

(No Model.)

G. C. GILL.
PAPER MACHINE.

No. 556,181.

Patented Mar. 10, 1896.

Fig. 1.

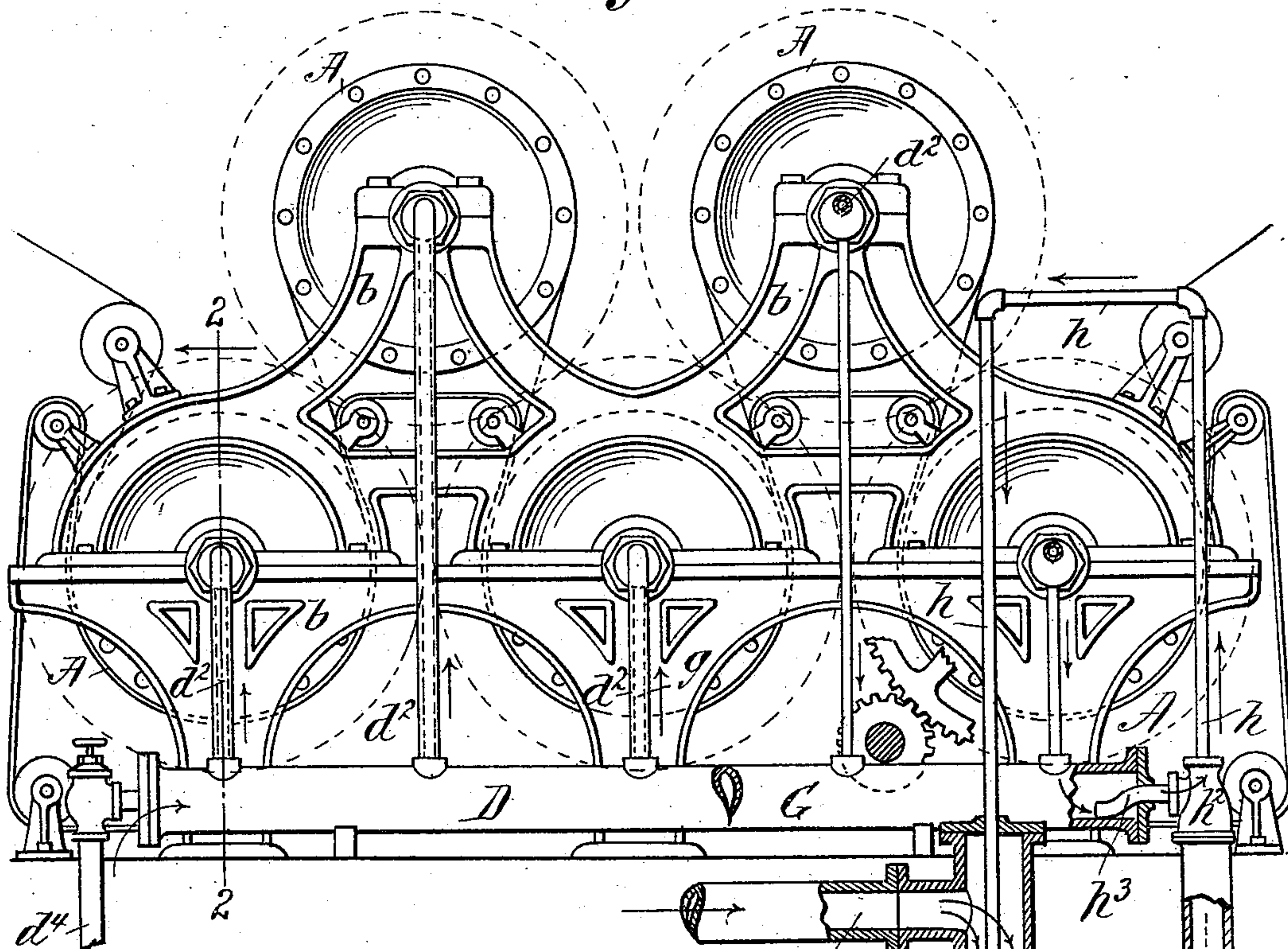


Fig. 2.

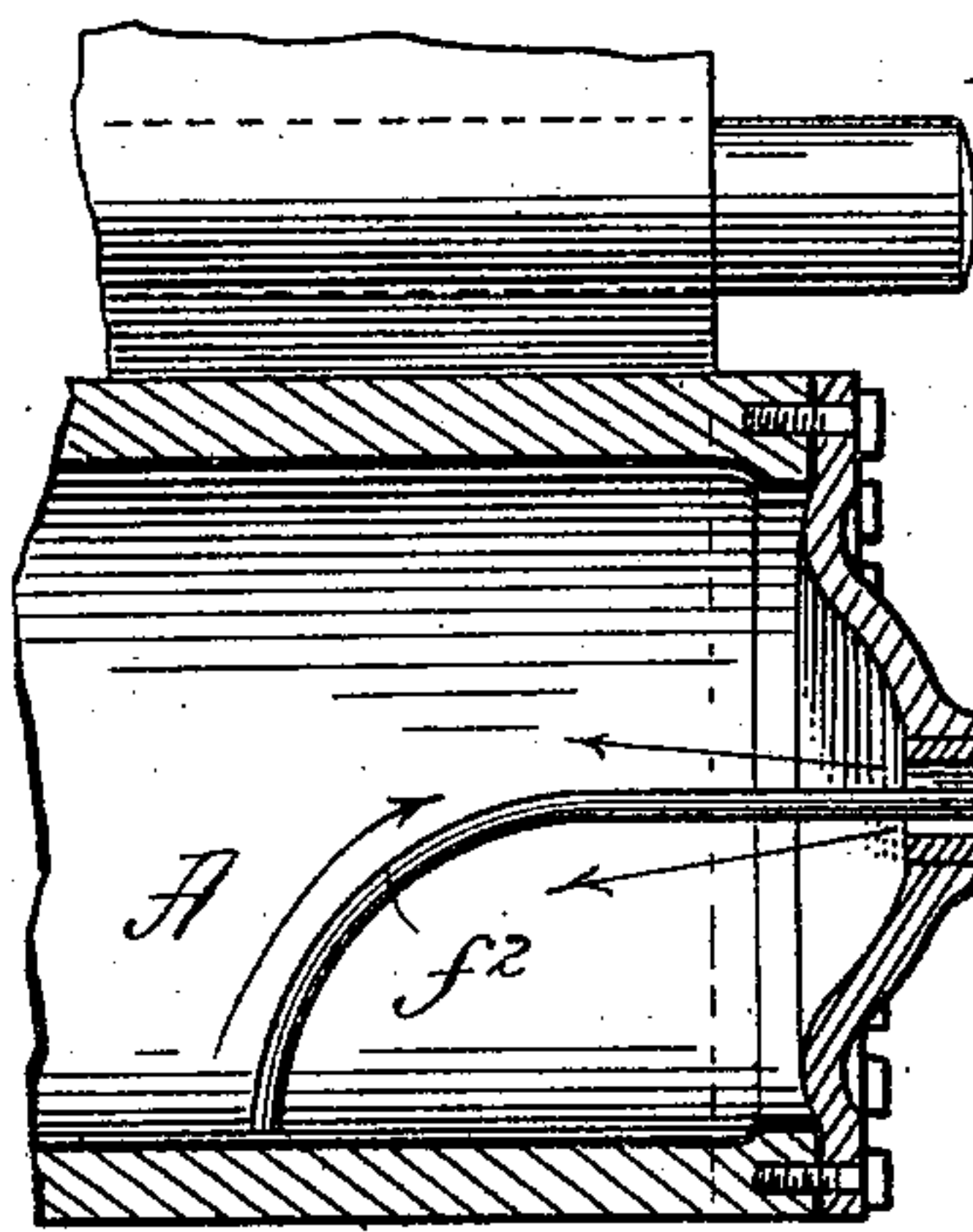


Fig. 3.

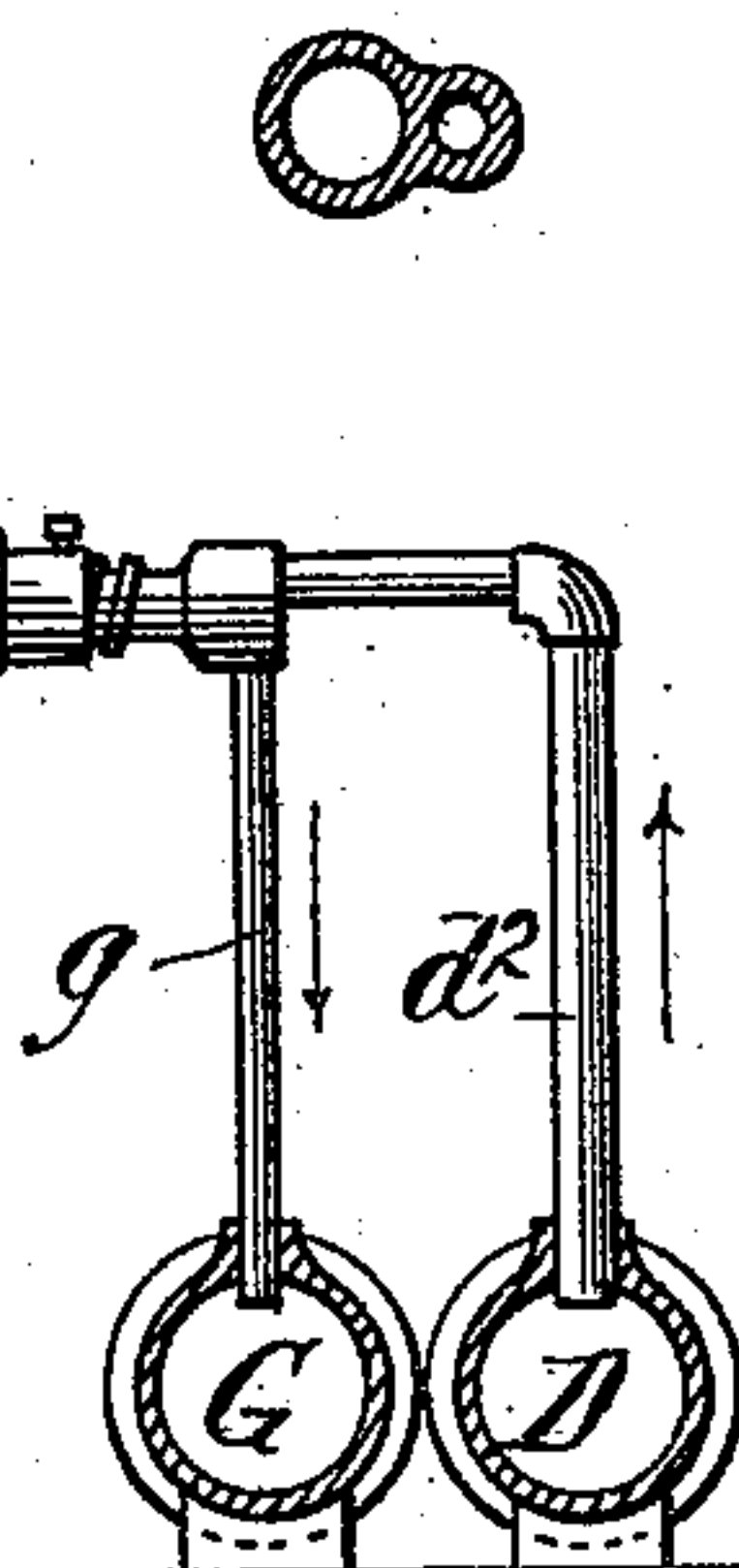
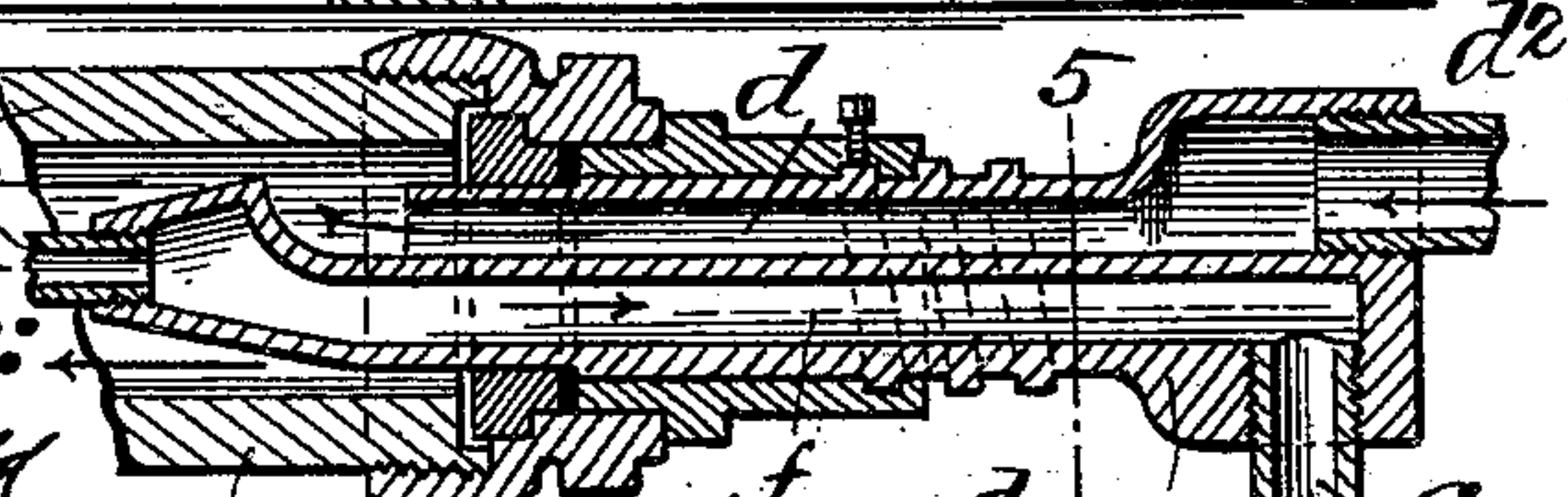


Fig. 4.



Witnesses:

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Fig. 5.



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PAPER-MACHINE.

SPECIFICATION forming part of Letters Patent No. 556,181, dated March 10, 1896.

Application filed June 17, 1895. Serial No. 552,991. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. GILL, a citizen of the United States of America, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Paper-Machines, of which the following is a specification.

As well known in the manufacture of paper, the web of pulp is passed around and over several rotary drier drums or cylinders which are heated by steam circulating therein. One disadvantageous condition which is found to exist against the most efficient drying action by the cylinders upon the web of paper consists in the filling of the drums with water by condensation up to the height of the journals, which are hollow, so that by reason of the drums being constantly about half-full of water decreased space for the circulation of steam remains, whereby the capacity for the drying operations, both in degree and the quality of the result, is very materially and unduly limited.

Various expedients have been devised or proposed for effecting the withdrawal of the accumulated water in the drums, some of which, while practicable in a degree, have been very complicated and expensive, while others have been so inefficient as to render their employment inadvisable.

It is the object of the present invention to provide means for keeping the drier-drums of a paper-machine—such as a Fourdrinier machine—emptied of all condensations, whereby a full holding capacity of the drum for steam will always be available, which means for such purpose shall be simple, easily applied, automatic, continuous, and entirely practical and efficient in its operation, requiring no attention or care, and withal very inexpensive; and for the accomplishment thereof the invention consists in the combinations and arrangements of parts, all substantially as will hereinafter fully appear, and be set forth in the claims.

In the drawings, Figure 1 is a side elevation of an intermediate part of an ordinary Fourdrinier paper-machine, which comprises a series of steam drier drums or cylinders, and which has combined therewith the apparatus which constitutes the present invention, parts thereof being in vertical section. Fig. 2 is a

sectional elevation taken on the plane indicated by the line 2 2, Fig. 1. Fig. 3 is a horizontal cross-section in detail taken on the line 3 3, Fig. 1. Fig. 4 is a sectional view, on a larger scale, through one of the journals and connected parts for one of the drier-drums. Fig. 5 is a cross-section in detail taken on the line 5 5, Fig. 4.

Each drier drum or cylinder A has at its end a journal *a*, which is supported in the side standard *b* of the machine, and has coupled thereto the tubular connection B, having therein the two separate passages *d* and *f*, the one, *d*, of which has clear and free communication with the interior of the rotary drier-drum A through the tubular journal *a*. The parts *a* and B are so coupled and packed that while the latter is stationary it constitutes no impediment to the free rotation of the journal *a*, and yet the connection is suitably steam-tight. The passage *f* has connected to its inner end the tube *f*², which extends through the hollow journal *a* within the cylinder A, and has its inner extremity downwardly turned, terminating near the inner periphery of the drum, as seen in Fig. 2.

To the outer end of the journal connection B is connected, in communication with the steam-passage *d* therethrough, the steam-pipe *d*², which also has connection with the larger steam-pipe D, which ranges along the side of the machine in common to the several drier-drums, and having steam connections with all of said drums through the form of journal connections which has been briefly described for one of the drums, and said steam-supply pipe D, connected, as aforesaid, with the several steam-distributing pipes *d*², has a pipe *d*⁴ leading thereinto from the boiler.

Each double-passaged connection B has connected to the passage *f* thereof a pipe *g*, which extends downwardly to connection with the large pipe or conduit G, which ranges alongside of the aforesaid pipe D. Thus for a set of drums there are provided in common thereto the two pipes D and G, both having connections through individual branch pipes with the steam and exhaust passages through the journals of the several drier-drums.

The pipe G, which is closed, except as to the branched pipe connections *g g*, has connected thereto a suction apparatus and a pe-

culiarly combined and arranged outlet-conduit for condensation drawn by the said suction apparatus from the cylinders into the pipe G and out from the latter into any suitable receptacle or to waste; and, describing the last-referred-to apparatus specifically as here shown, (although limitation is not to be imposed upon the specific form or detailed construction thereof,) it will be pointed out that there is a suction-pipe h , which is in the form of an inverted U, and which has its one end connected to the coupling h^2 and its other vertical limb depending through the closed head of and within a larger vertical pipe i , into which is laterally entered a water-supply pipe j , the place of entrance of pipe j into pipe i being somewhat above the lower open end of the smaller pipe h . Water under suitable pressure is caused to constantly run from pipe j into and down through pipe i .

From the hollowed coupling h^2 the pipe-section h^3 enters through the head or end wall of the aforementioned large horizontal pipe G, and at the lower end of the said coupling h^2 is connected the downwardly-extending conduit m , which, preferably, has a return-bend, as seen at m^2 , to constitute a trap or water seal, and with the discharge continuation or passage m^3 , which may lead back to the boiler or elsewhere.

The water entered and falling in the pipe i causes a suction through the pipe h and within the pipe G, the effect of which is to draw through the pipe f^2 , passage f , and pipe g into and through the said pipe G water and condensation from the drier-drum, and the same in passing into the coupling h^2 (at the top of which the suction-pipe h is entered) will by reason of its gravity fall down in the pipe m , the force of the suction or vacuum being insufficient to carry the water up to and across the intermediate horizontal member or back of the return-bent suction-conduit h . In practice there may be in some extent a small proportion of steam not fully condensed, which will be drawn around into the pipe i ; but this is immaterial.

Other means than those shown may be employed for creating the vacuum or suction effect in an upward direction at the junction of depending conduit m and the branch thereof which leads into the pipe G without departing from the essentials of the present invention, and while the particular arrangement of common steam-supply pipes D with branched steam-distributing pipes leading to the several drier-drums, and also of the common large conduit or chamber G with individual branches g , having a siphon-like communication with the lower interior portions of the drums, are shown as advantageous, very desirable, efficient, ingenious, novel and valuable, the invention is not to be limited to this particular arrangement inasmuch as the gist of the invention consists in the combination, with a drier-drum of the paper-machine having an adequate steam-inlet conduit, of an

outlet-conduit which has a communication through the journal of the drum with a lower portion of the interior thereof, and which has a connection outside of the drum with a chamber or passage connected to the top of which is a suction-pipe and to the bottom of which is a downwardly-directed discharge-passage.

It is understood that in this machine the steam which is entered in the drier-drums is at such low pressure as to show practically no pressure at the gage. Hence there is little or no liability of steam passing together with the condensation outwardly from the cylinders through the small siphon-like conduits $f f^2 g$, and the undue escape of steam is prevented, furthermore, by reason of the comparatively small size of the conduits for the condensations, and also by reason of the provision of the water seal or trap at m^2 .

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

1. In a paper-machine, the combination with a series of rotary drier drums or cylinders each having a steam-inlet conduit, of the chamber or conduit, G, provided in common to the several drums and having siphon-like branched conduits leading from said conduit, G, through a journal of each of the drums and communicating with the interior of the drums near their bottoms, a suction-pipe, h , having a connection for suction with the conduit, G, and having a depending limb, the pipe, i , into which said limb enters and which has the sidewise-entering water-supply pipe, j , and a downwardly-directed conduit, m , having connection with the said conduit, G, at a point adjacent and under the place of connection to said conduit of the suction-pipe, substantially as described.

2. In a paper-machine in combination, a series of rotary drier drums or cylinders each having a steam-inlet conduit, the conduit or chamber, G, provided in common to the several drums and having branched conduits leading therefrom through a journal of each of the drums and communicating with the interior of the drums near their bottoms, the coupling, h^2 , having a branched pipe, h^3 , connecting the conduit, G, the return-bent suction-pipe, h , having one end entered in the top of the hollow coupling, h^4 , the vertical pipe, i , of larger diameter than the suction-pipe and within which the other limb of said suction-pipe extends, the water-supply pipe, j , entering pipe, i , above the lower end of the said entered suction-pipe, and the conduit, m , connected to the lower end of the coupling, h^2 , and having the return-bent passage and the discharge continuation, m^3 , all substantially as described and shown and for the purposes set forth.

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Witnesses:

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