure 112 for a valve seat 113 in a valve such as V1 between pipe sections 42 and 43 from beater chest N.

As shown in Fig. 5, diaphragm motor D2, as also D4, are substantially the same as D1 except that the casing 116 includes a hub 104 for a screw from hand wheel 102 and there are two diaphragms 15 and 115 and the air from a pipe such as 12 goes between them.

There is also a pressure plate 105 to engage diaphragm 115 and press it against 15 and plate 113 to move rod 111 against spring 117 for adjusting or in case there is a leak in the air supply.

Rod 111 moves plug shaft 21 in its thrust bearing 20 together with sensitive member T2 as the pressure between plug 22 and shell 23 varies.

The recorder and controller devices, each of which for convenience we will call a panel, are all of similar construction such as shown in Fig. 1 and as follows.

The mechanism of each recorder and controller R1, R2, R3, R4 is the same in the following particulars.

The main or common air pressure line is M and from this are one or more branches to a relay valve O in a

recorder and controller such as R1, R2, R3 or R4. One line, designated as air supply line 24 goes from main air line M to the air relay valve O in a recorder and controller. The other line, designated as air supply line 12 goes to a diaphragm motor such as D1, D2, D3 or D4.

In the air relay valve O in a recorder and controller, the air supply divides. A small part passes through the orifice 73 and feeds a bleed nozzle 89 through nozzle air line 71. The main flow of air goes to one of the diaphragm motors D1, D2, D3 or D4 to control a valve such as V1 or V2 or to move axially the thrust bearing 20 for a shaft 21 which carries a plug 22 of a Jordan such as J2 or J4 in its shell 23.

There is a connecting air line 11 shown in Fig. 2 from a sensitive member T1 or it might be from sensitive member T3 to a bellows converter such as G which moves a rod 85 and bell crank lever 86 pivoted at 81 to the body R of a recorder and controller R1 or R3 which includes automatic mechanism S to operate the bleed nozzle 89 for automatically increasing or decreasing the over atmospheric pressure in a diaphragm motor D1 or D3 and for indicating the desired pressure in the machine chest or suction roll as the case may be.

Arm 86 of bellows converter G is connected to an arm 87 in automatic mechanism S which arm is pivoted at 91 to a rocking bracket 80 medially pivoted at 92 to the body R of a recorder and controller such as R1 or R3 in such a way that the arm 87 when caused to move by variation in under atmospheric pressure in a sensitive member such as T3 or of any pressure in T1, T2 or T4 will move one arm of bracket 80 on its pivot 92 on body R so that it will move a pen arm 84 fixed to it at 92 to show pressure.

The bracket 80 is of the rocker type pivoted at 92 with arm 87 pivoted to one of its arms 91 while its other arm 93 has a lip which extends under the end of a baffle plate 88 pivoted at 90 directly above an air release regulating or bleed nozzle 89. As shown, there is a revoluble back plate 94 and an arm 83 capable of adjustment thereon or therewith. Baffle plate 88 is mounted in a position to cooperate with the nozzle 89 which normally remains fixed after it is adjusted and is supplied with air from a pipe 71 from relay valve O. The air supplied to the nozzle escapes through it in amounts determined by the position of the baffle 88 with the result that as the baffle approaches the nozzle 89, the back pressure in the pipe 71 will increase and as the baffle moves away from the nozzle the back pressure in the pipe 71 will decrease. This pipe 71 communicates through a by-pass tube 77 and through an orifice 73 from main air pressure supply pipe 24 and with the capsular diaphragm 75 of the relay valve O.

As the back pressure increases in the pipe 71, the capsular diaphragm 75 will move its valve element 74 to decrease the amount of compressed air from the supply pipe 24 and its over atmospheric air pressure branch pipe 12 leading to the air chamber 14 of a diaphragm motor D1, D2, D3 or D4.

The decrease in the above mentioned back pressure in the pipe 71 will affect the capsular diaphragm 75 to move the valve element 74 to increase the application of compressed air to the air chamber 14 at the top of valve assembly V1 through pressure pipe 12, thus pushing against diaphragm 15, plate 13 and spring 117 to move rod 111 to tend to close valve closure 112 on valve seat 113 in valve V1 in outlet 42, V3 in outlet 45 or the plug of Jordan J1 or Jordan J2.

The sensitive member for the first stage B is T1 and the weight and level of the stock in machine chest E is transmitted through pipes B, B and recorder and controller R1 to diaphragm motor D1.

The sensitive member for the third stage is T3 and is the vacuum leg 55 for the suction couch roll L and its sub-atmospheric pressure is transmitted through pipes C, C, recorder and controller R3 to diaphragm valve motor D3. In recorder R3, the subatmospheric pressure is connected

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to over atmospheric pressure from the main air supply line M which always carries such pressure.

The sensitive member for the second stage is T2 and pressure in Jordan J1 is transmitted to diaphragm motor D2 through conductors A1, A1, recorder and controller R2 to diaphragm motor D2 which moves the thrust bearing such as 20 with its Jordan plug shaft such as 21 and plug such as 22 in a Jordan such as J1 in its shell such as 23 according to the pressure between its plug and shell. In Fig. 4, 79 is the radial bearing of the Jordan.

If a second or other Jordan such as J2 is to be regulated for the fourth stage, its sensitive member such as T4 through conductors A4, A4, recorder and controller R4 and diaphragm motor D4 moves the plug bearing, shaft and plug of Jordan J2 in the same manner as J1 according to the pressure between its plug and shell.

The sensitive member T1 for the stock level system B (see Fig. 3) includes a pipe 60 attached by brackets 35, 35 to an inside wall 34 of the machine chest E in such a way that its bottom which is provided with a flange 37 is spaced perhaps 12 inches from the bottom of the chest. This pipe 60 serves as an escape hatch for the air bleed nozzle 64 which has a vent 65 inside of pipe 60 and also houses the air supply line 24 from main air supply line M and the air line 11 to the bellows controller G of the panel R1.

At the bottom of pipe 60 is a sensing unit 139 in which are suitable threaded and other passages for the various devices and this is held in place by a flange 38 in which is an opening 61 so that a diaphragm 62, preferably of stainless steel, can be clamped between flange 38 and unit 139.

In contact with the diaphragm 62 and engaging a baffle 63 is a contact button 67. This baffle 63 is pivoted at 53 between a spring 66 and the contact button 67 so that its free end will be able to move back and forth between the opening of the bleed nozzle 64 and the diaphragm 62.

The weight of the liquid in the machine chest E up against the diaphragm 62 must be balanced by an equal pressure of air exerted against the top or inside or sensing side of the diaphragm 62.

This balancing pressure is fed to the sensing unit from the recorder and controller R1 by way of the air supply line 24, whereby a rising stock level in the chest E will increase the pressure exerted by the stock against the diaphragm. Such a temporary unbalancing would cause the diaphragm to move towards the sensing unit and towards the inlet of the bleed nozzle 64. Such a temporary unbalancing would cause the diaphragm 62 to move towards the sensing unit 39, thereby moving the baffle 63 closer to the air bleed nozzle 64. This restricts the flow of air to the atmosphere, through pipe 60, and causes an increase in back pressure through air line 11 to the bellows converter G in the recorder and controller R1.

This increase in back pressure then tends to close the air pressure diaphragm valve D1 in system B, thus reducing the amount of stock which is permitted to flow through it.

Therefore, as the level of the stock rises in the machine chest E, the back pressure, through air line 11 to bellows converter G, in the controller, is increased thereby reducing the back pressure through the nozzle air line 71 which lowers the ball 74 in the relay valve O and increases the amount of air flowing through air line 12 to valve B1. This increased pressure in the valve B1 tends to close it reducing the amount of stock which is permitted to flow through it.

Where a secondary Jordan J2 is used as shown in Fig. 1, I prefer to have the flow pipe 47 from machine chest E enter a compartment 90 in a Jordan head box H so that part of the stock passes through a gate 91 into compartment 92 and through pipe 48 into Jordan J2 while the level is maintained by a baffle 93 over which any excess goes into compartment 94 and back through pipe 95 into machine chest E.

As shown in Fig. 6 the second Jordan J2 and system A4 with its members R4, D4, H and T4 can be omitted

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and flow pipe 47 from pump 46 can connect directly with Fourdrinier head box K through pipe 50.

The Fourdrinier head box K may be like H, but, as shown it is in one compartment 51 and it has the usual adjustable slice outlet gate 52, with wire 53, and suction boxes 54, 54.

The sensitive members T2 and T4 used in systems A2 and A4, Fig. 1, are both the same as shown in Fig. 5 in section as applied to a Jordan plug and Fig. 4 shows the connection as from T2 to a recorder and controller R2 in which there is a relay valve O and automatic mechanism S, but bellows converter G is replaced by a Bourdon spring I.

A sensitive member T2 or T4 is located between bearing 20 and rod 111 and is a sealed disk of mercury 27 connected by tube 11 to a Bourdon spring I in recorders and controllers R2 and R4. The tube 85 of spring I carries an arm 86 connected to arm 87 of automatic mechanism S. This mechanism S and relay valve O are the same in all of the recorders and controllers R1, R2, R3, R4 for operating the pneumatic diaphragm motors D1, D2, D3 and D4 in systems B, A2, C and A4.

Valves 39, 44 and 96 are to manually regulate the stock flow if the diaphragm motors D1 or D3 or the flow needs special adjustment.

It will be apparent that the inlet valve V1 for the Jordan will cut down the amount of stock delivered to the Jordan J1 if the liquid level sensitive device T1 indicates that the liquid level in machine chest E is too high. Similarly outlet valve V3 will cut down the amount of stock exiting from the Jordan J1, and thereby retain the stock in the Jordan for further refining, if the suction sensitive device T3 so indicates. In either case the pressure sensitive device T2 and the pneumatic motor D2 will automatically compensate for any changes in stock pressure in the Jordan J1 caused by the operation of the valve V1 or V3 and maintain the pressure of the plug against the shell lining at a constant amount. The degree of refinement of the stock thus remains even in spite of restrictions in the outlet or inlet of the Jordan and turbulence or oscillatory surges within the Jordan are avoided.

In operation, as long as the proportion of water and fibres remains constant, a uniform layer of fibres will be deposited on the Fourdrinier wire and the suction at the couch roll will remain uniform. Unlike prior control devices wherein the Jordan plug is controlled by a reversible electric motor through an unyieldable thrust screw or the like, in this invention, the Jordan plug is controlled by an air operated motor continually urging the plug inward at a uniform pressure but yieldable outwardly under excessive stress. Thus while the stock consistency is correct and the suction uniform, the plug is continually urged inwardly at a uniform pressure to automatically take up the wear of the knives. Similarly the stock level control system continually compensates for changes in stock level in the machine chest to keep the system always in balance and to keep a uniform flow of stock to the Fourdrinier.

If the consistency of the stock changes in the proportion of fibre to water, the air and water passage through the paper sheet on the Fourdrinier wire will be affected and the suction will change correspondingly. It has heretofore been proposed to use the above mentioned reversible electric motor to axially slide the Jordan plug in and out of the shell to compensate for changes in the suction at the suction couch roll. The clearance between the knives and bars of the Jordan is thus changed and the pressure within the Jordan is correspondingly changed. Departing from this teaching of the art, in this invention the Jordan plug clearance and Jordan pressure is automatically kept uniform at all times by the yieldable air pressure motor regardless of changes in consistency of the stock. Changes in consistency of the stock, sensed by suction changes in the formed sheet are, instead, cor-

rected by maintaining the stock in the Jordan for a longer or shorter time. Thus the consistency of the stock is maintained uniform by flow control rather than by knife clearance control as in other well known devices. By opening and closing the outlet valve of the Jordan in accordance with changes in suction the stock in the Jordan is refined more or less as required and undue axial movements of the plug is avoided.

When the rate of flow and time of refining in the Jordan is changed by actuating the outlet valve, it will be apparent that the stock levels in the head box and chests will change correspondingly. Stock level changes can of course be disastrous and, in operation, the machine chest absorbs such changes sufficiently to prevent such disasters. When the Jordan outlet valve is opened or closed by changes in suction, the machine chest will receive more or less of the stock but the level in the Fourdrinier head box remains constant in view of the ability of the chest to absorb ordinary stock level changes. However, if the level in the machine chest changes beyond predetermined limits, the level sensitive device actuates the Jordan inlet valve to change the flow of stock to the Jordan in an amount to maintain balance.

When a primary or cutting Jordan is used in tandem with a secondary or brushing Jordan as illustrated in Fig. 1, the Jordan pressure in both Jordans remains uniform at all times. Corrections for changes in consistency are accomplished automatically by opening and closing the outlet valve of the primary Jordan to increase or decrease the coarseness of the fibres in the stock as they are being cut or sheared by increasing or decreasing the time of refining and hydration in that Jordan. Constant maintenance of uniform pressure between the Jordan plug and shell knives is thus achieved by this invention and the fibre structure remains uniform rather than being changed to compensate for suction changes. Control of the rate of speed at which stock is permitted to flow through a Jordan having uniform pressure and clearance results in a maintenance of the exact fibre structure required and does not involve continual changes of conditions within the Jordan.

I claim:

1. Paper stock control apparatus for regulating paper stock in a system which includes a beater chest and pump, a Jordan inlet valve, a Jordan, a Jordan outlet valve, a machine chest and pump, a machine head box, a Fourdrinier machine and a couch roll suction leg, said control apparatus comprising first pneumatic means automatically advancing and retracting the Jordan plug in accordance with variations in stock pressure within the Jordan for continuously maintaining uniform preselected pressure between the plug and shell knives thereof; second pneumatic means automatically opening and closing the Jordan outlet valve in accordance with variations in the quantity and equality of the stock at the couch roll for increasing and decreasing the time stock remains in said Jordan and third pneumatic means automatically opening and closing the Jordan inlet valve in accordance with variations in the stock level of the machine chest for increasing and decreasing the amount of stock delivered to said Jordan, said first means automatically compensating for changes in stock pressure in the Jordan caused by the actuation of said second and third means.

2. A combination as specified in claim 1 wherein said third pneumatic means comprises a liquid level sensitive device submerged in said machine chest, a source of air pressure, a pneumatic converter for converting pressure variations in said sensitive device into variations in air pressure, an axial air pressure motor operably mounted on said Jordan inlet valve and an air pressure pipe leading from said converter to said motor.

3. Paper stock control apparatus for regulating paper stock in a system which includes a beater chest and pump, a Jordan inlet valve, and a machine chest for a Fourdrinier comprising an axial air pressure motor operably

mounted on the Jordan inlet valve for regulating the quantity of paper stock delivered by said beater chest to said Jordan, a source of air pressure for operating said axial air pressure motor; a liquid level sensitive device submerged in said machine chest for sensing variations in paper stock level therein and a pneumatic converter between said sensitive device and said axial air pressure motor for converting variations in liquid level, sensed by said sensitive device, into variations in air pressure delivered from said air source to said axial air pressure motor.

4. Paper stock control apparatus for regulating the flow of paper stock in a system which includes a Jordan inlet valve, a Jordan, a Jordan outlet valve, a machine chest and pump, and a Fourdrinier having a couch roll suction leg, said apparatus comprising an axial air pressure motor for opening and closing said Jordan inlet valve, another axial air pressure motor for opening and closing said Jordan outlet valve; pneumatic converter means for converting variations in suction in said suction leg into variations in air pressure for actuating the axial air pressure motor of said Jordan outlet valve, a liquid level sensitive device submerged in said machine chest and another pneumatic converter means for converting variations in liquid level, sensed by said sensitive device, into variations in air pressure for actuating the axial air pressure motor of said Jordan inlet valve whereby changes in level in said chest caused by actuating the Jordan outlet valve are automatically compensated by changes in flow through said Jordan inlet valve.

5. In paper making apparatus including a Fourdrinier supplied with paper stock by a Jordan, the combination of pneumatically operated Jordan outlet valve means, actuated by variations in suction in the Fourdrinier, for correspondingly varying the flow of stock exiting from the Jordan, pneumatically operated Jordan inlet valve means, actuated by variations in liquid level of the machine chest of the Fourdrinier for correspondingly varying the flow of stock entering the Jordan and pneumatically operated Jordan plug advancing and retracting means, actuated by variations in the pressure between the plug and shell lining of the Jordan, for maintaining said pressure at a predetermined constant amount despite the fluctuations in flow caused by operation of said valves.

6. Paper stock control apparatus for regulating paper stock in a system which includes a Jordan having an inlet valve and an outlet valve and a Fourdrinier having a suction compartment, said apparatus comprising first air diaphragm operated means for effecting axial adjustment of the Jordan plug within the Jordan shell; pressure sensitive means responsive to pressure changes between said plug and shell for actuating said first air operated means to maintain said pressure at a predetermined constant amount; second air operated means for effecting adjustment of the Jordan outlet valve; suction sensitive means responsive to suction changes in said suction compartment for actuating said second air operated means to retard or advance the flow of stock through said Jordan by means of said outlet valve; third air operated means for effecting adjustment of the Jordan inlet valve and liquid quantity sensitive means in said system between said Jordan and said Fourdrinier for actuating said third air operated means to increase and decrease the quantity of stock admitted to said Jordan in accordance with changes in flow time therethrough.

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