March 6, 1962 H. A. SCHLAPAK 3,023,772

CONTROL DEVICE

Filed Jan. 21, 1959

Fig. 1.

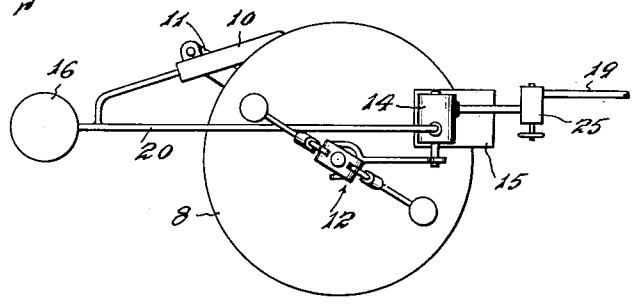
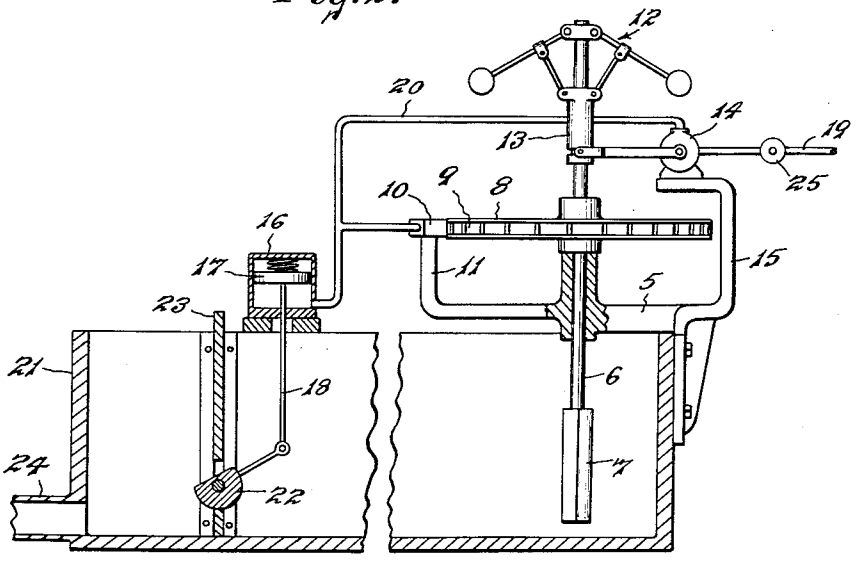


Fig. 2.



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CONTROL DEVICE

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This invention relates to a control device and more particularly to a device which is adapted to control the supply of a material in accordance with the consistency, or fluidity, thereof and which is especially useful for controlling the supply of paper stock to a paper machine in such a manner that the amount of stock supplied to the machine will vary in accordance with any variations in the consistency of said stock; whereby the paper produced by the machine will be of uniform texture and hardness.

An object of the present invention is to provide certain novel and important improvements over such control devices as shown and described in my United States Letters Patent No. 2,772,605, dated December 4, 1956, and my copending application Serial No. 744,587, filed June 25, 1958, and now abandoned, so that the device is greatly simplified and rendered still more sensitive to the consistency of the material which it controls and therefore more efficient in its operation.

Further objects and advantages of the present invention will be more clearly understood from the following description and the accompanying drawing in which:

FIG. 1 is a plan view of a control device embodying my present invention.

FIG. 2 is a side view partly in section of said device.

In the embodiment of this invention shown in the drawing, my improved control device includes a base **5** having a shaft **6** rotatably mounted thereon and depending therefrom. A suitable paddle **7** is mounted upon the lower end of said shaft.

The said shaft **6** is driven by a suitable air turbine motor which includes a rotor **8** in the form of a wheel having a series of radial vanes **9** therein and driven by a stream of compressed air which is delivered against the said vanes by suitable means such as a nozzle **10** that is preferably mounted upon an extension **11** from the base **5**.

A governor **12** is mounted upon the upper end of the shaft **6** and driven thereby to move an operating member **13** which is slidable on said shaft and operates a suitable air valve **14** that is mounted upon an extension **15** of the base **5**.

My improved control device also includes a suitable air motor which may comprise a cylinder **16** containing a piston **17** which is connected to a piston rod **18** that depends from said cylinder. If desired, a conventional air operated diaphragm may be used in place of the said piston.

As shown, an air supply pipe **19** is connected to the valve **14** and a separate air pipe **20** extends from said valve to the nozzle **10** and also to the cylinder **16**.

As shown in FIG. 2, the said control device may be mounted upon a conventional paper stock vat **71**, so that the paddle **7** is immersed in the stock contained therein, and the cylinder **16** may also be mounted on said vat in any suitable position; the rod **18** being connected to a suitable valve **22** that is preferably associated with a conventional gate **23** in said vat to regulate the quantity of stock allowed to pass from said vat to a paper machine through the conduit **24**.

A suitable reducing and metering valve **25** may be provided in order to regulate and hold constant the pressure of the air supplied through the pipe **19** to the valve **14**.

In the use of said device, air pressure is supplied through the valve **14** to the nozzle **10** and the cylinder **16**. The air ejected from the nozzle **10** against the vanes **9** will

rotate the wheel **8** and thereby drive the shaft **6** so as to rotate the paddle **7** in the stock and also rotate the governor **12**. Any change in the consistency or fluidity of the paper stock in the vat **21** will vary the resistance applied by said stock against the rotation of the paddle **7** and this will either reduce or increase the rate of speed at which the shaft **6** is rotated.

As the said stock becomes thicker, or less fluid, a greater resistance is applied thereby against the rotation of the paddle **7**. This will reduce the speed of rotation of the shaft **6** and cause the governor **12** to lower the operating member and open the valve **14** further to increase the amount of air supplied to the cylinder **16** and thereby cause movement of the piston **17** to further close the valve **22** so as to reduce the amount of stock allowed to pass from the vat to the paper machine. As the said stock becomes thinner, or more fluid, the resistance against the paddle **7** is decreased and this causes faster rotation of the shaft **6** and the wheel **8** and operation of the governor **12** to raise the operating member **13** and further close the valve **14** to reduce the amount of air supplied to the cylinder **16** and thereby open the valve **22** to further increase the quantity of said stock passing therethrough in proportion to its consistency.

It will be understood from the above description that my improved device operates to control the amount of stock passing from the vat to the paper machine in such a manner that the amount supplied to the paper machine increases as the stock becomes thinner and decreases as the stock becomes thicker so that the paper produced by the machine will be maintained at a constant degree of hardness and consistency as well as thickness.

As the stock becomes thicker and the valve **14** is opened further by the governor **12** to increase the supply of air to the cylinder **16**, it will also increase the supply of air to the nozzle **10**. This increase to the nozzle will not be sufficient to maintain rotation of the wheel **8** at a constant speed against the increase of resistance to the rotation of the paddle **7**, but it will serve to reduce the variation in the speed of rotation of said wheel in proportion to the variation in resistance against the rotation of the paddle **7** and thereby provides for a more accurate and delicate adjustment of the valve **14** to maintain a more delicate adjustment of the valve **22**.

By connecting both the nozzle **10** and the cylinder, or diaphragm, **16** under the control of the valve **14**, the said nozzle will operate as a vent for the air pressure supplied to the cylinder **16** and thereby provides for varying the pressure in said cylinder in accordance with the degree to which the valve **14** is opened or closed by the governor **12**. Also, the variation in air pressure applied through the nozzle **10** will operate to reduce the variations in the speed of the wheel **8**, due to changes in the resistance to the rotation of the paddle **7**, and prevent excessive changes in the speed of rotation of said wheel which would otherwise result under conditions where large variations in the resistance applied to the paddle **7** are caused due to large variations in the consistency of the stock material.

I claim:

1. A control device for varying the flow of a material in accordance with the degree of fluidity thereof, said device including a base, a shaft rotatable in said base, means for varying the speed of rotation of said shaft in response to changes in the fluidity of said material, an air motor including a rotor secured to said shaft, a nozzle for delivering air under presure to said rotor for the rotation thereof, a material control valve for controlling the flow of said material, air operated means for operating said material control valve, means for supplying air under pressure to said rotor and air operated means, an air control valve for controlling the supply of air pressure to said

rotor and air operated means, and means responsive to variations in the speed of rotation of said shaft for operating said air control valve in accordance with variations in the fluidity of said material.

2. A device for controlling the flow of a material, said device including a base, a shaft rotatable in said base, a paddle mounted on said shaft and insertable into said material, an air motor including a rotor secured to said shaft, a nozzle for delivering air under pressure to said rotor for the rotation thereof, a material control valve, air operated means for operating said material control valve, means for supplying air under pressure to said rotor and air operated means, an air control valve for varying the volume of said air supplied to said rotor and air operated means, and a governor responsive to variations in the speed of rotation of said shaft for operating said air control valve to vary the supply of air to said rotor and air operated means in accordance with variations in the resistance applied against the rotation of the said paddle caused by changes in the fluidity of said material.

3. A control device for varying the flow of a material, the said device including a base, a shaft rotatable in said base, a paddle mounted on said shaft and insertable into said material, an air driven rotor secured to said shaft, a nozzle for delivering air under pressure to said rotor for rotation thereof, means for varying the flow of said material, an air motor for operating said flow varying means, means for supplying air under pressure to said nozzle and air motor, an air valve for varying the supply of said air pressure, and a governor rotatable with said shaft and connected for operating said air valve in accordance with variations in the speed of rotation of said rotor caused by variations in the resistance applied to said paddle by changes in the fluidity of said material to thereby cause operation of said flow varying means in accordance with said changes in the fluidity of the material.

4. A control device for varying the supply of a material in accordance with changes in the fluidity thereof, said device including a base, a shaft rotatable in said base and having means thereon in engagement with said material, an air driven rotor secured to said shaft, a nozzle supported on said base in position to deliver air pressure against said rotor for the rotation thereof, a valve for controlling the flow of said material, air operated means for operating said material control valve, a pipe-line for supplying air under pressure to said nozzle and said air operated means, a valve in said pipe-line for varying the said supply of air, and a governor rotatable with said shaft and connected for operating said air valve to vary the said supply of air to the nozzle and air operated means in accordance with changes in the resistance applied against the rotation of said shaft by the material.

5. A control device for varying the flow of a material in accordance with the degree of fluidity thereof said device including a base, a shaft rotatable in said base, means for varying the speed of rotation of said shaft in response to changes in the fluidity of said material, an air motor including a rotor secured to said shaft, a material control valve for controlling the flow of said material, air operated means for operating said material control valve, means for supplying air under pressure to said rotor and air operated means, an air control valve for controlling the supply of air pressure to said rotor and air operated means, and means responsive to variations in the speed of rotation of said shaft for operating said air control valve in accordance with variations in the fluidity of said material.

6. A control device including a supporting base, a shaft rotatable in said base, a paddle carried on said shaft and insertable into a material, an air motor including a rotor secured to said shaft, means for applying air pressure against said rotor for the rotation thereof, which pressure is maintained substantially constant for any particular consistency of said material, control means operated by said air pressure for controlling the flow of said material, a governor secured to said shaft for rotation therewith and responsive to variations in the speed of rotation thereof, and means controlled by said governor for varying the supply of said air pressure to said rotor and control means for rotating said rotor and operating said material control means to vary the flow of said material in accordance with variations in the speed of rotation of said shaft caused by variations in the resistance applied by said material against the rotation of said paddle.

7. A control device for controlling the flow of a material in accordance with the degree of its fluidity, said device including a base, a shaft rotatable in said base, a paddle mounted on said shaft and insertable into said material, an air rotor for rotating said shaft at speeds variable in accordance with the consistency of said material, means for applying air pressure to drive said rotor, a governor directly responsive to variations in the speed of rotation of said shaft, a material control valve operated by said air pressure for controlling the flow of said material, and an air control valve operated by said governor for varying the supply of pressure for rotating said rotor and operating said material control valve in accordance with variations in the speed of said shaft caused by variations in the resistance applied to said paddle by said material.

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