

(No Model.)

2 Sheets—Sheet 1.

H. FAIRBANKS & H. PARKER.
SUCTION DEVICE FOR PAPER MAKING MACHINES.

No. 545,788.

Patented Sept. 3, 1895.

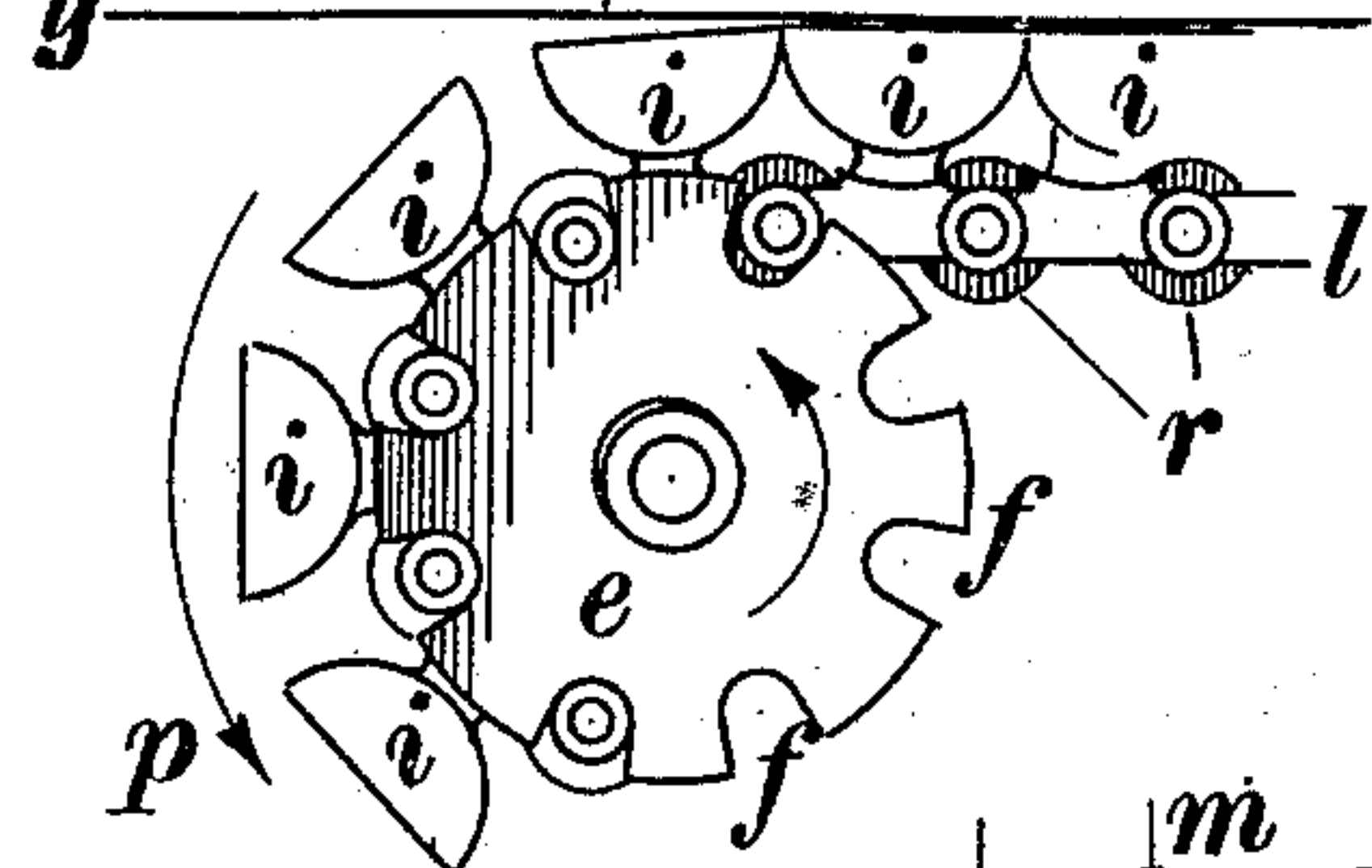


Fig. 1.

Fig. 2,

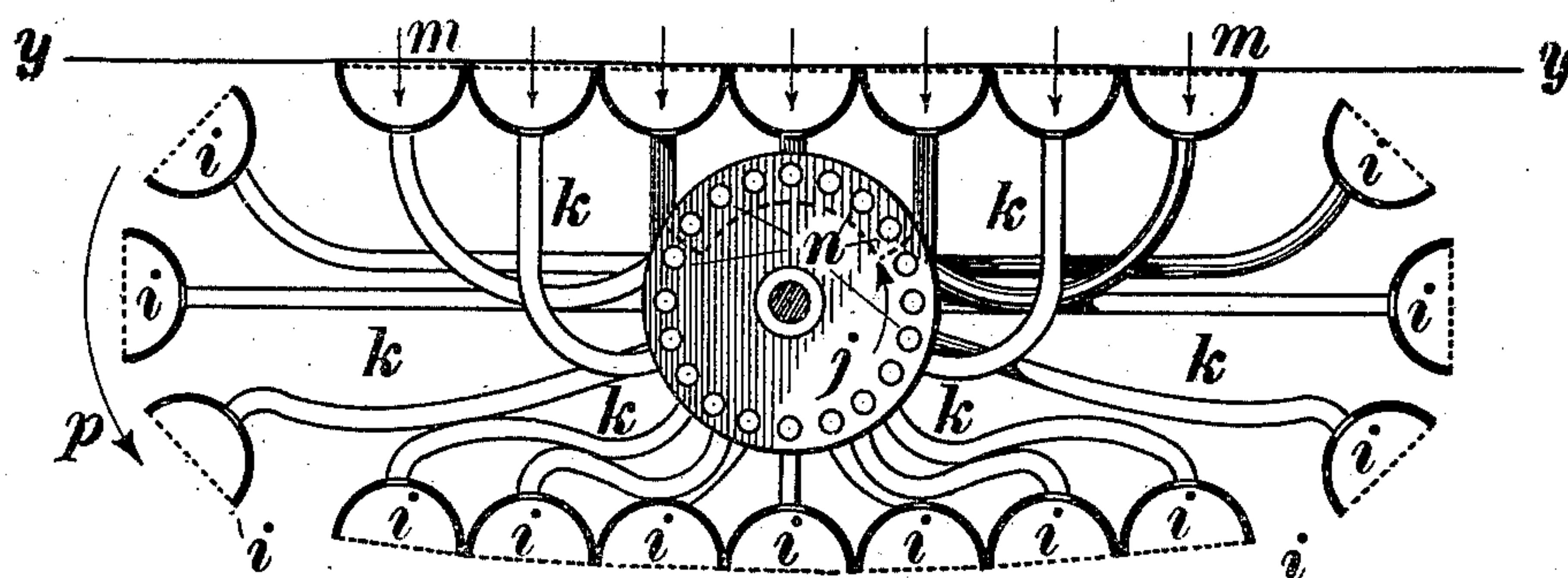
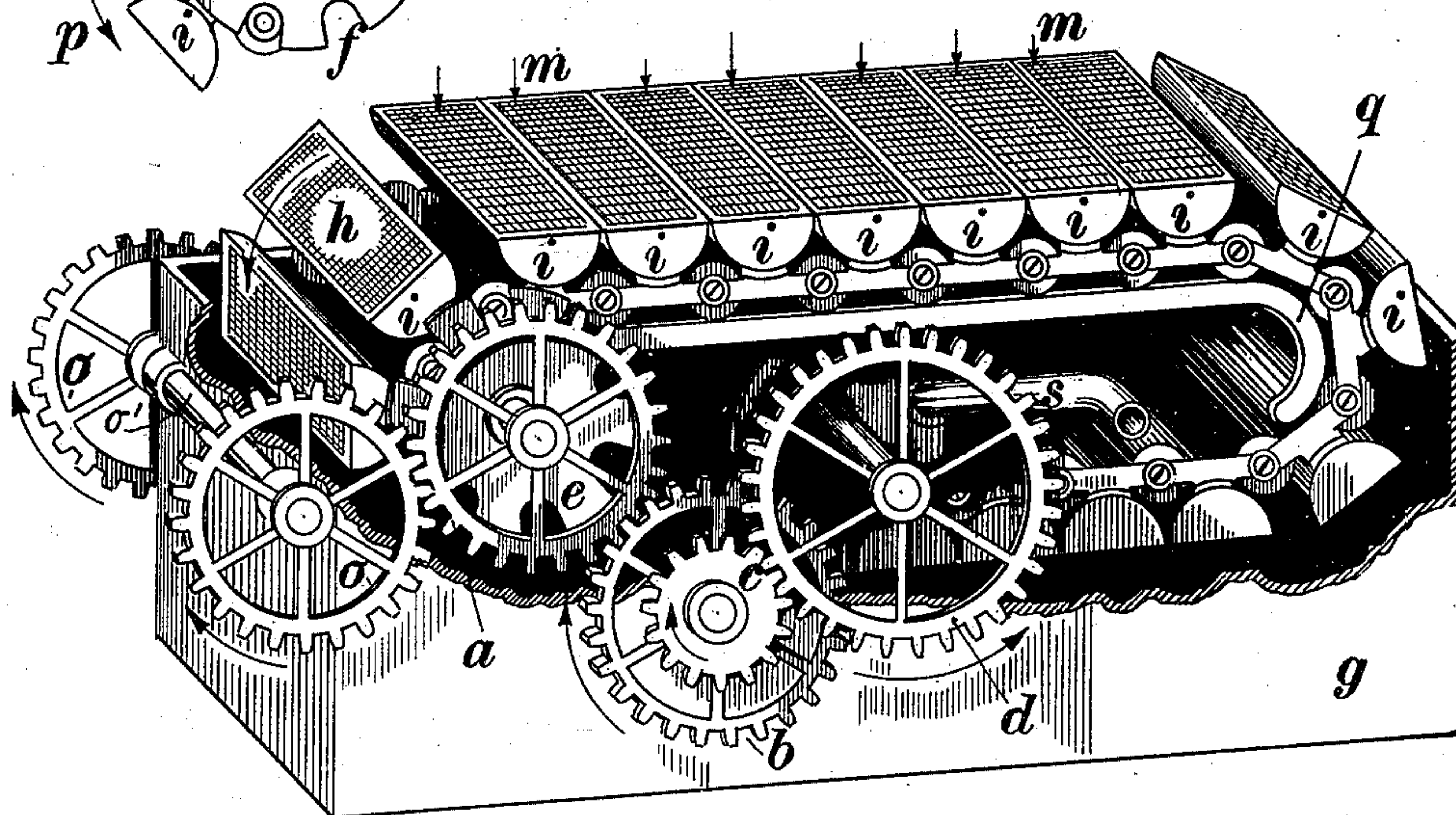


Fig. 3,

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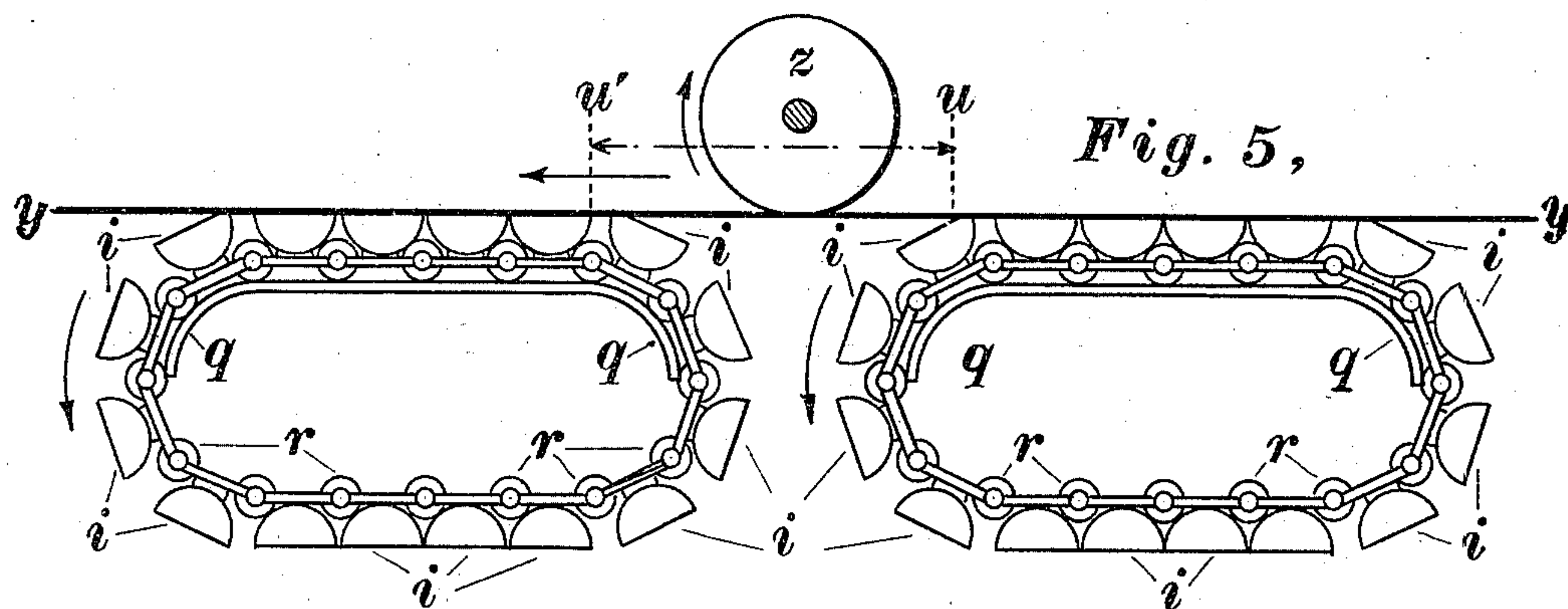
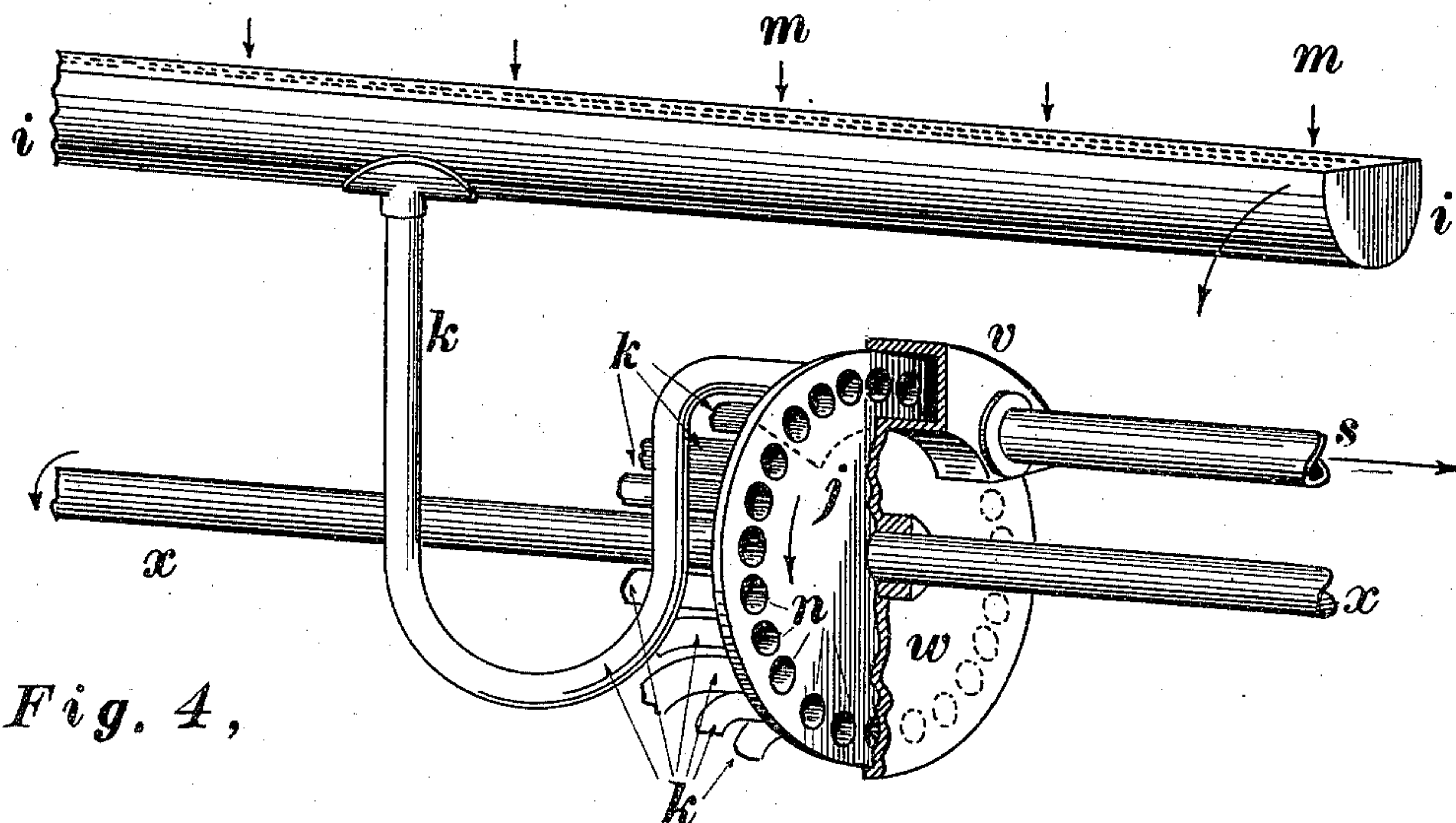
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2 Sheets—Sheet 2.

H. FAIRBANKS & H. PARKER.
SUCTION DEVICE FOR PAPER MAKING MACHINES.

No. 545,788.

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Witnesses,

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G. H. Howe.

Inventors,

Henry Fairbanks.
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UNITED STATES PATENT OFFICE.

HENRY FAIRBANKS AND HOWARD PARKER, OF ST. JOHNSBURY, VERMONT,
ASSIGNORS TO THE VACUUM WET MACHINE COMPANY, OF VERMONT.

SUCTION DEVICE FOR PAPER-MAKING MACHINES.

SPECIFICATION forming part of Letters Patent No. 545,788, dated September 3, 1895.

Application filed January 28, 1895. Serial No. 536,396. (No model.)

To all whom it may concern:

Be it known that we, HENRY FAIRBANKS and HOWARD PARKER, of St. Johnsbury, in the county of Caledonia and State of Vermont, have invented certain new and useful Improvements in Suction Devices for Paper-Making Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

10 In paper and pulp machines where the layer of wet pulp is carried upon an endless apron of wire-cloth or felt it is customary to have this moving apron, which is loaded with the pulp layer, slide over the perforated
15 or open top of narrow boxes partially exhausted of air for the purpose of drawing some of the water from the pulp and leaving less to be pressed out in the further treatment. The atmospheric pressure upon the
20 apron makes it drag heavily over these suction-boxes, and it is thereby subjected to very severe strain and wear. To avoid this rotary suction-boxes have been tried; but the apron moving over these is in contact with only a
25 very small part of the cylindrical surface, and they have not proved efficient, and closed suction-boxes with flat traveling tops sometimes proposed have not come into use.

Our invention consists in providing a series
30 of suction-boxes, each as long as the apron is wide, driven by power moving with the apron, together forming a large flat exhausted surface on which the apron rests, and upon
35 it without causing any wear or strain, since all sliding friction is avoided. Moving with the apron as far as required they then drop away from it and return underneath to their starting-point. These boxes are preferably
40 semicylindrical with closed ends, and having the flat top in the plane of the diameter of the semicylinder formed of perforated sheet metal. These boxes are attached at the ends to the links of two endless chains carried by
45 properly-formed sprocket-wheels, which links also carry rollers by which the boxes while in contact with the apron above are supported and ride upon tracks, returning underneath the same. Each box is connected
50 by a flexible hose-pipe with one of a series of holes through a rotary disk, which has as

many holes as there are suction-boxes, and in the rotation of the disk these holes register with a small exhaust-chamber through which the boxes that for the time are in contact with
55 the apron above them are brought into internal communication with a strong air-pump. A series of gear-wheels give equal motion to the sprocket-wheels at the two sides of the machine and also to the rotary disk in the
60 middle, which is speeded so as to make its rotation agree with the revolution of the whole series of suction-boxes and so keep the flexible hose-pipes from crossing.

In the drawings, Figure 1 shows in a side
65 elevation the relation of the boxes, the links supporting them, the rollers and the sprocket-wheels carrying them. Fig. 2 shows in perspective the principal parts of the suction devices, the sides being removed. Fig. 3 shows
70 in a side elevation the boxes, the rotary disk, and the flexible hose connections between them. Fig. 4 shows the same in perspective for a single box. Fig. 5 sketches in side elevation the arrangement of two similar series
75 of such boxes placed so that the pulp resting over the edges of the boxes of one series shall be over the middle of those of the other series, a leveling or dandy roll being applied to the surface of the pulp as it passes from one
80 series to the other.

In all the figures similar letters of reference are used to designate similar parts.

For the semicylindrical boxes closed at the ends *i* is used, and *m* for their perforated tops. 85 Each end of each box is attached to a link *l*, and at each joint of these links is a roller *r* on the inner side of the endless chain and on the outer side a projection or short stud fitting the forks *ff* of the sprocket-wheels *e*. 90 The sprocket-wheel *e* and gear-wheel *a* are upon a short arbor, as are the corresponding wheels upon the other side of the machine, and there is no shaft connecting them across the machine through the center, where the
95 space must be left clear for the movement of the flexible hose. The gear-wheels at the two sides of the machine are connected across by the shaft *o'* of the gear-wheels *o o* or that of the wheel *d*, and the speed of the wheel *a* is
100 reduced through the wheels *b* and *c* to *d*, which moves slower in proportion as the num-

ber of suction-boxes in the whole series is greater than the number of forks $f f$ in the sprocket-wheel e —that is, slower in proportion as the revolution of the whole series of boxes is slower than the rotation of the wheel a .

Motion is communicated to the whole series of gear-wheels by a connecting-wheel, (not shown,) which, being properly geared, causes the surface of the boxes to move at the same speed as the apron which rests upon them and relieves this apron from the strain incident to carrying them.

The rollers $r r$, carrying the endless chains to which the boxes are attached, roll upon and are supported by the tracks $q q$, which are level across the top, but bend down at the ends, so that when a box begins to turn down, as at h , in the movement indicated by the arrow p , the rising edge is not thrown above the level of the apron.

The flexible hose-pipes $k k$ are made of material that will not collapse under atmospheric pressure and connect the boxes with corresponding holes $n n$ in the disk j , as shown in Figs. 3 and 4. This disk j is attached to the shaft x of the gear-wheel d , and its flat side is in practically air-tight connection with the stationary plate w , carrying the small arc-shaped air-chamber v , which fits the disk j and brings a certain number of the openings $n n$ near the edge of that disk into communication with the exhaust-pipe s , leading to the air-pump or other strong exhauster. In this manner a predetermined number of the boxes in the middle of the top of the series and in contact with the apron are subjected to the strong exhaust-current. The boxes when moving in contact with the apron are close together, their edges formed with strips of elastic material meet each other, and the exhaust action upon the pulp on the belt resting upon them is practically continuous through the series; but if it proves to be less at the lines where the boxes meet, the machine may be speeded so that the boxes will travel a little faster than the apron, helping in its movement and providing that no part of the pulp shall miss the full action of the exhaust. This equalizing of exhaust action will be effected still more completely by providing two series of suction-boxes arranged, as shown in Fig. 5, where the pulp that has been over the middle of each box of the right-hand series, as at u , will come over the meeting edges of the boxes of the left-hand group at u' . In case the pulp-carrying apron moves uniformly with the boxes and there is but a single series of these, coarse perforations in their flat tops will give corresponding water-marks in the paper, and these may be arranged to form any desired figures; but fine uniform perforations or wire-cloth over the perforated sheets will give uniform paper. The dandy-roll z , between the two series or at the end of one will help to lay the surface of the paper.

To adapt the device to use upon paper narrower than the full width of the apron each

box is provided with sliding heads controlled by a long screw having a right-hand thread at one end and a left-hand one at the other in the manner common in suction-boxes, which, being common, requires no illustration.

Having described what we consider the best way of carrying out our invention, it will be apparent that the details of this machine may be much varied without altogether destroying its efficiency. The shape of the traveling suction-boxes, and the method of mounting and propelling them may be different. The gearing need not be the same, and the connection with the exhaust may be otherwise arranged. By forming the boxes with suitable valve-seats they might be made to register directly with a properly-shaped opening in an exhaust-chamber without the intervention of the flexible hose-pipes and rotary disk. Such a series might be carried by the traveling apron and the gearing dispensed with; but a mechanic will easily see the advantages of the full plan which we have adopted.

Having thus set forth our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a paper or pulp machine, the combination of an endless apron, adapted to carry wet pulp, with a series of traveling suction boxes, successively carried beneath, and in working contact under said apron, and with means for exhausting the same, substantially as and for the purpose herein specified.

2. In a paper or pulp machine, the combination of an endless apron adapted to carry wet pulp, with partially exhausted traveling suction boxes carried successively beneath and in supporting contact under said apron, and with the endless chains connecting them in series, and the tracks upon which they ride, directing their motion as herein described.

3. In a paper or pulp machine, the combination of an endless apron adapted to carry wet pulp, with partially exhausted traveling suction boxes carried successively beneath and in working contact under said apron, and with the endless chains connecting them in series, and the sprocket wheels and gear connections whereby they are carried forward with the same movement as the apron resting upon them, substantially as and for the purpose specified.

4. In a paper or pulp machine, the combination of an endless apron adapted to carry wet pulp, a series of open top boxes, means for moving them beneath and in contact with said apron, the exhaust chamber v , communicating with said boxes, and the exhaust conduit s , as herein fully described.

5. In a paper or pulp machine, the combination of the endless apron y , adapted to carry wet pulp upon one side, with the suction boxes i, i , in working contact with the other side of the said apron, the flexible hose pipes k, k , the disk j , on a shaft geared to move with the series of boxes, the exhaust chamber v , with which the flexible hose from the boxes com-

municates, and the exhaust conduit *s*, all constructed and arranged, substantially as set forth.

6. In a paper or pulp machine, the combination of the endless apron *y*, adapted to carry wet pulp, with the open top boxes *i*, *i*, upon which this apron rests, the flexible hose pipes *k*, *k*, connecting these boxes to the openings *n*, *n*, of the disk *j*, and the exhaust chamber *v*, and with the supporting track *q*, the links *l*, *l*, the sprocket wheel *e*, and the gear wheels *a*, *b*, *c*, and *d*, constructed and arranged for

joint action substantially as and for the purpose herein described.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 23d day of January, A. D. 1895.

HENRY FAIRBANKS.
HOWARD PARKER.

Witnesses:

C. H. HORTON,
ALBERT L. FARWELL.