

No. 690,686.

Patented Jan. 7, 1902.

C. H. ATKINS.
PAPER MAKING MACHINE.

(Application filed Apr. 15, 1901.)

(No Model.)

4 Sheets—Sheet 1.

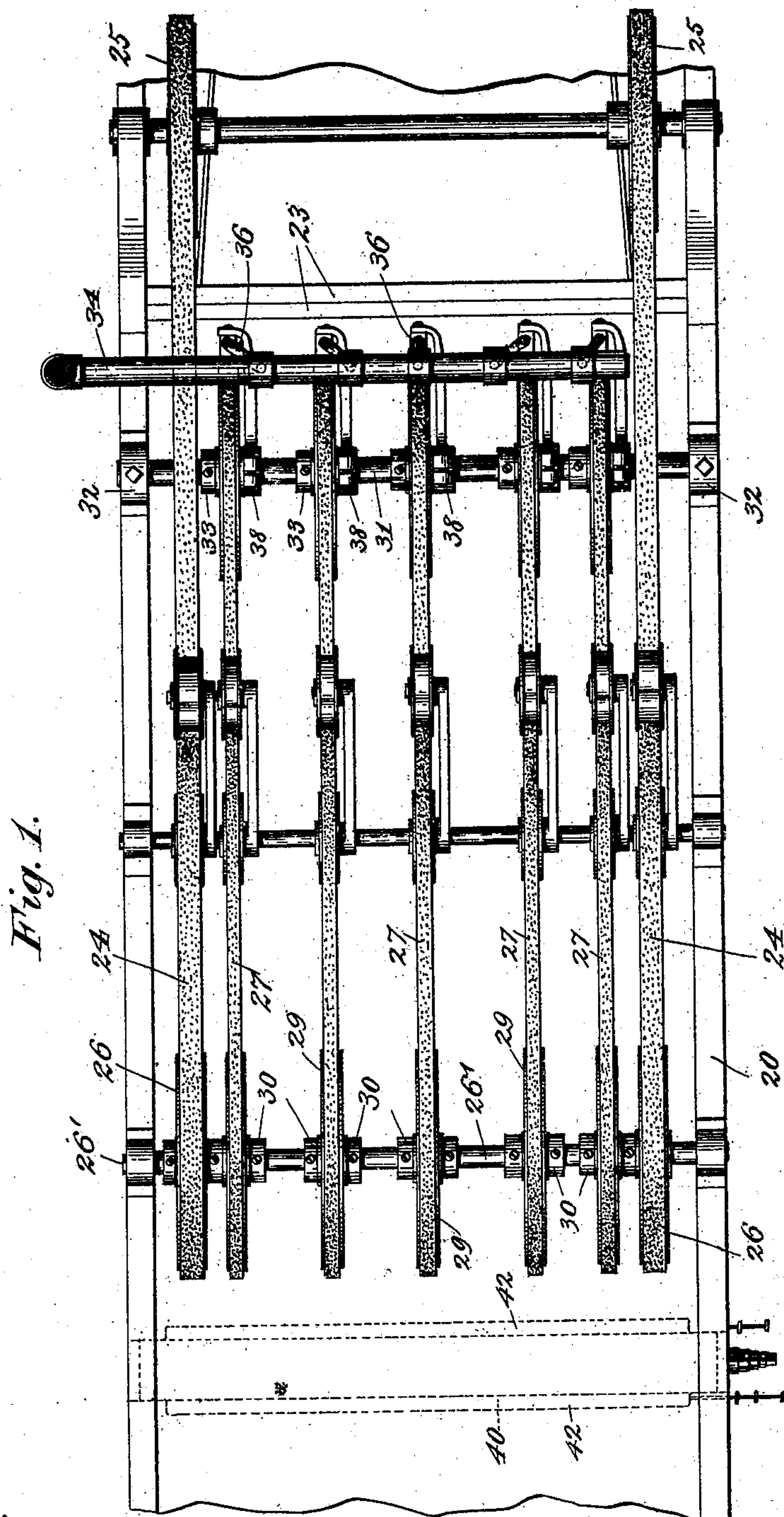


Fig. 1.

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4 Sheets—Sheet 2.

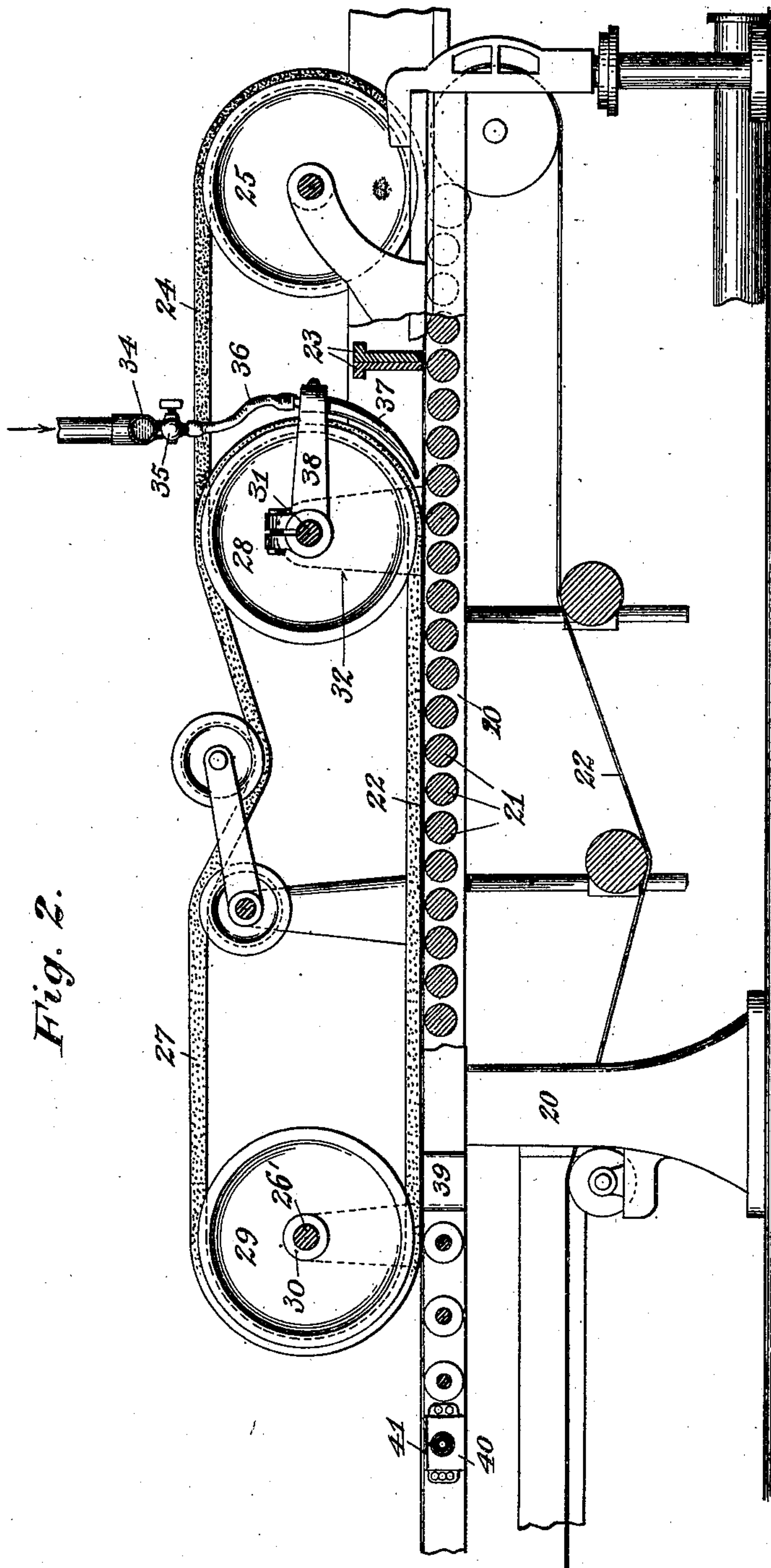


Fig. 2.

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4 Sheets—Sheet 3.

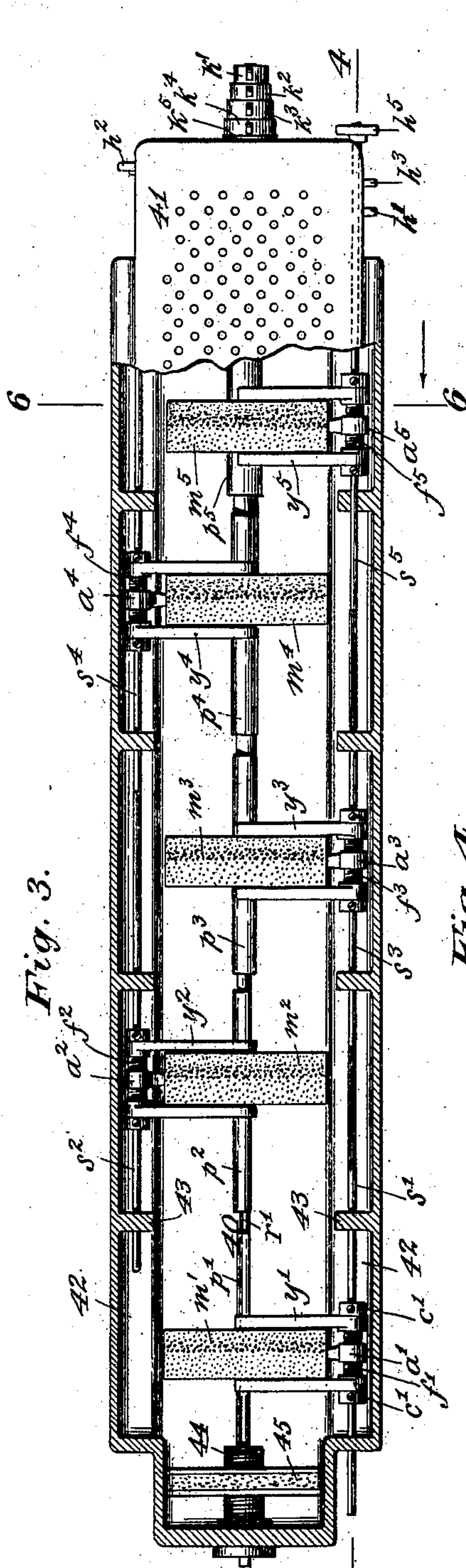


Fig. 3.

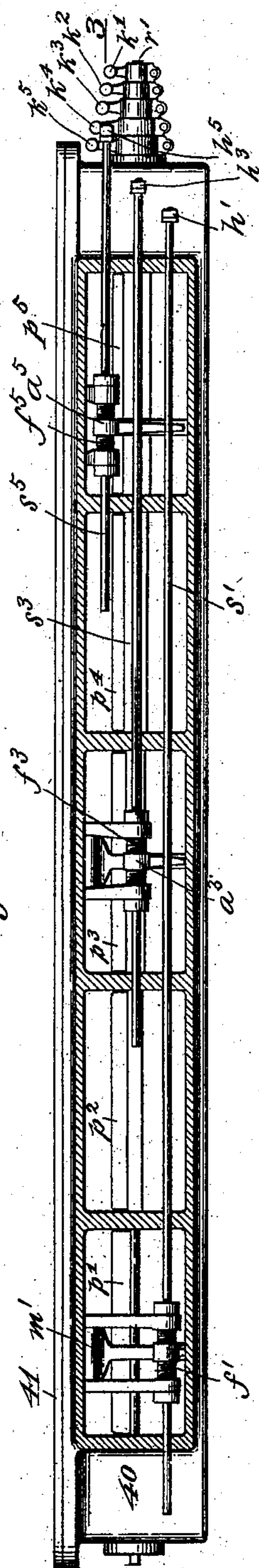


Fig. 4.

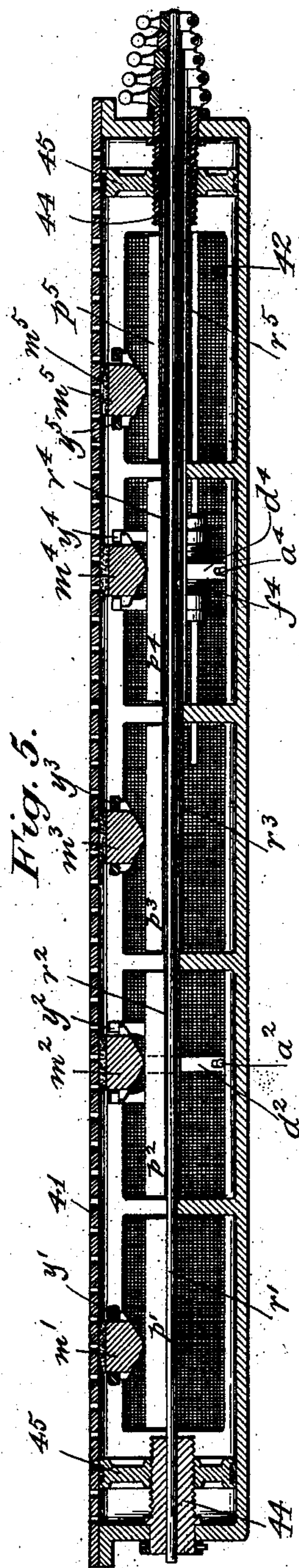


Fig. 5.

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4 Sheets—Sheet 4.

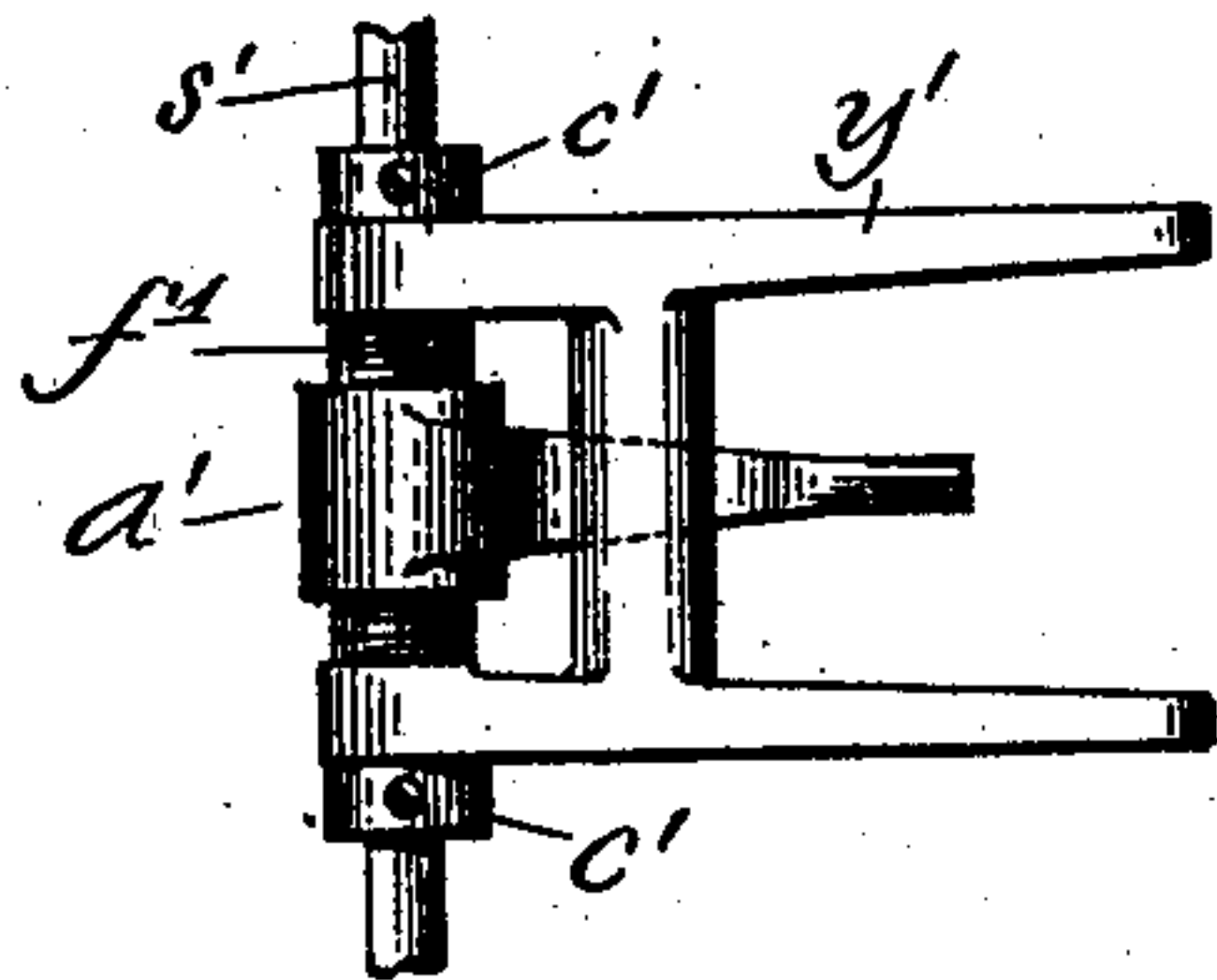


Fig. 7.

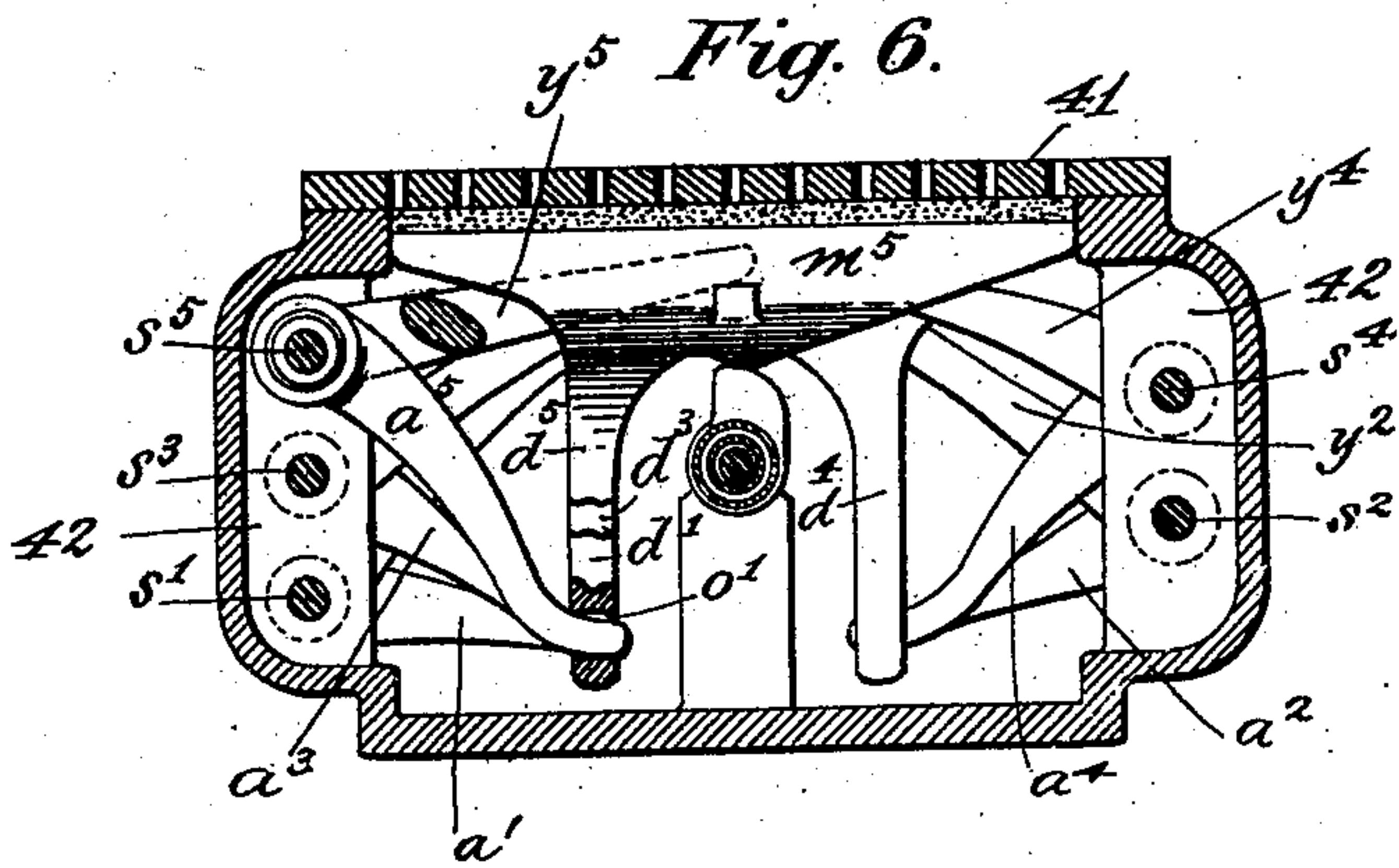


Fig. 6.

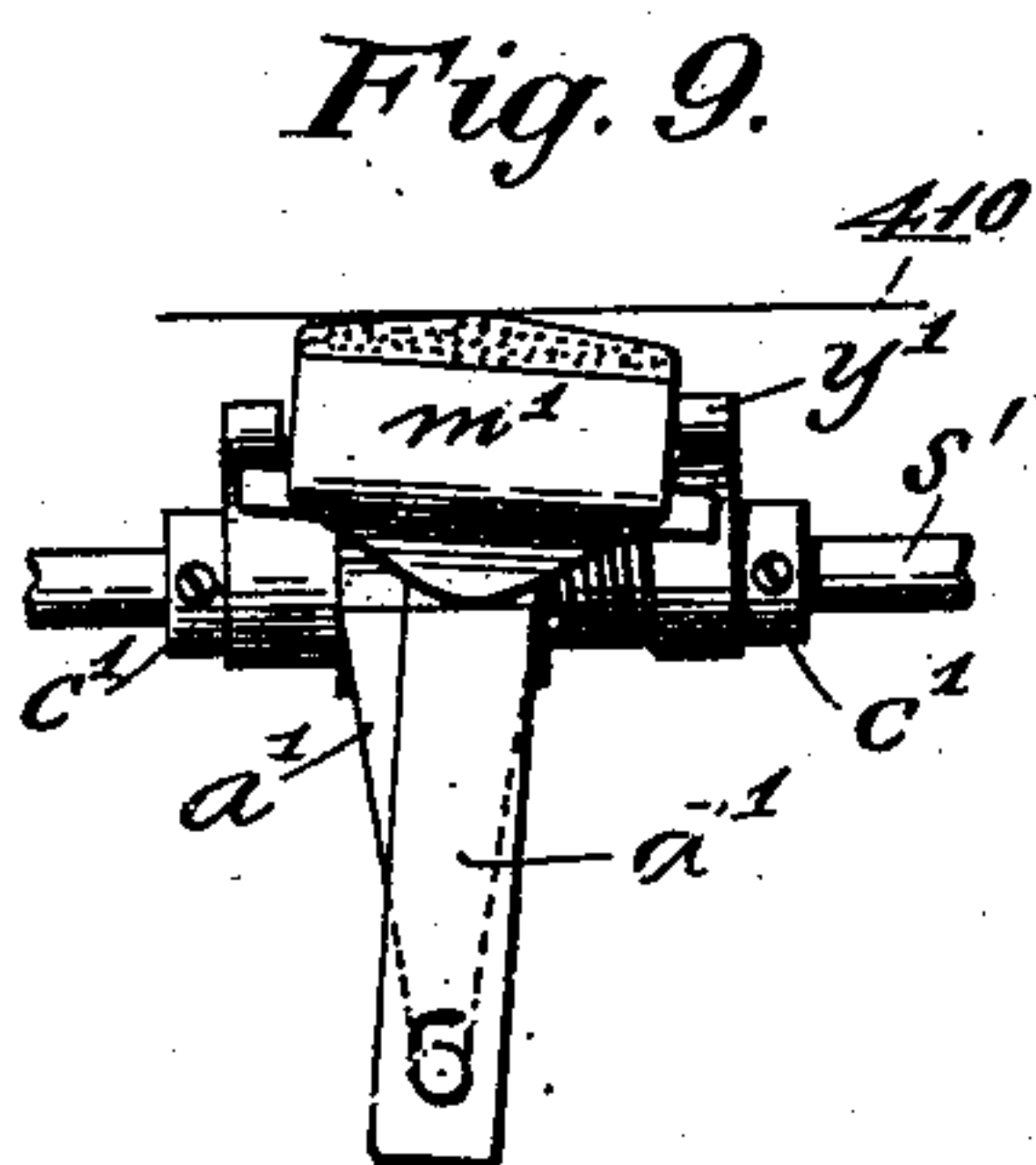


Fig. 9.

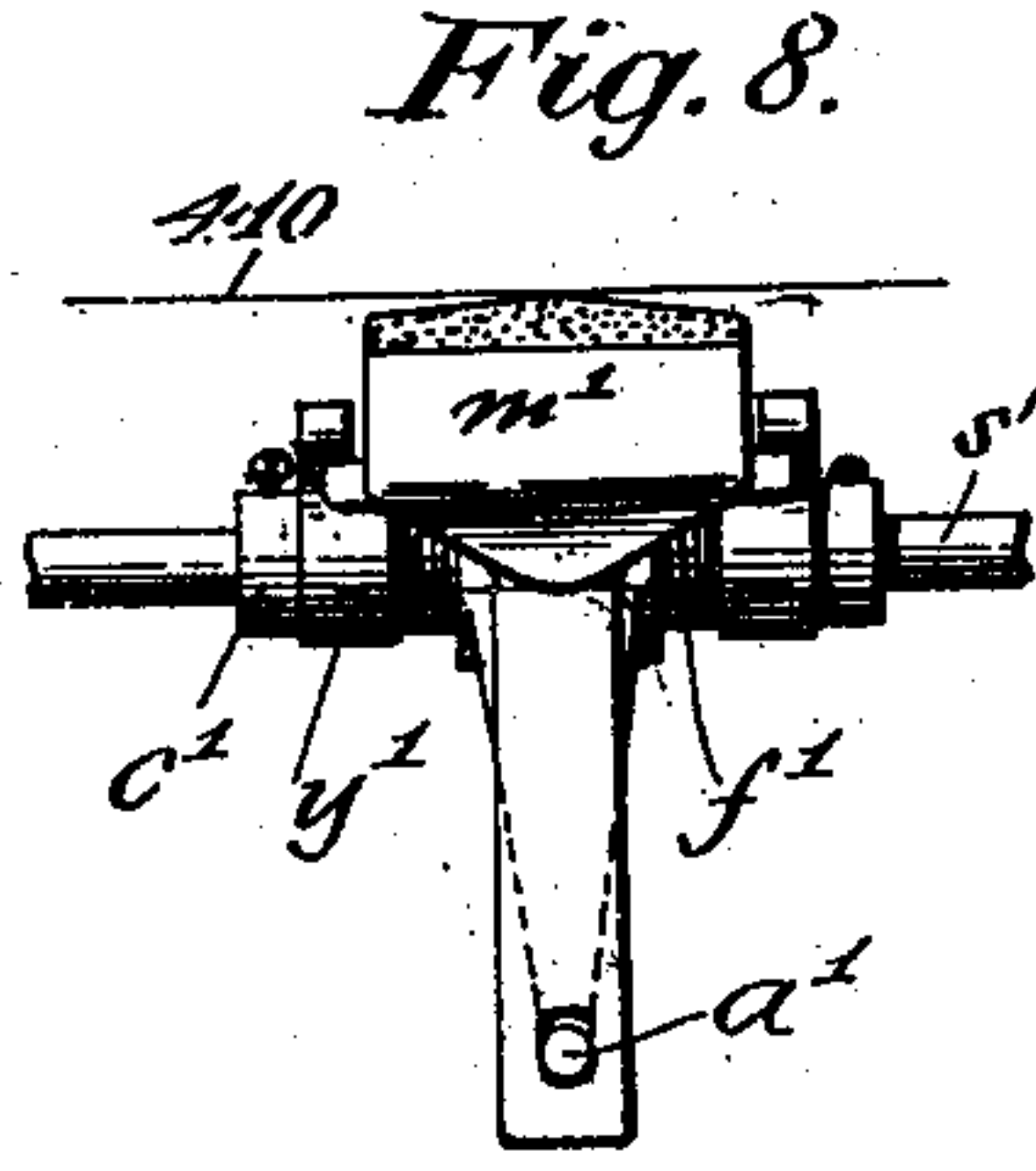


Fig. 8.

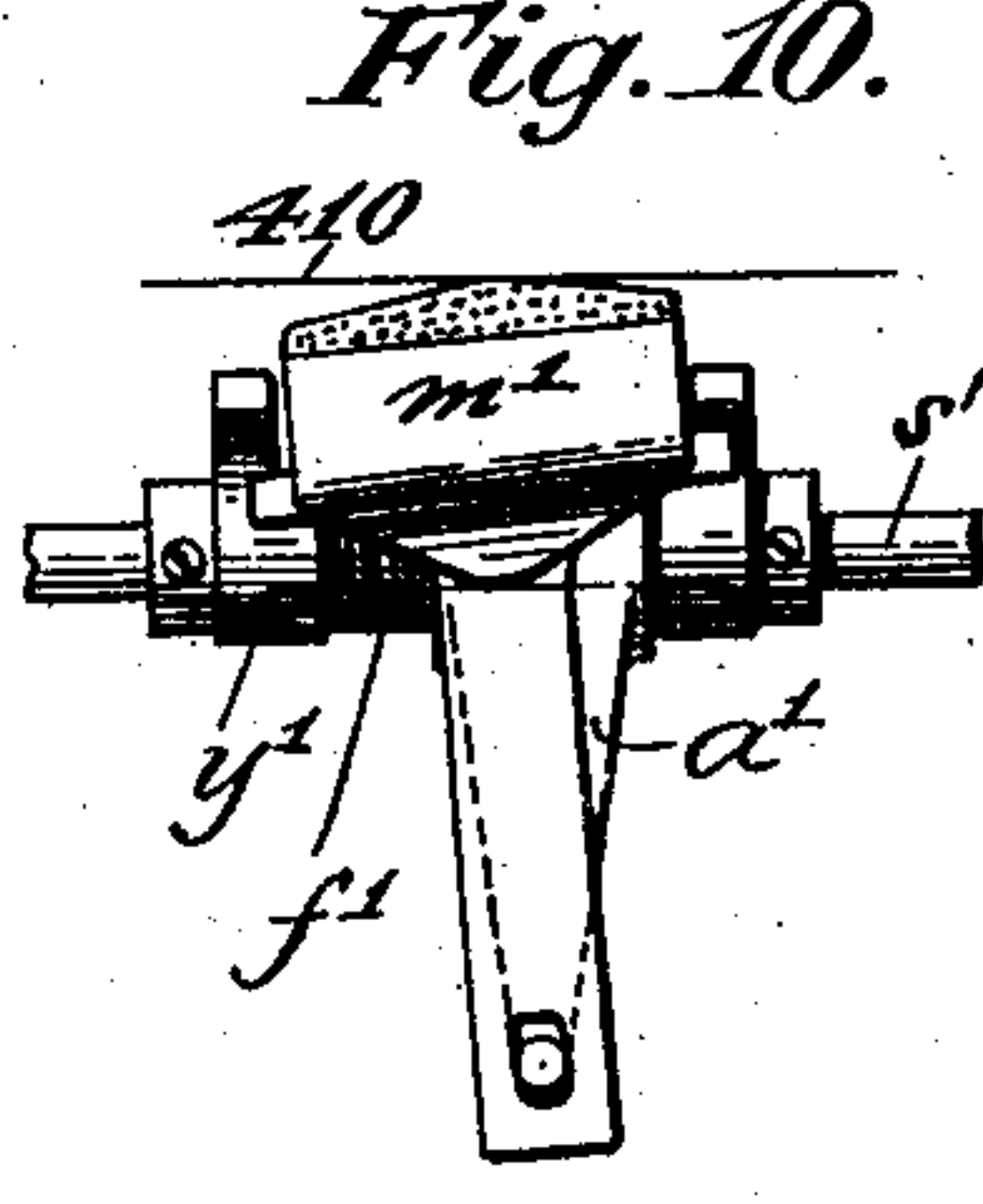


Fig. 10.

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UNITED STATES PATENT OFFICE.

CHARLES H. ATKINS, OF SPRINGFIELD, MASSACHUSETTS.

PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 690,686, dated January 7, 1902.

Application filed April 15, 1901. Serial No. 55,884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. ATKINS, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Paper-Making Machines, of which the following is a full, clear, and exact description.

10 This invention relates to paper-making machines, and more especially to that class thereof which in the art are known as "Fourdrinier" machines and in which paper-pulp is passed over an endless wire apron, the sides 15 of which are limited or bounded by so-called "deckle-straps," said screen and deckle-straps moving in unison, so that the water contained within the pulp may be withdrawn therefrom and the pulp will ultimately form an endless 20 sheet. The paper or sheet as it passes beyond the deckle-straps will have at its sides rough edges, ordinarily called "deckle edges;" and my invention has for one of its principal objects the provision of means whereby these 25 deckle edges may be obtained with unusual certainty and practicability of the character and form desired.

My invention has, furthermore, for its object the provision of means whereby the efficiency of any one of said heads may be varied at opposite sides thereof; and my invention comprises a series of heads each one of which is tiltable laterally, so as to vary the proximity of either edge relatively to the under side of the foraminous cover of the suction-box, so that the amount of water withdrawn from the pulp may be regulated to a nicety and a fine feather deckle edge may be obtained.

40 Further improvements will be found in the particular construction and organization of some of the component elements of the apparatus, as will be hereinafter described, and particularly pointed out in the claims.

45 In the accompanying drawings, in which similar characters denote similar parts, Figure 1 is a plan view of a portion of a paper-machine incorporating my invention. Fig. 2 shows a side view, partly broken away, of that portion of the machine shown in Fig. 1. Figs. 3, 4, and 5 represent different views in detail of my improved suction-box, Fig. 3

illustrating the top view thereof and partly shown in a horizontal section taken on line 3 3 of Fig. 4. Fig. 4 is a vertical section taken 55 on line 4 4 of Fig. 3, and Fig. 5 is a central longitudinal section of said box. Fig. 6 shows a vertical cross-section on an enlarged scale and taken on line 6 6 of Fig. 3. Fig. 7 is a top view illustrating the manner in which the 60 heads within the box are controlled, the head being removed. Figs. 8, 9, and 10 illustrate the manner in which the heads may be operated to vary the efficiency of their oppositely-disposed sides when in coöperation with the 65 under side of the foraminous box-cover.

As has been above stated, it is one of the principal objects of my present invention to provide a machine in which the deckle edges of the paper may be made very thin, so that 70 a nice finished product may be obtained.

In the drawings, 20 denotes a suitable framework supporting a plurality of rollers 21 for supporting a screen 22, which is of ordinary construction and on which the pulp is carried, so that the water which is contained in 75 said pulp may gradually find its way through said endless wire apron and leave the pulp in less wet condition. Disposed near one end of said screen are the sluice-bars or slices 23, 80 also of ordinary construction and provided for preventing the foam of the pulp from passing beyond that point.

Disposed at the sides of the endless wire apron are a pair of side deckles 24, carried on 85 pulleys 25 and 26, which may be mounted upon shafts 26', respectively, the latter being supported in any suitable manner on the frame, and said side deckles 24 extend at the initial portion of this apparatus endwise be- 90 yond the slices, which are transversely between them.

Interposed between the side deckles 24 are shown a series of intermediate deckles 27, the number of which may be varied as de- 95 sired, said deckles being carried on pulleys 28 and 29, respectively, the latter being mounted for rotation on the shaft 26', above referred to, and positioned thereon—as, for instance, by collars 30—while the pulleys 28 are preferably loosely mounted upon a shaft 31, which in the present instance is shown stationary in side frames 32, secured to or forming a part of the frame 20. The position of the 100

pulleys 28 28 is such that the intermediate deckles 27 are forward of the sluice-bars, as shown in Figs. 1 and 2. The pulleys 28 may be positioned on the shaft 31 by collars 33, disposed on one side of said pulleys 28, as seen in Fig. 1.

It will now be understood that the pulp passing beyond the sluice-bars 23 will fill the space between the side deckles 24 and will therefore as a matter of course lie on the endless wire apron, so that as the latter travels forward the entire thickness of the layer of pulp would be carried beneath the intermediate deckles 27 and the top of the wire, whereby the close contact between these parts would of course be prevented. Means are provided whereby not only this difficulty will be avoided, but whereby, furthermore, the consistency of the pulp adjacent to the deckles may be reduced, so that the thin film of water containing more or less pulp will travel along with said deckles and the paper finally issued from between said deckles will then have a fine feather-edge. The means which are preferably employed for this purpose may be clearly seen in Fig. 2, in which 34 denotes a water-supply pipe provided with a series of stop-cocks 35, arranged crosswise of the machine and connected by flexible tubes 36 with a series of nozzles 37, the number of which may correspond to the number of intermediate deckles 27. Each of the nozzles 37 is carried in this instance by an arm 38, the rear end of which is clamped to the shaft 31, above referred to, while the lower end of said nozzle may be positioned relatively to the point of contact between the deckle-strap and endless wire apron in any desired manner, so as to direct a stream of water in the required direction and with the proper force, the stop-cocks 35 serving as a means for regulating the supply of water thrown upon the endless wire apron and to wash away or remove the pulp from the endless wire apron and in alignment with the intermediate deckles 27, as will be readily understood.

Disposed beneath the endless wire apron, near the point where the deckle-straps leave the endless wire apron and where the fibers of the pulp are sufficiently interwoven and freed from water to constitute a sheet of paper, although in wet condition, is a suction-box 39, which may be of any suitable construction, this suction-box removing all surplus moisture from the paper and leaving the same in proper condition to have a water-mark impressed upon it, the mechanism for performing this work not being shown.

After the sheet has been provided with a water-mark it becomes necessary to withdraw all moisture from the several sheets, the number of which of course depends upon the number of spaces between the deckles. This water is withdrawn from the stock by a suction-box 40, containing a number of improvements, which also form subject-matter of this application. The suction-box 40 is provided

with a foraminous cover 41, and inasmuch as this box constitutes a vacuum-box, into which the water is withdrawn from the paper traveling above the same, it becomes necessary to seal all such holes in said cover as are disposed in alinement with the deckle-straps, said holes being at this time not covered by any paper, so that naturally the vacuum in said box would be broken and the efficiency thereof impaired. Now since the deckle-straps 27 are adapted for adjustment laterally of the machine it will become necessary to provide a mechanism whereby the proper holes in the foraminous cover may be sealed no matter what position the deckle-straps may be in, and, as above stated, my invention comprises the combination, with said suction-box, of a plurality of heads, which are operative independently of and relatively to each other, and the mechanism, substantially as hereinafter particularly described, for operating and adjusting the same in proper position being disposed exteriorly of the box, so that as a matter of fact any one and all of the heads are completely under the control of the operator, who can make the necessary adjustment from the side of the machine.

Referring more particularly to Figs. 3, 4, and 5 of the drawings, it will be seen that the suction-box 40 contains a series of heads or members the number of which corresponds to the number of intermediate deckle-straps employed, five being shown. Commencing on the left of Fig. 3, m' denotes a head or member, the top of which may be covered with rubber or other suitable material and which is of a width corresponding to that of the intermediate deckle-straps 27, while the length of said head will permit the same to be moved within the box. (See Fig. 6.) The head m' is primarily mounted for movement longitudinally of said box, while in addition to such movement said head may be raised or lowered in order to bring the rubber top into contact with or to be free from the under side of the foraminous cover 41.

The box 40 is provided with a pair of side pockets 42, which are preferably divided into sections by partitions 43. One of said pockets supports a shaft s' , projecting through the end walls of said pocket and having at one end thereof a handle h' , while near the other end thereof said shaft carries a pair of collars c' , between which is mounted a yoke y' , the arms of which engage the member m' at opposite sides thereof, and it will therefore be seen that when said shaft s' is moved longitudinally the member m' will be shifted in said box.

Secured to the shaft s' and intermediate the arms of the yoke y' is a screw-threaded sleeve f' , in engagement with an arm a' , the lower end of which may enter an aperture or opening o' , disposed at a point remote from its support and in a depending arm d' , secured to or forming a part of the head m' . It will be seen that when the shaft s' is rotated

the arm a' will be moved longitudinally of said shaft and relatively to the yoke y' and that therefore the head m' will be tilted laterally between the arms of said yoke, this movement resulting in varying the proximity of both oppositely-disposed edges of said head relatively to the under side of the cover, as indicated in Figs. 9 and 10, by the line 410, these figures illustrating the effect of the movement of the arm a' longitudinally of said shaft by the mechanism just mentioned. In addition to the movement longitudinally of the suction-box and the tilting movement laterally of its width means are provided whereby the head m' may be raised or lowered relatively to the cover, these means consisting in the present instance of a cam projection p' , secured to or forming a part of a rotatable rod r' , said cam being of such length as to correspond to its box-section, so that the head m' may be moved from end to end of said section and yet be under the control of the cam p' . The rod r' is journaled at both ends in the adjusting-sleeves 44, which are preferably externally screw-threaded and serve for adjusting the deckle-heads 45 into alinement with the side deckles 24, and said rod r' is provided at its extreme right end with the handle or knob k' , whereby said rod may be turned to raise or lower the head m' relatively to the cover 41, as desired, so that, to recapitulate, the member m' has three distinct movements—first, a shifting movement bodily longitudinally of the suction-box; second, a vertical movement relatively to the cover of said box, and, third, a tilting movement, also relative to said cover, so that by these means I am enabled to regulate and vary the efficiency as well as location of the head m' as required.

As above stated, my improved suction-box is herein illustrated as having five heads to correspond to the number of intermediate deckles shown in the machine, and the operation of each one of the remaining four heads is substantially the same as the one just described.

The head m^2 is herein shown as being mounted for movement longitudinally of the suction-box by a shaft s^2 , having the yoke y^2 , carrying a screw-threaded sleeve f^2 , which engages and is adapted to move the arm a^2 longitudinally of the shaft, tilting the head m^2 as required. The means for raising and lowering the head m^2 is in this instance a cam-piece p^2 , secured to the end of a tubular rod r^2 , which is operable by a knob k^2 , secured to the outer end of said rod. Likewise the head m^3 may be shifted longitudinally by a shaft s^3 , raised by a cam p^3 on the tubular rod r^3 , and it may be tilted by rotating the shaft s^3 and with it the screw-sleeve f^3 , engaging the arm a^3 . In a similar manner the head m^4 is under control of the shaft s^4 and the cam p^4 on the tubular rod r^4 , while the head m^5 is under control of the shaft s^5 , the cam p^5 , and the tubular rod r^5 , the several

shafts s' , s^3 , and s^5 being preferably superposed to each other within one side pocket of the suction-box, while the other remaining shafts s^2 and s^4 for operating the heads m^2 and m^4 , respectively, are shown located within the other side pocket of the suction-box 40, the several members of the operating mechanism of each individual rod or shaft being substantially the same throughout, so that the description of the first one, as given above in detail, will answer for all the remaining ones.

The suction-box 40 constituting a vacuum-box, it may be advantageous to employ, in connection with the several shafts projecting through the end walls of said box, stuffing-boxes or similar devices, which may be of any suitable construction, and I wish it to be understood that I do not confine my invention to the particular construction and organization of the several elements as hereinbefore described, since many changes may be made therein without departing from the gist of my invention.

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

1. The combination, with the endless wire apron, the outer pair of deckles and the slice-bar transversely arranged between the lower courses of the outer deckles, of a plurality of deckle-straps coöperative with the wire along courses forward of the slice-bar, nozzles directed upon the wire adjacent the initial point of contact of the intermediate deckles therewith, and conduits for forcing fluid under pressure through said nozzles.

2. The combination, with the endless wire apron, the outer pair of deckles and the slice-bar transversely arranged between the lower courses of the outer deckles, of a plurality of deckle-straps which are bodily transversely adjustable, and coöperative with the wire along courses forward of the slice-bar, nozzles which are transversely adjustable to correspond with the positions of said intermediate deckles, directed upon the wire adjacent the initial point of contact of the said intermediate deckles therewith, and conduits for forcing fluid under pressure through said nozzles.

3. In a paper-machine, the combination with the endless wire apron, the usual pair of side deckles, and the plurality of intermediate-arranged deckles transversely adjustable, of a transversely-arranged support adjacent the initial ends of the said intermediate deckles, a plurality of brackets individually transversely adjustable on said support, and a plurality of nozzles carried by said brackets directed upon the wire adjacent the initial point of contact of the intermediate deckles therewith.

4. In a paper-machine, the combination with an endless wire apron, the usual pair of outer deckles, and the plurality of intermediate deckles transversely adjustable, of the transversely-arranged shaft 31 supporting the

series of adjustable brackets 38, the series of nozzles corresponding to the intermediate deckles, carried by said brackets, and directed upon the wire adjacent the initial point of contact of the intermediate deckles therewith, the common supply-pipe 34, and the series of flexible conduits between said pipe and the several nozzles.

5. The combination with the endless wire apron, the usual pair of outer deckles, and the plurality of intermediate deckles bodily transversely adjustable, of the transversely-arranged shaft 31 supporting the series of adjustable brackets 38 corresponding to the intermediate deckles, the series of nozzles carried by said brackets, the common supply-pipe 34, the series of flexible conduits between said pipe and the several nozzles, and the cocks 35 for opening and closing connection between the supply-pipe and the individual flexible conduits.

6. The combination, with the endless wire apron, the usual pair of outer deckles, a plurality of intermediate deckle-straps coöperative with the wire, and a transverse shaft, having pulleys for the intermediate deckles, of a series of nozzles for removing the pulp from the wire adjacent to the intermediate deckle-straps and near the initial point of contact thereof with said wire, fluid-supply conduits connected with said nozzles, and bracket-arms, on which said nozzles are individually mounted, which are supported on and radially adjustable relatively to the said deckle-pulley shaft.

7. The combination, with an endless wire apron, a pair of outer deckle-straps coöperative therewith; and one or more intermediate deckles laterally adjustable, and a suction-box having a foraminous cover; of sealing-sections for closing the holes in portions of the cover movable endwise in the box and also bodily movable against and away from the under side of the cover; and means operable exteriorly of the suction-box for both endwise adjusting the sealing sections and moving them from or against the cover.

8. The combination, with an endless wire apron, and deckle-straps which are bodily adjustable to occupy positions nearer or farther apart as desired; of a suction-box, having a foraminous cover; devices for sealing the holes in said cover, comprising a pair of outer end sections, and sections intermediate thereof which latter have inclined tops as described, are mounted for longitudinal movements, bodily vertical movements, and lifting movements, externally-accessible means for shifting said intermediate sections longitudinally in said box, externally-accessible means for tilting said sections, and externally-operable means for raising and lowering said intermediate sections.

9. The combination, with the endless wire apron; and a plurality of deckles one or more of which are bodily adjustable transversely of their lengths; of a suction-box having a fo-

raminous cover; a device for sealing the holes in said cover, in sections; and a longitudinally-movable member and a yoke carried thereby for shifting said device longitudinally in said box.

10. The combination, with the endless wire apron and the deckles; of a suction-box, having a foraminous cover; a device for sealing the holes in said cover, in sections; and a cam for bringing said device into contact with said cover.

11. The combination, with the wire apron and the deckles, one or more of which are transversely adjustable, of a suction-box having a foraminous cover; a device for sealing the holes in said cover, in sections; and a member movable longitudinally in said box; a yoke loosely supported on said member, and for shifting said device longitudinally in said box; and means for bringing said device into contact with said cover.

12. The combination, with the wire apron and the deckles, one or more of which are transversely adjustable, of a suction-box, having a foraminous cover; and a device for sealing the holes in said cover, in sections; an oscillatory member for bringing said devices into contact with said cover; and a longitudinally-movable yoke movable longitudinally of said box, and for shifting said device.

13. The combination, with the wire apron and the deckles, one or more of which are transversely adjustable, of a suction-box, having a foraminous cover; a device for sealing the holes in said cover, in sections; a yoke for shifting said device longitudinally of said box; and an oscillatory member for forcing said device into contact with said cover.

14. The combination with the screen and the deckles of a suction-box, having a foraminous cover; a device for sealing the holes in said cover, in sections; and means for varying the sealing efficiency of said device at opposite sides thereof.

15. The combination, with the screen and the deckles one or more of which are transversely adjustable, of a suction-box, having a foraminous cover; a device for sealing the holes in said cover, in sections; a yoke for shifting said device, movable longitudinally of said box; and an arm engaging said device at a point remote from its point of support, and movable relatively to and independently of said yoke.

16. The combination, with the screen and the several deckles one or more of which are transversely adjustable, of a suction-box, having a foraminous cover; a device for sealing the holes in said cover, in sections; means for shifting said device longitudinally of said box; an arm engaging the said device at a point remote from its point of support; and a rotatable sleeve for operating said arm relatively to the yoke.

17. The combination, with the screen and the several deckles one or more of which are transversely adjustable, of a suction-box, hav-

ing a foraminous cover; a device for sealing
the holes in said cover, in sections; a yoke
for shifting said device longitudinally of said
box; an arm engaging said device at a point
5 remote from its point of support; and a
screw-threaded sleeve for moving said arm
relatively to the yoke and for positioning said
device relatively to the cover.

18. The combination with the screen and
10 the several deckles of a suction-box, having

a foraminous cover; a laterally-tiltable de-
vice for sealing the holes in said cover, in sec-
tions; and a rotatable member for operating
said device.

Signed by me, at Springfield, Massachu- 15
setts, this 11th day of April, 1901.

CHARLES H. ATKINS.

Witnesses:

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