

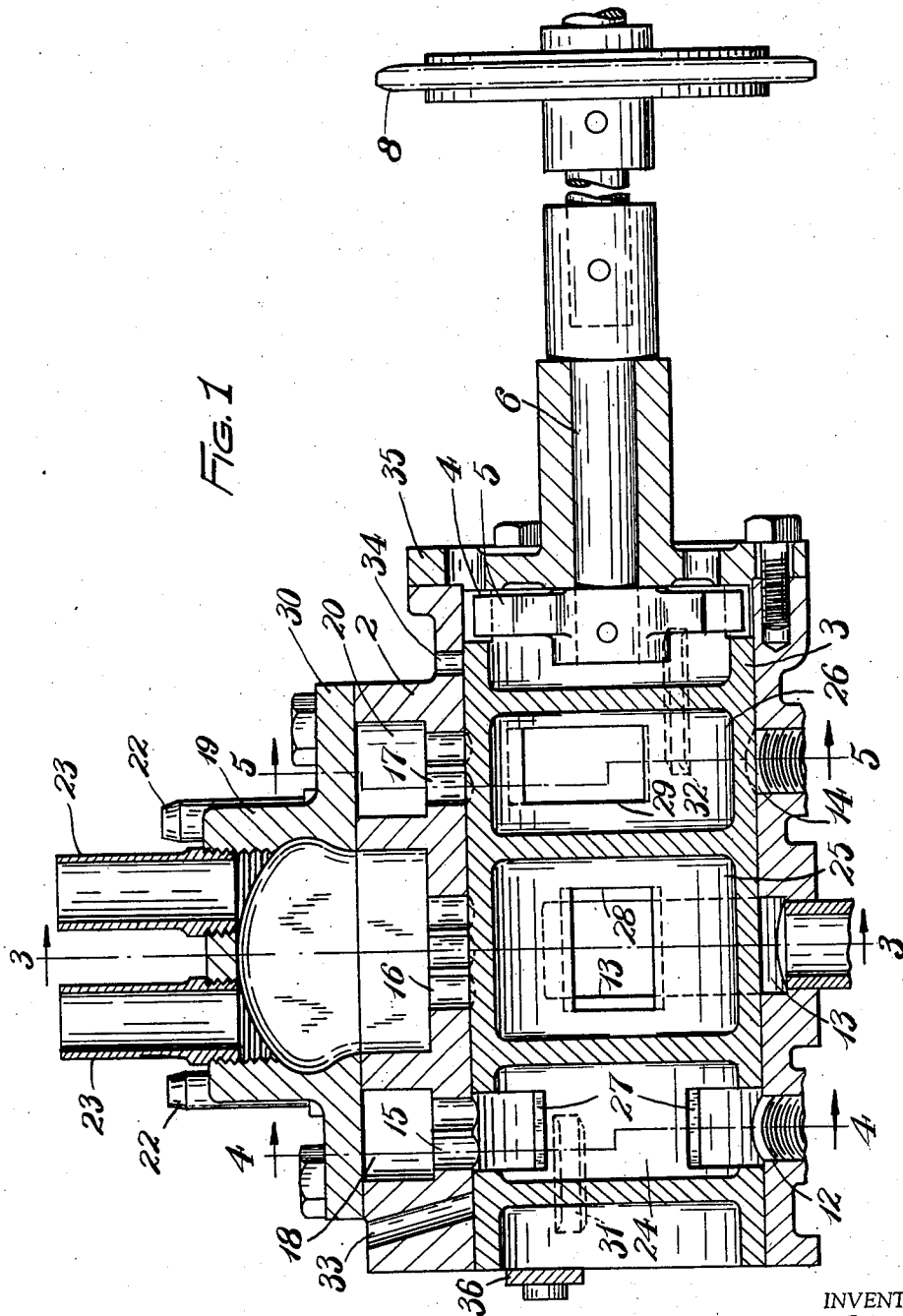
March 4, 1941.

H. T. BACKHOUSE

2,233,934

CYLINDRICAL VALVE FOR SHEET HANDLING MACHINES

Original Filed Jan. 4, 1936 4 Sheets-Sheet 1



INVENTOR.
HEADLEY TOWNSEND BACKHOUSE
BY
Kris Hudson & Kent
ATTORNEYS

March 4, 1941.

H. T. BACKHOUSE

2,233,934

CYLINDRICAL VALVE FOR SHEET HANDLING MACHINES

Original Filed Jan. 4, 1936 4 Sheets-Sheet 2

FIG. 3

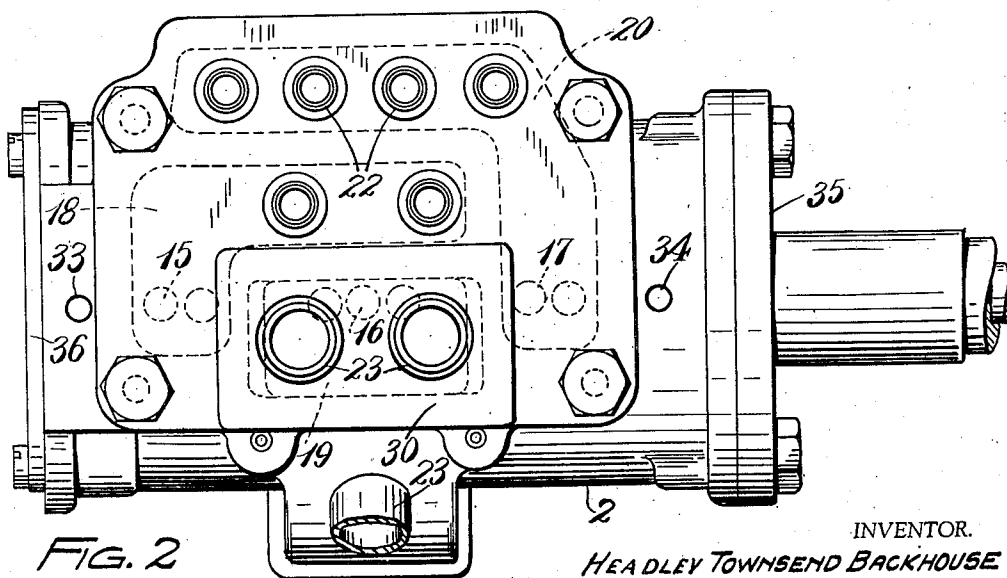
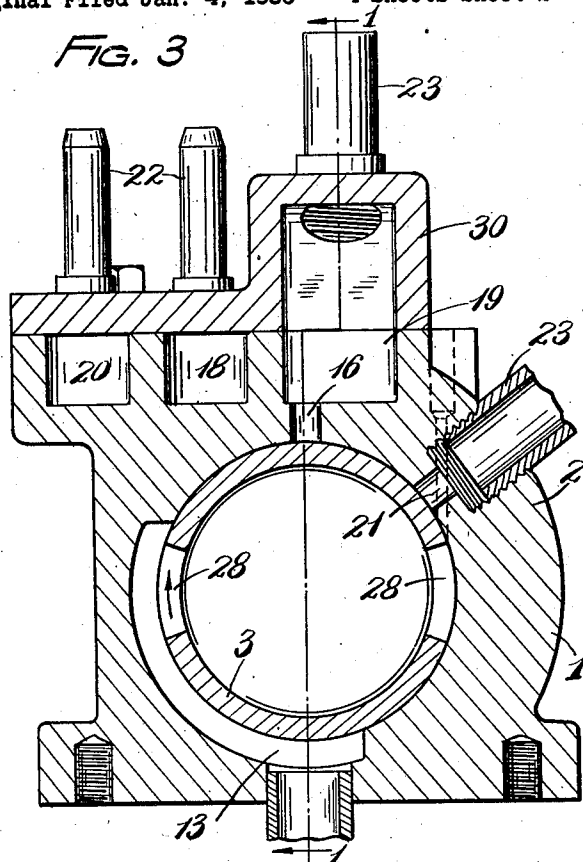


FIG. 2

INVENTOR.
HEADLEY TOWNSEND BACKHOUSE
BY *Kris Hudson & Kent*
ATTORNEYS

March 4, 1941.

H. T. BACKHOUSE

2,233,934

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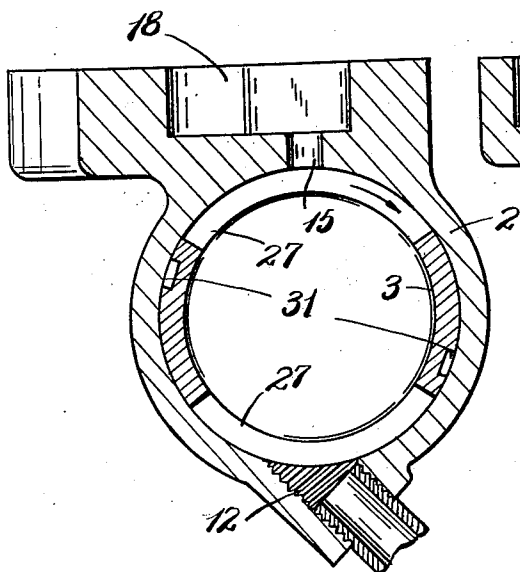


FIG. 4

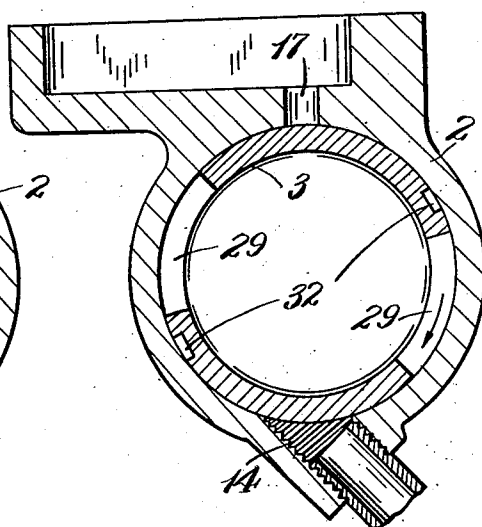


FIG. 5

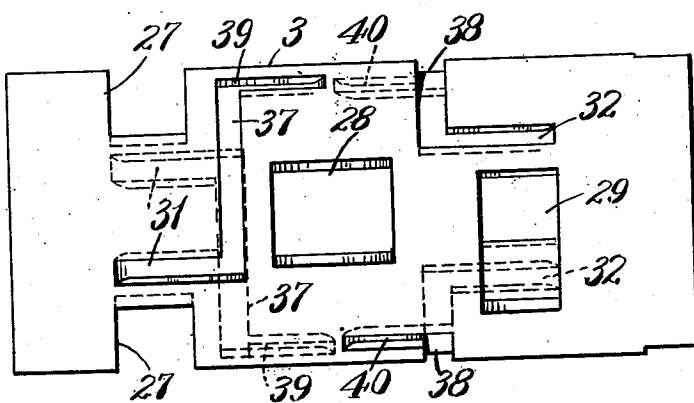


FIG. 8

INVENTOR.
HEADLEY TOWNSEND BACKHOUSE
BY *Kurs Hudson & Kent*
ATTORNEYS

March 4, 1941.

H. T. BACKHOUSE

2,233,934

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4 Sheets-Sheet 4

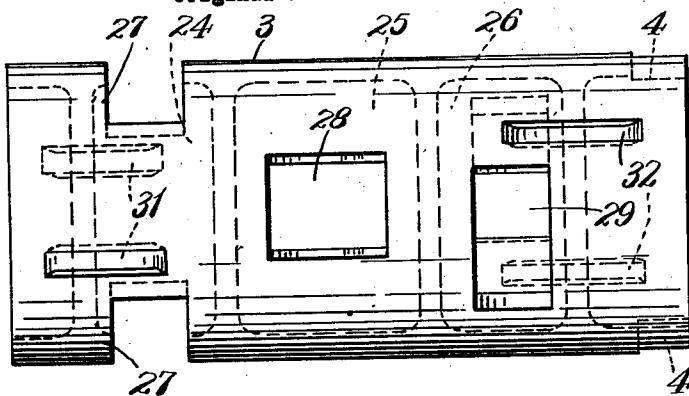


FIG. 6

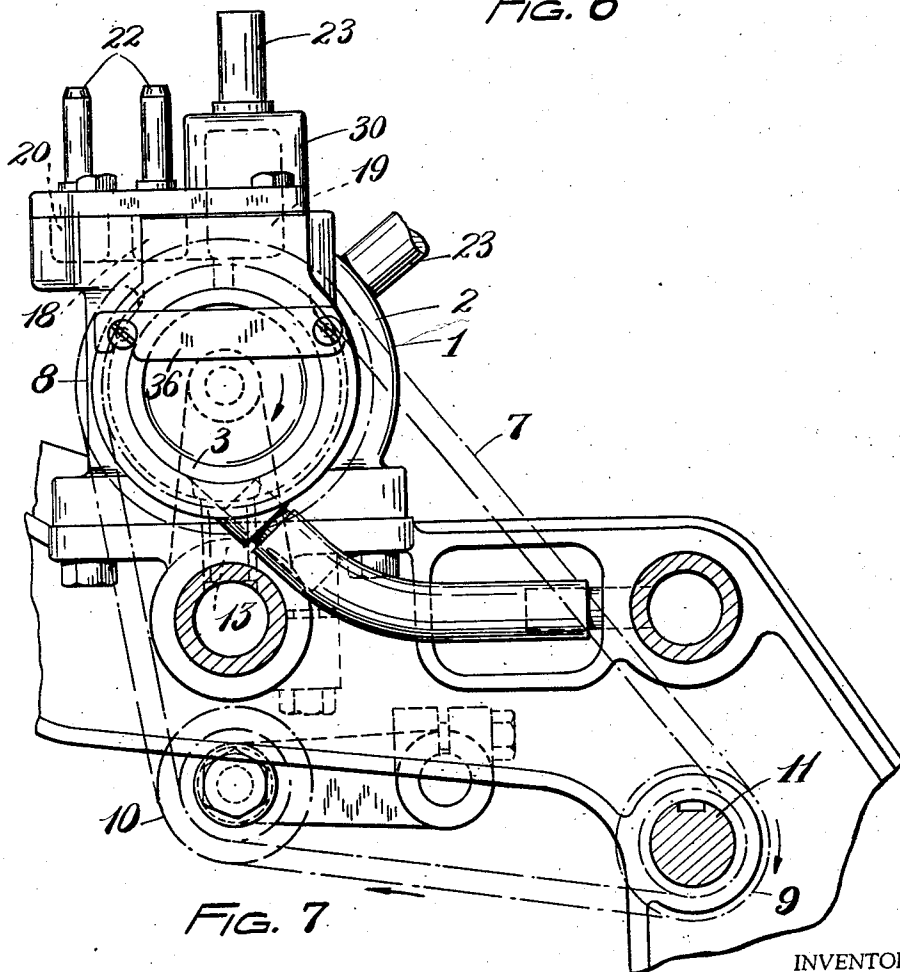


FIG. 7

INVENTOR.

HEADLEY TOWNSEND BACKHOUSE

BY

Kurs Hudson & Kent

ATTORNEYS

UNITED STATES PATENT OFFICE

2,233,934

CYLINDRICAL VALVE FOR SHEET
HANDLING MACHINES

Headley Townsend Backhouse, London, England

Application January 4, 1936, Serial No. 57,547.

Renewed June 19, 1940. In Great Britain

January 11, 1935

3 Claims. (Cl. 251—98)

This invention relates to an improvement in cylindrical valves for sheet handling machines, particularly but not exclusively sheet feeding devices for printing presses and like machines. In many types of machines for separating sheets in order that they may be forwarded singly to a printing press or like machine, the separating and forwarding operations are performed by devices employing blasts of air under pressure and by suction devices or by devices employing a combination of air blast and suction, a customary arrangement being to have a continuously running suction pump or blower, and the timing of the sucking and blowing operations being controlled by a plurality of separate valves.

According to the present invention a machine operable to separate sheets of paper or the like from a pack by means of suction devices, and devices employing blasts of air under pressure is characterised by means for controlling the suction and air blasts comprising a single rotary valve common to a plurality of said devices and consisting of a rotor rotatable in a stator and having at least two transverse passageways arranged to cooperate in certain positions of the rotor with ports in the stator and to put said ports into communication one with another, one passageway and its associated ports being appropriated to suction and another to pressure.

In the case of the suction device it is usually necessary after the device has been put out of communication with the vacuum pump by the valve to release the remaining suction in the device and according to a preferred feature of the invention the rotor is provided with passageways arranged to put one or more of the "suction" ports into communication with the atmosphere, or with the pressure system, at appropriate positions of the rotor.

A specific example of a machine embodying the invention will now be described with reference to the accompanying drawings in which

Fig. 1 is a longitudinal cross section of the valve controlling the suction and air.

Fig. 2 is a plan view of the valve shown in Fig. 1.

Fig. 3 is a transverse cross section on the line 3—3 of Fig. 1.

Fig. 4 is a transverse section on the line 4—4 of Fig. 1 with the cover removed.

Fig. 5 is a transverse section on the line 5—5 of Fig. 1 also with the cover removed.

Fig. 6 is a side elevation of the rotor.

Fig. 7 is an end view of the valve and associated parts of the machine showing the driving means for the valve, and

Fig. 8 is a side elevation of a modified rotor.

Like reference numerals refer to like parts throughout the several figures of the drawings.

The machine with which the present invention is used may be of the kind described in the specification of my application Serial No. 738,500, filed August 4, 1934, now Patent 2,108,702, granted Feb. 15, 1938, in which a set of suckers are arranged to grip each sheet in turn and to lift a portion of the sheet, which portion is then transferred to a second set of suckers also arranged to grip the sheet and to be given a movement in a direction to forward the sheet. The machine is also provided with one or more sheet stops which move under the lifted sheet, rest on the top of the pack and at the same time direct blasts of air between the lifted sheet and the top of the pack.

Located in a suitable position, preferably centrally of the machine and above the suckers and said sheet stop or stops is a single rotary valve provided with flexible connections to each of the suckers and sheet stop or stops. This valve controls the suction or air blast to each of these devices and consists as to its main components of a stator 2 and a rotor 3 closely fitting inside the stator. The rotor has slots 4 formed at one end engaged and driven by a spider 5 on a shaft 6 which is continuously rotated during the operation of the machine by a chain 7 on sprockets 8, 9 and 10, of which 9 is mounted on and driven by a shaft 11 extending transversely of the machine.

The stator is provided with a set of three ports 12, 13 and 14 of which 12 and 14 are connected to the suction side of an air pump and 13 to the pressure side. Diametrically opposite to the ports 12, 13 and 14 is a further set of ports 15, 16 and 17 leading to chambers 18, 19 and 20 in the stator body and closed by a cover plate 30. A further port 21 is also provided opposite to the port 13 which latter port extends around an appreciable part of the circumference of the stator. Connections to the various suckers are taken from the chambers 18 and 20 by means of flexible tubes fitted over nipples 22 in the cover plate 30 and connections to the sheet stops or other devices employing air under pressure are also made by means of flexible tubes over nipples 23.

The rotor which is hollow is divided into three chambers 24, 25 and 26 by transverse diaphragms and each of these chambers is provided with a pair of diametrically opposed ports 27, 28 and 29, these ports being suitably spaced to cooperate with the ports 12—15, 13—16—21 and 14—17 respectively in the stator. It will be seen that as

the rotor rotates it puts the ports 12, 13 and 14 into communication with the ports 15, 16—21 and 17 respectively, the ports in the rotor being located at suitable relative positions around the circumference of the rotor so that the various communications are made at the desired times for the correct operation of the machine.

In this instance I have located the pressure ports in the middle and the suction ports on the ends of the rotor, which arrangement tends to product a balanced condition of the rotor, the ports 12, 13 and 14 being substantially in alignment, so that their suction and pressure effects on the rotor are in opposition to each other.

Of course this arrangement could be reversed to provide a set of pressure ports on each end and a set of suction ports in the middle of the rotor.

In order that the suction remaining in the chambers 18 and 20 and their corresponding connections to the suckers may be released after the connection to the suction pump has been cut off, longitudinal grooves 31 and 32 are provided in the external surface of the rotor and are arranged at the appropriate times to connect the ports 15 and 17 to passages 33 and 34 leading to the atmosphere.

The release of the suction in the chambers 18 and 20 can be effected more quickly by connecting the passages 33 and 34 to the pressure system. Alternatively, a rotor as shown in Fig. 8 can be employed. In this rotor the longitudinal grooves 31 and 32 communicate at their inner ends with grooves 37 and 38 which extend partly around the rotor and which lead to grooves 39 and 40 respectively; the latter grooves also extend longitudinally of the rotor but are disposed on the side of the grooves 37 and 38 opposite to the grooves 31 and 32 so as to communicate at the proper time with the port 13 in the stator. If this rotor is provided, the passages 33 and 34 are unnecessary.

The rotor is held against longitudinal displacement with respect to the stator by means of a cover plate 35 (which also acts as a bearing for the shaft 6) at one end of the stator and at the other end by means of a retaining bar 36 which may readily be released to allow of the rotor being withdrawn. By virtue of this construction, rotors with different port arrangements may be employed interchangeably.

In the construction shown on the drawings, the rotor has a pair of ports corresponding to each pair of ports in the stator, and the arrangement of the ports is such that the valve operates twice in each revolution of the rotor. It will be appreciated that in this case the speed of the rotor must be such that the valve operates once in each cycle of operations of the machine. By increasing the number of the ports in the

rotor associated with each pair of ports in the stator, the speed at which the rotor has to be driven can be correspondingly reduced.

It is to be understood that the application of the invention is not confined to sheet-feeding devices, but may be extended to include any appliances using valves to control fluids. For example, the two or more passageways herein described as being appropriated to suction and pressure respectively may be adapted to control two or more gases, two or more liquids, or both gas and liquid simultaneously.

Having thus described my invention, I claim:

1. In an air valve mechanism for sheet handling machines, a cylindrical casing having three primary ports approximately in longitudinal alignment, and three secondary ports on the opposite side of the casing, certain of said primary ports being suction ports and certain other of said primary ports being air pressure ports, and the central primary port being different in kind from the two end primary ports, a cylindrical rotor mounted for rotation within the casing, said rotor having three passages therethrough, each passage being adapted to register simultaneously with a primary port and a corresponding secondary port, and means for rotating said rotor.

2. In a valve, a cylindrical casing, a primary central port therein, a pair of primary ports in the casing spaced longitudinally from said central port on either side thereof, three longitudinally spaced secondary ports in the casing opposite to said primary ports, a plug rotatably mounted in the casing provided with three passages adapted in one position of the plug to connect said primary and secondary ports in pairs, said central primary port and said outer primary ports being connected respectively with conductors for fluids at different pressures, and said secondary ports being connected to conductors for fluids at pressures intermediate the pressures of the fluids in said conductors connected to the central primary port and outer primary ports respectively.

3. In a valve, a casing provided with an opening for a rotatable valve plug, a group of three longitudinally spaced ports on one side of the casing, a second group of three longitudinally spaced ports on the opposite side of the casing, a plug rotatably mounted in the casing provided with three passages adapted in one position of the plug to connect the ports of said two groups in pairs, each pair of casing ports being adapted to join parts of a fluid line, whereby the valve may be balanced to a greater or lesser extent by carrying in the outer pairs of conductors fluid having a given pressure direction and in the middle pair of conductors fluid having an opposite pressure direction.

HEADLEY TOWNSEND BACKHOUSE.