April 13, 1926. 1,580,431

H. M. GASSMAN

AUTOMATIC LOAD REGULATING MEANS

Filed May 23, 1925 2 Sheets-Sheet 1

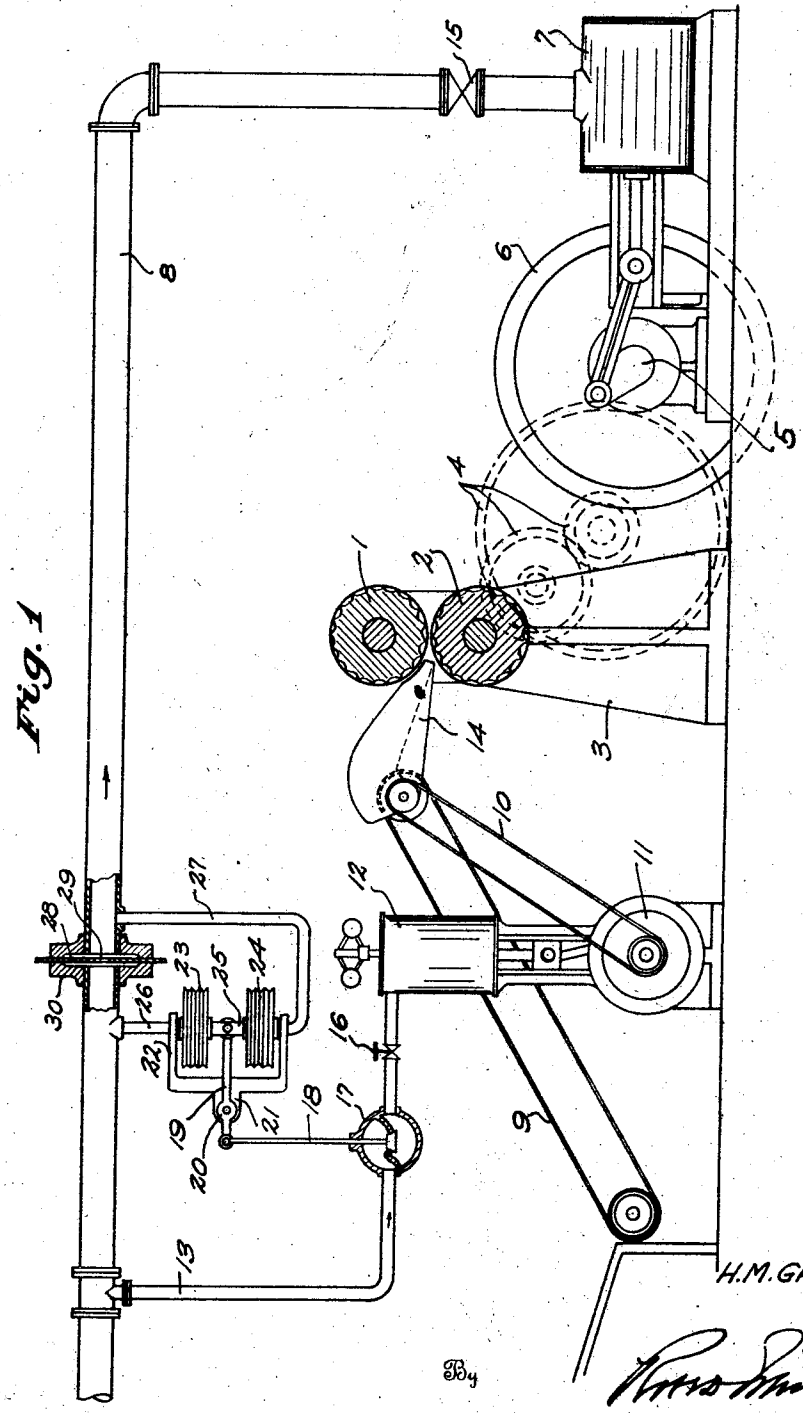


Fig. 1

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Fig. 3

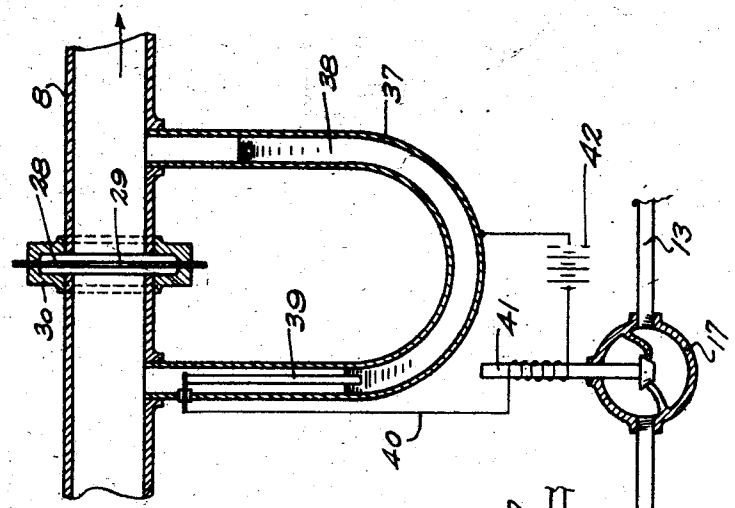
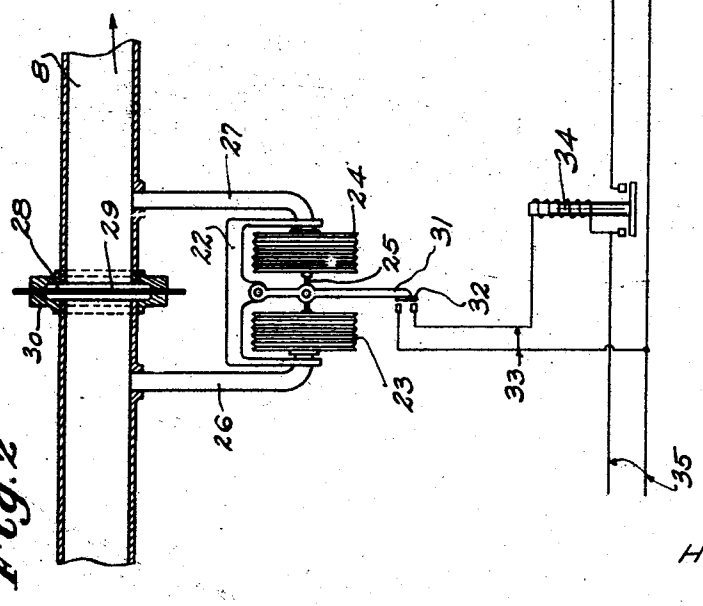


Fig. 2



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UNITED STATES PATENT OFFICE.

HOWARD M. GASSMAN, OF BIRMINGHAM, ALABAMA.

AUTOMATIC LOAD-REGULATING MEANS.

Application filed May 23, 1925. Serial No. 32,501.

To all whom it may concern:

Be it known that I, HOWARD M. GASSMAN, a citizen of the United States of America, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Automatic Load-Regulating Means, of which the following is a specification.

My invention relates to a load regulating means applicable to mills driven by steam, air or other fluid motive power as contrasted with the electric or belt driven mills.

The prime object of my invention is to maintain an approximately constant load on the power driving machinery for crushing, grinding or otherwise acting on or handling material.

In Letters Patent No. 1,450,720, issued to me, I have disclosed a load regulating means as applied to electric and belt driven machinery, wherein it was sought to maintain the load reasonably constant independently of the speed by an automatic control of the feed to the machine.

The chief object therefore of my present invention is to adapt the principles of control disclosed in my said patent to the control of machinery driven by fluid motive power, and to this end it contemplates interposing in the path of the flow of the power medium to the prime mover a means which will produce a differential in pressure variable responsive to the rate of flow of the power medium, in association with means responsive to this differential pressure which will act correspondingly upon the feed of the material to be treated or handled.

My invention further comprises the novel details of construction and arrangement of parts, which in their preferred embodiment only are hereinafter described and illustrated in the accompanying drawings, which form a part of this specification.

According to the drawings:—

Fig. 1 is an elevation of a steam driven cane crusher which is selected as a typical mechanism for the illustration of my invention, the steam line to the prime mover and to the drive for the feed being broken away to illustrate a suitable restricting means in the latter.

Fig. 2 is a detail view illustrating a modified type of my invention in which electrical means is employed to regulate the feed by intermittently starting and stopping the same, responsive to the rate of flow of motive fluid to the prime mover.

Fig. 3 is an electrical feed control mechanism providing a variable energy to actuate the control valve for the feed mechanism.

Similar reference numerals refer to similar parts throughout the drawings.

In the embodiment of my invention illustrated in Fig. 1, and which is selected merely as a typical embodiment of my invention, cane crushing rolls 1 and 2 are mounted in a suitable housing 3 and driven by a train of gears generally designated by the numeral 4 from the crank shaft 5 of an engine 6 having a cylinder 7 supplied by a main 8 with steam or other fluid power medium. The mill is provided with a conveyor 9 which is driven by a belt 10 from a steam engine 11 having its cylinder 12 supplied with motive fluid by a line 13, preferably connected to the main 8. The material that has been elevated is delivered by a chute 14 to the crusher rolls. I interpose in the steam main 8 a conventional cut-off valve 15 and in the line 13 I provided a cut-off valve 16 and a throttle valve 17 actuated by a stem 18 connected to a lever 19 having a fixed pivot 20 preferably formed by a lug 21 rigidly mounted on the bracket 22. This bracket has upper and lower parallel legs and under the upper leg is mounted a diaphragm 23 and on the upper face of the lower member is mounted a diaphragm 24. The free ends of these diaphragms are connected by an element 25 to which in turn is pivotally connected the other end of the lever 19. The diaphragms 23 and 25 are connected to the main 8 by the pipes 26 and 27 respectively, and I interpose in this main between the points of connection therewith of these pipes 26 and 27 any suitable means for producing a differential pressure responsive to variations to the rate of flow of the power medium. The means shown is an orifice plate 28 having an orifice 29 therein smaller than the cross-sectional area of the main 8. The plate 28 is mounted in between flanges 30 connecting adjacent spaced ends of sections of the main.

In the operation of this device, whenever there is a variation in the rate of flow of the motive fluid, whether it be steam, air or water, there will be a change in the differential pressure, which acting through the then unbalanced diaphragms 23 and 24, will pro-

duce a movement of the lever 19 that will act on the throttle valve 17 to either increase or decrease the speed or rate of the feed.

Referring to Fig. 2, I show the diaphragms 23 and 24 similarly mounted in the bracket 22 and connected by the pipes 26 and 27 on opposite sides of the orifice plate 28 to the main 8. These diaphragms, in the manner already described, act on a lever 31 pivoted above to the bracket and pivotally connected at an intermediate point to the connecting element 25 between the diaphragms and carrying at its free end a contact 32 adapted to open or close a circuit 33 which includes a relay 34 and is connected across a power supply circuit 35 in which is included a solenoid 36 operating the valve 17 in the line 13 to the feed drive.

Whenever a variation in the differential pressure occurs and the diaphragms move responsive thereto sufficiently to make or break the relay circuit 34, the relay will act to open or close the power circuit 35 and to energize or deenergize the solenoid 36, thus opening or closing the valve 17. This will produce an intermittent control of the feed by stopping and starting the feed mechanism as contrasted with the throttling regulation described in connection with Fig. 1.

In Fig. 3 I show the orifice plate 28 interposed in the main 8 but here, in lieu of the diaphragms, I provide a U-shaped tube 37 connected to the main 8 on opposite sides of the plate 28 and containing therein a body of mercury 38 which is in contact with a register 39 connected to one side of a circuit 40 that includes a solenoid 41 for operating a valve 17 in the feed line 13. The battery 42 or other source of electrical energy is included in this circuit 40 which on its other side is connected to the mercury in the tube 37. The variations in pressure will act to vary the extent of the immersion of the resistor in the mercury and will thus vary the energy of the current flowing through the solenoid and acting to open or close the control valve 17 for the feed mechanism.

Though I have described with great particularity the details of the embodiment of the invention herein shown, it is not to be construed that I am limited thereto, as changes in arrangement and substitution of equivalents may be made by those skilled in the art without departing from the invention as defined in the appended claims.

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

1. An automatic load control mechanism for power driven machinery, comprising a motive fluid driven prime mover having a supply main for the motive fluid, means to regulate the feed of material to be acted upon by said prime mover, means to create a differential pressure responsive to the variations in flow of motive fluid to the prime mover, and means responsive to the variation in such differential to regulate said feed.

2. An automatic load control mechanism according to claim 1, in which the means for creating a differential pressure are interposed in the main, and means responsive to the variations in differential are connected to the main line.

3. An automatic load control mechanism according to claim 1, in which the means for creating a differential pressure are interposed in the main, and means responsive to the variations in differential are connected to said main line adjacent to the means for producing the differential pressure therein.

4. In an automatic load regulating means, a motive fluid driven prime mover having a supply main, and elements driven thereby for acting on material, means to feed material to said elements, means to regulate said feed responsive to the rate of flow of the motive fluid to the prime mover, comprising means responsive to the rate of flow of the motive fluid to create a variable differential in pressure in said main, elements responsive to the variations in such differential pressure, and means controlled by said elements to increase or decrease the feed responsive to a decrease or increase of its controlling differential pressure.

In testimony whereof I affix my signature.

HOWARD M. GASSMAN.