July 16, 1963 D. A. GODDARD 3,097,993

APPARATUS FOR AUTOMATIC KNOCK-OFF SHOWER FOR PAPER MACHINE

Filed May 23, 1961 3 Sheets-Sheet 1

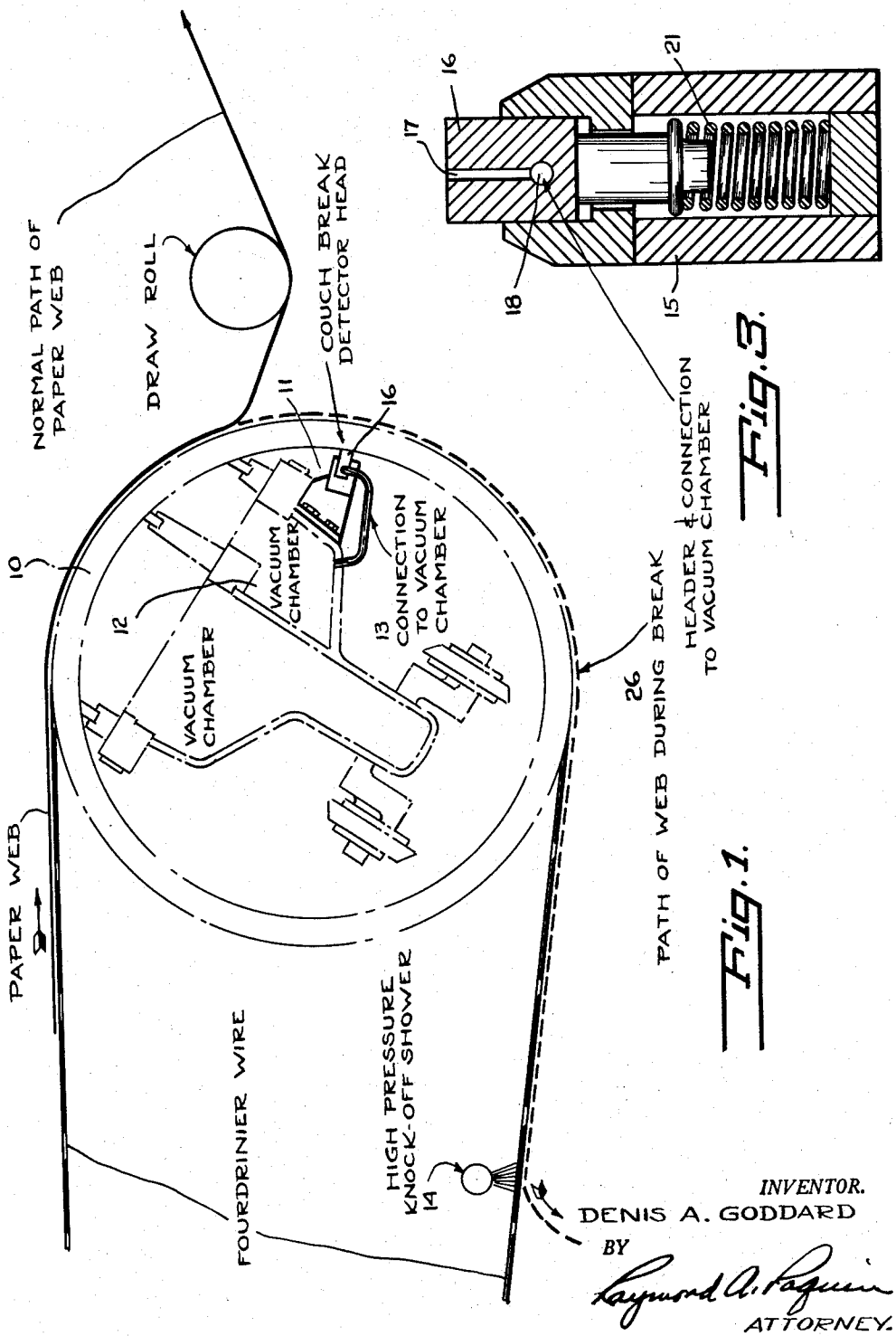


Fig. 1.

Fig. 3.

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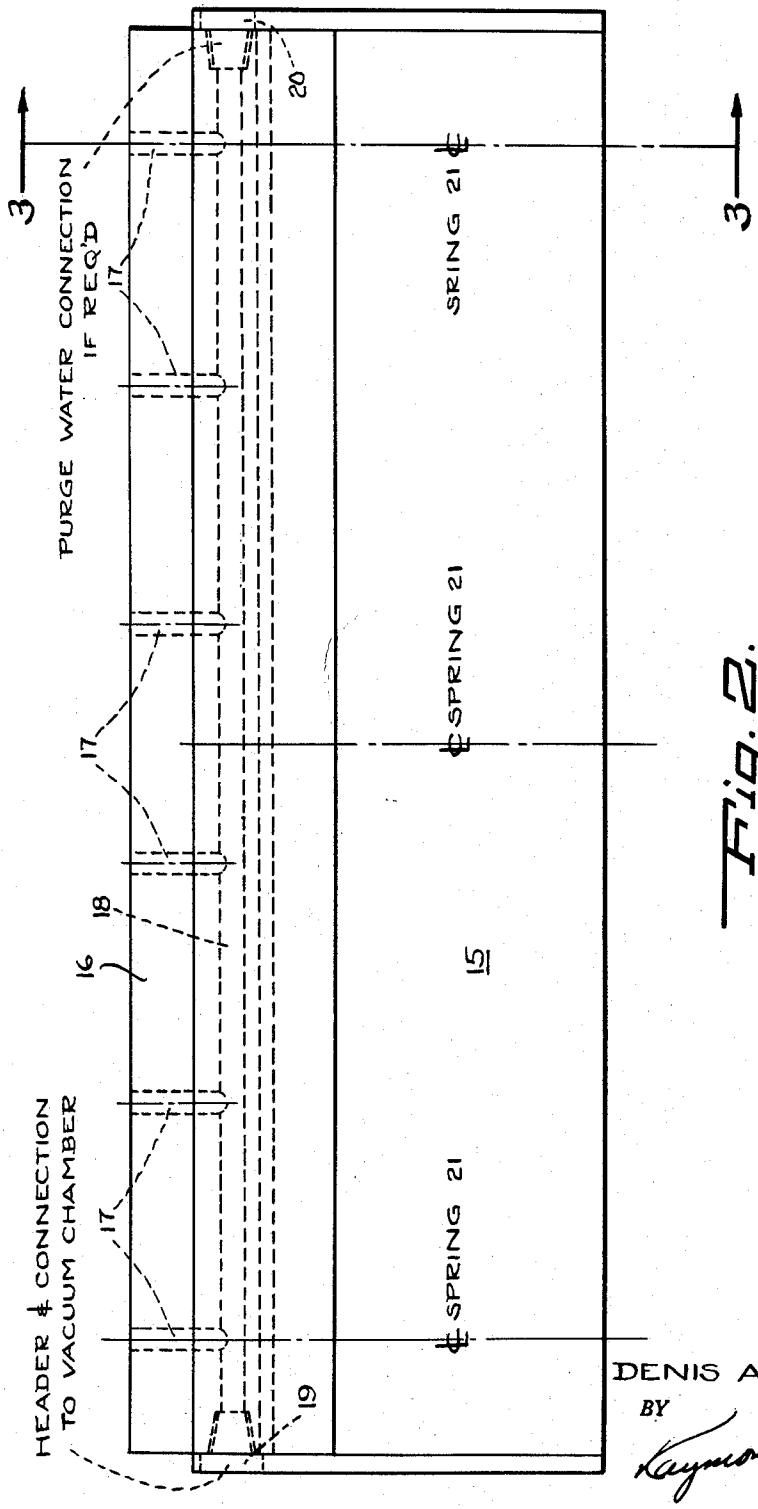


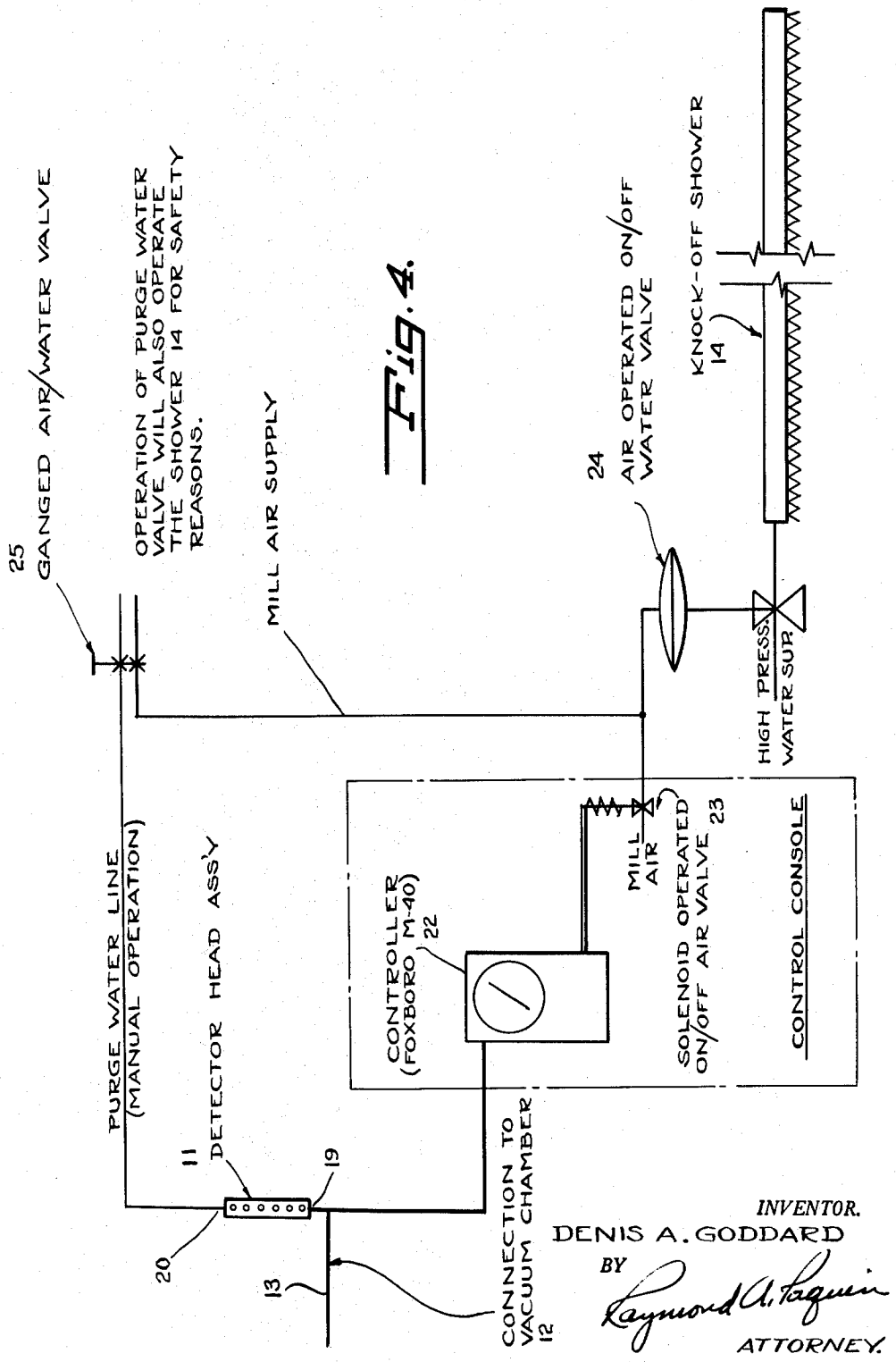
Fig. 2.

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APPARATUS FOR AUTOMATIC KNOCK-OFF SHOWER FOR PAPER MACHINE

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This invention relates to paper machinery and has particular reference to new and improved apparatus for removing the paper web from a Fourdrinier wire in the event of a paper break occurring at the couch.

An object of the invention is to provide new and improved apparatus of the type set forth which is quick, reliable and safe.

Another object of the invention is to provide new and improved device of the type set forth which senses a break in the paper web right at the couch and as close as possible to the actual break and which senses a break in the paper web the instant it occurs.

Another object of the invention is to provide a new and improved apparatus of the type set forth which uses a minimum amount of high pressure water and is operated only when necessary.

Another object is to provide a device of the type set forth which has "fail safe" characteristics whereby any blockage of the sensor inlet holes merely causes operation of the knock-off shower.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings and it will be understood that changes can be made in the details of construction and arrangement of parts without departing from the scope of the invention as set forth in the accompanying claims, the preferred form having been shown by way of illustration only.

Referring to the drawings:

FIGURE 1 is a schematic view of the couch end of a paper machine Fourdrinier and embodying the present invention;

FIGURE 2 is a plan view of the detector head assembly;

FIGURE 3 is a sectional view taken on line 3—3 of FIGURE 2 looking in the direction of the arrows; and

FIGURE 4 is a schematic diagram of the invention showing the relative positions of the various components.

In the operation of a paper machine Fourdrinier, when the paper web breaks at the couch, instead of passing directly from the couch to the press section, it clings to the Fourdrinier forming wire and passes around the couch and along underneath the Fourdrinier, where it can cause damage and also fall into a section of the wire pit not designed to accommodate it.

The purpose of the present invention, therefore, is to remove the paper web from the Fourdrinier wire and pass into a pit below the couch, designed to receive it.

One known method of achieving the above object is to provide a knock-off shower positioned near the couch and running continuously, to prevent the paper web clinging to the Fourdrinier wire.

Another method utilizes photoelectric cells on either side of the paper web, which complete an electrical circuit when the paper web breaks and which in turn operates a knock-off shower.

Another method has been to use manually operated valves to turn on a knock-off shower.

One big disadvantage of the first method is that a continuously running shower consumes an excessive amount of water. In addition, it dilutes the contents of the couch pit, causing great difficulty in maintaining stock consistencies.

A disadvantage of the photoelectric cell arrangement is that the sensing device is usually positioned after one of

the presses, giving a signal which is too late to be effective. Also, the photoelectric cells eventually become covered with a thin film of paper stock and cease to sense a break in the paper.

In the manually operated valve arrangement, it is virtually impossible for the papermaker to anticipate or catch the break in time, by manually operating the water valve, especially at the high speeds at which the machines are operated.

The present invention provides an arrangement which senses a break in the paper web right at the couch and as close as possible to the actual break.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout, FIGURE 1 shows the couch end of a paper machine Fourdrinier containing a conventional suction couch assembly **10** and embodying the present invention shown generally at **11**.

The suction couch assembly **10** contains a conventional vacuum chamber **12** to which is attached the present invention **11**, positioned on the dry side. The invention shown at **11** comprises a detector head assembly which is in reality a vacuum chamber having a direct connection **13** to the main suction couch vacuum chamber **12**. Also shown in FIGURE 1 is the high pressure knock-off shower **14**.

In FIGURES 2 and 3 are shown details of the detector head assembly and the detector body **15** which supports the vacuum sensor **16**. Vacuum sensor **16** has a plurality of inlets **17** all leading to an interconnecting header **18**. At one end **19** of header **18**, a pipe connection **13** is made to the suction box vacuum chamber **12**. At the other end of header **18** is a connection **20** to a water supply, which is used for routine cleaning of the sensor **16**. FIGURE 3 shows clearly how vacuum sensor **16** is kept in sealing contact with the inner surface of the couch roll **10**, using a plurality of springs **21** to provide the necessary pressure.

FIGURE 4 shows a schematic arrangement of all the components. The input side of a vacuum-recording controller **22** is connected to the detector head assembly in parallel with the connection **13** to vacuum chamber **12**. The output side of controller **22** is connected to a solenoid operated air valve **23** which operates an air operated water valve **24**. This valve **24** controls the supply of high pressure water to knock-off shower **14**.

Also connected in the circuit is a ganged air/water valve **25** which has a water connection at **20** to the detector head assembly and an air connection to the air operated water valve **24**, in parallel with the solenoid operated valve **23**.

Referring to FIGURE 1, it will be seen that when the paper web follows its normal path, the holes **17** in vacuum sensor **16** are open to atmosphere and, therefore air will be drawn through via connection **13** into vacuum chamber **12**. When the paper web breaks, it clings to the suction couch and follows the path shown at **26** in FIGURE 1. This causes the holes **17** in vacuum sensor **16** to be sealed off, and a high vacuum then occurs in header **18**. This vacuum will be communicated to the recording controller **22** which will record the time of the break and at the same time energize the solenoid operated air valve **23**. Valve **23**, when energized, will operate the air operated water valve **24**, which will then admit high pressure water to the knock-off shower **14**. This will remove the web of paper **26** from the underside of the Fourdrinier wire and direct it into the couch pit.

To keep the holes **17** in vacuum sensor **16** clean and open and thereby avert unnecessary operation of knock-off shower **14**, a water supply is provided to allow periodical cleaning of holes **17**. This is a manual operation using air/water valve **25**. The operation of valve **25** also actuates the air operated water valve **24**, thereby admitting

high pressure water to the knock-off shower 14. This covers the eventuality of a paper break occurring during the purging operation.

The present invention can be used with one or more detector head assemblies per suction roll, as required.

The detailed design of the present invention could be varied in many ways, such as with the substitution of pneumatic pressure instead of springs to hold vacuum sensor 16 in sealing contact with the inner surface of suction couch 10.

It will be seen that the present invention, due to its position and construction, senses a break the instant it occurs. Also there are no electrical components on the machine itself, all the sensing being taken from an existing pneumatic source.

The present invention uses the minimum amount of high pressure water, the knock-off shower being operated only when necessary.

Another feature of the present invention lies in its "fail safe" characteristics; any blockage of the sensor inlet holes merely causing operation of the knock-off shower.

From the foregoing it will be seen that I have provided new and improved means for obtaining all of the objects and advantage of this invention.

I claim:

1. In a paper machine having a couch roll and a Fourdrinier wire carried thereby, the combination comprising a shower normally non-operating but adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and sensor means for automatically effecting operation of said shower upon breakage of said paper web, said means being located at said couch roll.

2. In a paper machine having a couch roll and a Fourdrinier wire carried thereby, the combination comprising a shower normally non-operating but adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and sensor means for automatically effecting operation of said shower upon breakage of said paper web, said means being located at said couch roll and being pressure actuated.

3. In a paper machine having a couch roll and a Fourdrinier wire carried thereby, the combination comprising a shower normally non-operating but adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and means for automatically effecting operation of said shower upon breakage of said paper web, said means being located at said couch roll and including a vacuum sensor.

4. In a paper machine having a couch roll and a Fourdrinier wire carried thereby, the combination comprising a shower normally non-operating but adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and means for automatically effecting operation of said shower upon breakage of said paper web, said means being located at said couch roll and including a vacuum sensor, said sensor being operatively connected to means for controlling the supply of water to said shower.

5. In a paper machine having a couch roll and a Fourdrinier wire carried thereby, the combination comprising a shower normally non-operating but adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and means for automatically effecting operation of said shower upon breakage of said paper web, said means being located at said couch roll and including a vacuum sensor and a water supply for cleaning said vacuum sensor.

6. In a paper machine having a couch roll and a Fourdrinier wire carried thereby, the combination comprising a shower normally non-operating but adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and means for automatically effecting operation of said shower upon breakage of said paper web, said means being located at said couch roll and including a vacuum sensor, said sensor being operatively connected to means for controlling the supply of water to said shower and a water supply for cleaning said vacuum sensor.

7. In a paper machine having a couch roll, a Fourdrinier wire carried thereby and a vacuum chamber, the combination comprising a normally non-operating shower adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and vacuum sensor means adjacent said wire and connected to said vacuum chamber, means for controlling the supply of water to said shower, said means being adapted to be actuated upon blockage of said vacuum sensor upon breakage of said paper web.

8. In a paper machine having a couch roll, a Fourdrinier wire carried thereby and a vacuum chamber, the combination comprising a normally non-operating shower adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and a vacuum sensor means adjacent said wire and connected to said vacuum chamber, means for controlling the supply of water to said shower, said means being adapted to be actuated upon blockage of said vacuum sensor upon breakage of said paper web and a water supply for cleaning said vacuum sensor.

9. In a paper machine having a couch roll, a Fourdrinier wire carried thereby and a vacuum chamber, the combination comprising a normally non-operating shower adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and a vacuum sensor means adjacent said wire and connected to said vacuum chamber, means for controlling the supply of water to said shower, said means being adapted to be actuated upon blockage of said vacuum sensor upon breakage of said paper web, said vacuum sensor means being positioned at said couch roll.

10. In a paper machine having a couch roll, a Fourdrinier wire carried thereby and a vacuum chamber, the combination comprising a normally non-operating shower adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and a vacuum sensor means adjacent said wire and connected to said vacuum chamber, means for controlling the supply of water to said shower, said means being adapted to be actuated upon blockage of said vacuum sensor upon breakage of said paper web, said vacuum sensor means being positioned at said couch roll and a water supply for cleaning said vacuum sensor.

11. In a paper machine having a couch roll, a Fourdrinier wire carried thereby and a vacuum chamber, the combination comprising a normally non-operating shower adapted to be actuated to prevent the paper web from clinging to said wire in the event of breakage of said paper web and a vacuum sensor means adjacent said wire and connected to said vacuum chamber, means for controlling the supply of water to said shower, said means being adapted to be actuated upon blockage of said vacuum sensor upon breakage of said paper web, said vacuum sensor means being positioned at said couch roll and said shower being positioned adjacent said couch roll.

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