(No Model.) 4 Sheets—Sheet 1.

E. T. FISHER.

PAPER DAMPENING MACHINE.

No. 483,738. Patented Oct. 4, 1892.

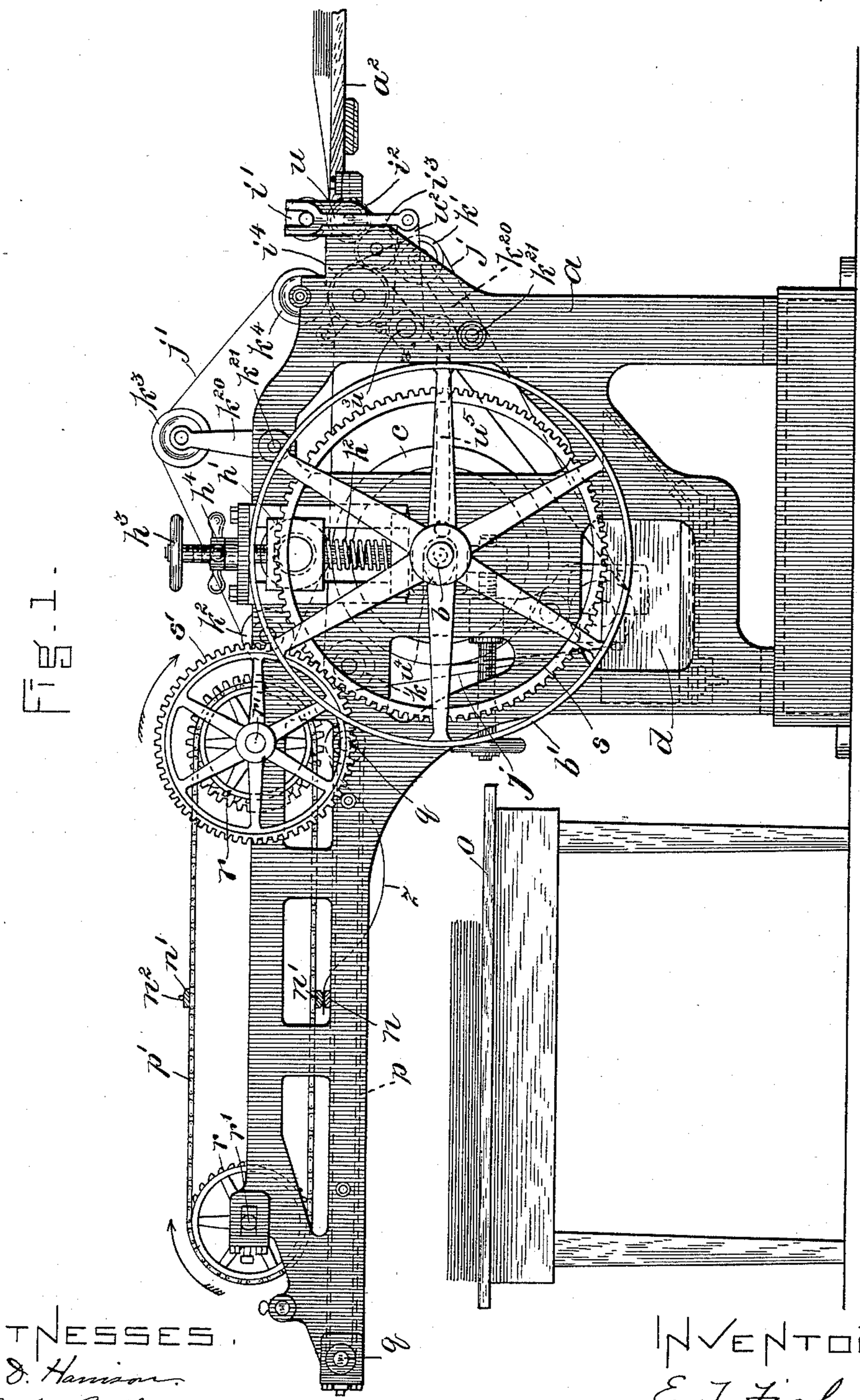

FIG. 1.

WITNESSES.
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H. A. Hall.

INVENTOR.
E. T. Fisher
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Attys.

(No Model.) 4 Sheets—Sheet 2.

E. T. FISHER.

PAPER DAMPENING MACHINE.

No. 483,738. Patented Oct. 4, 1892.

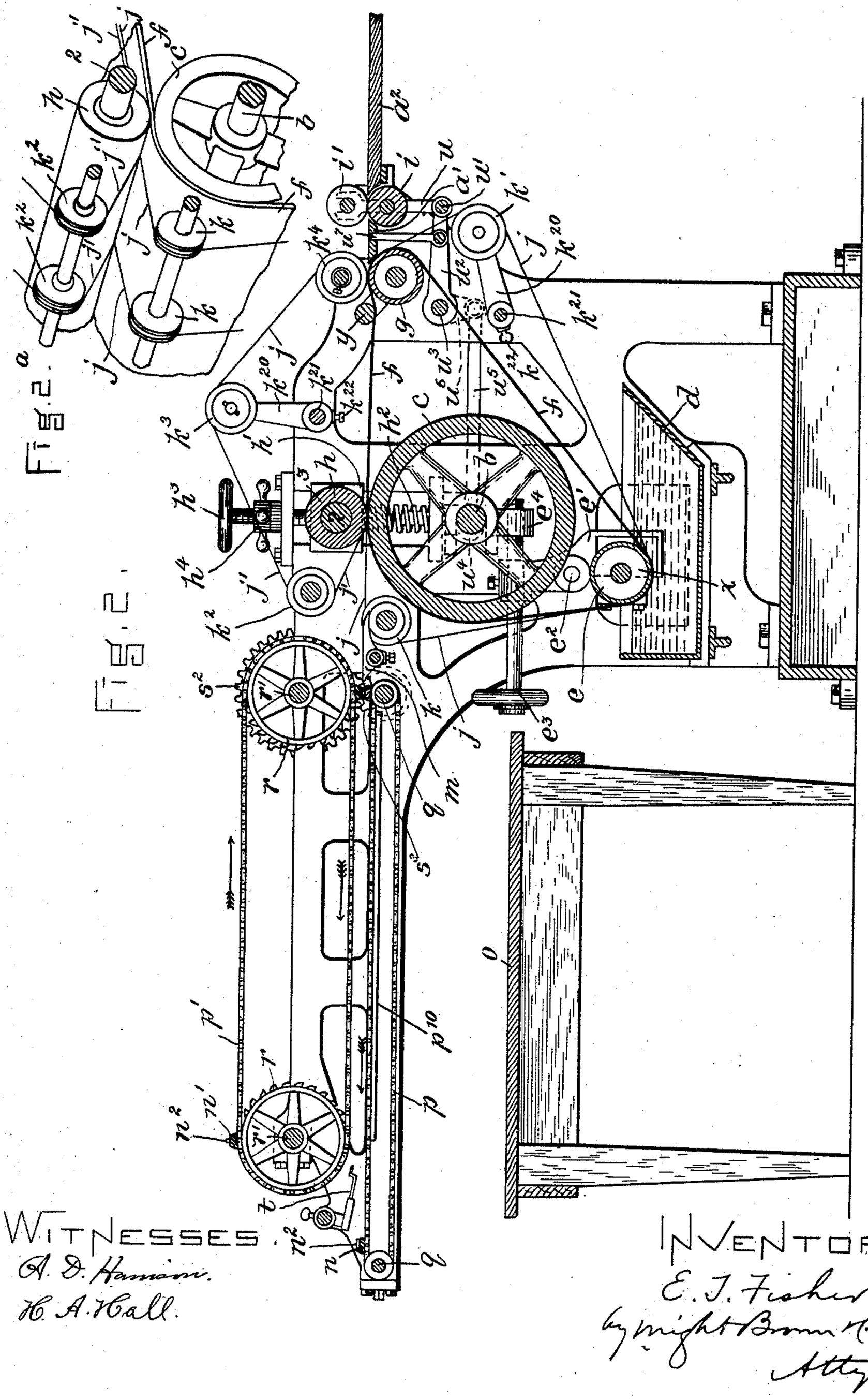

FIG. 2.

FIG. 1.

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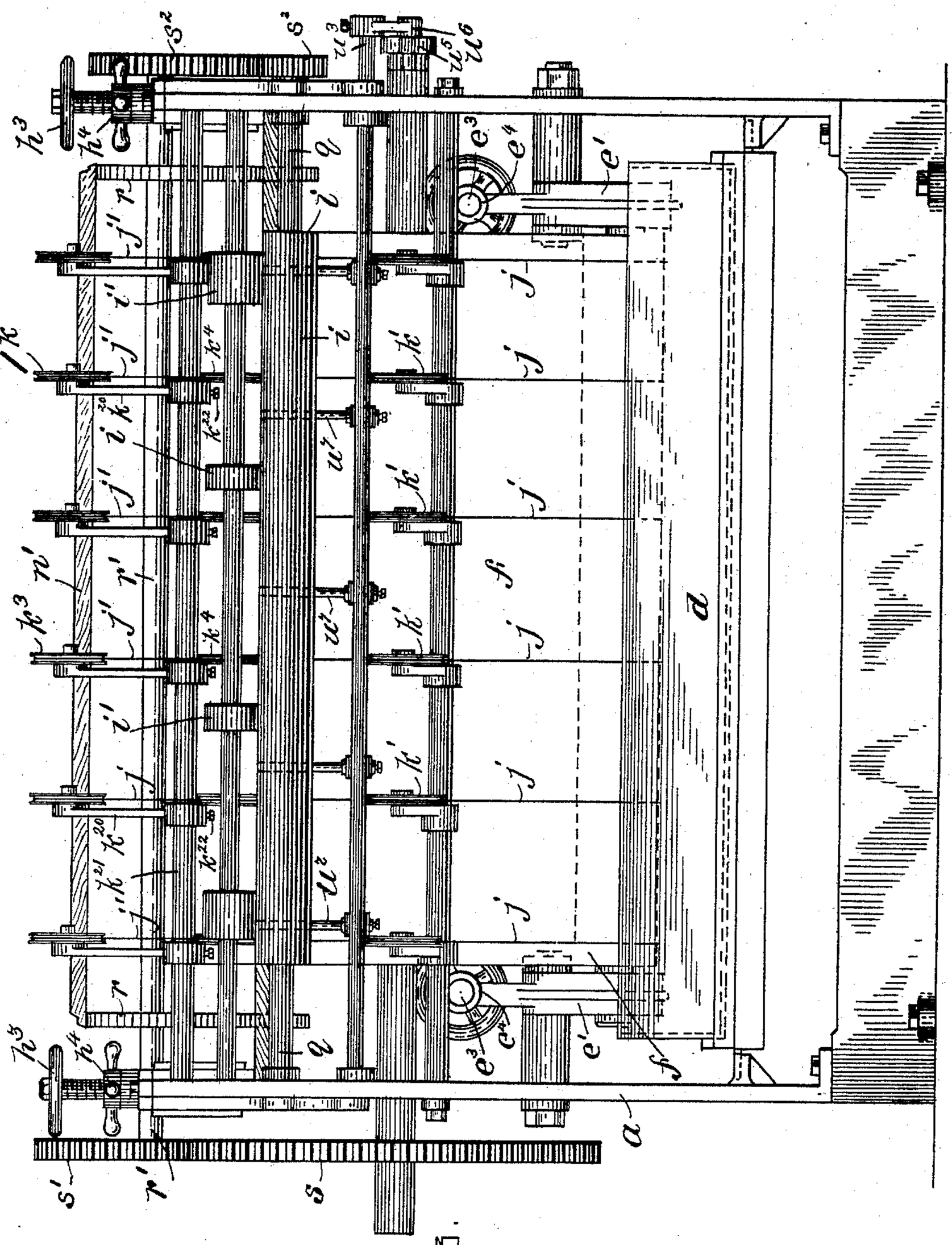
(No Model.) 4 Sheets—Sheet 3.

E. T. FISHER.

PAPER DAMPENING MACHINE.

No. 483,738. Patented Oct. 4, 1892.



WITNESSES.
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(No Model.)

4 Sheets—Sheet 4.

E. T. FISHER.

PAPER DAMPENING MACHINE.

No. 483,738. Patented Oct. 4, 1892.

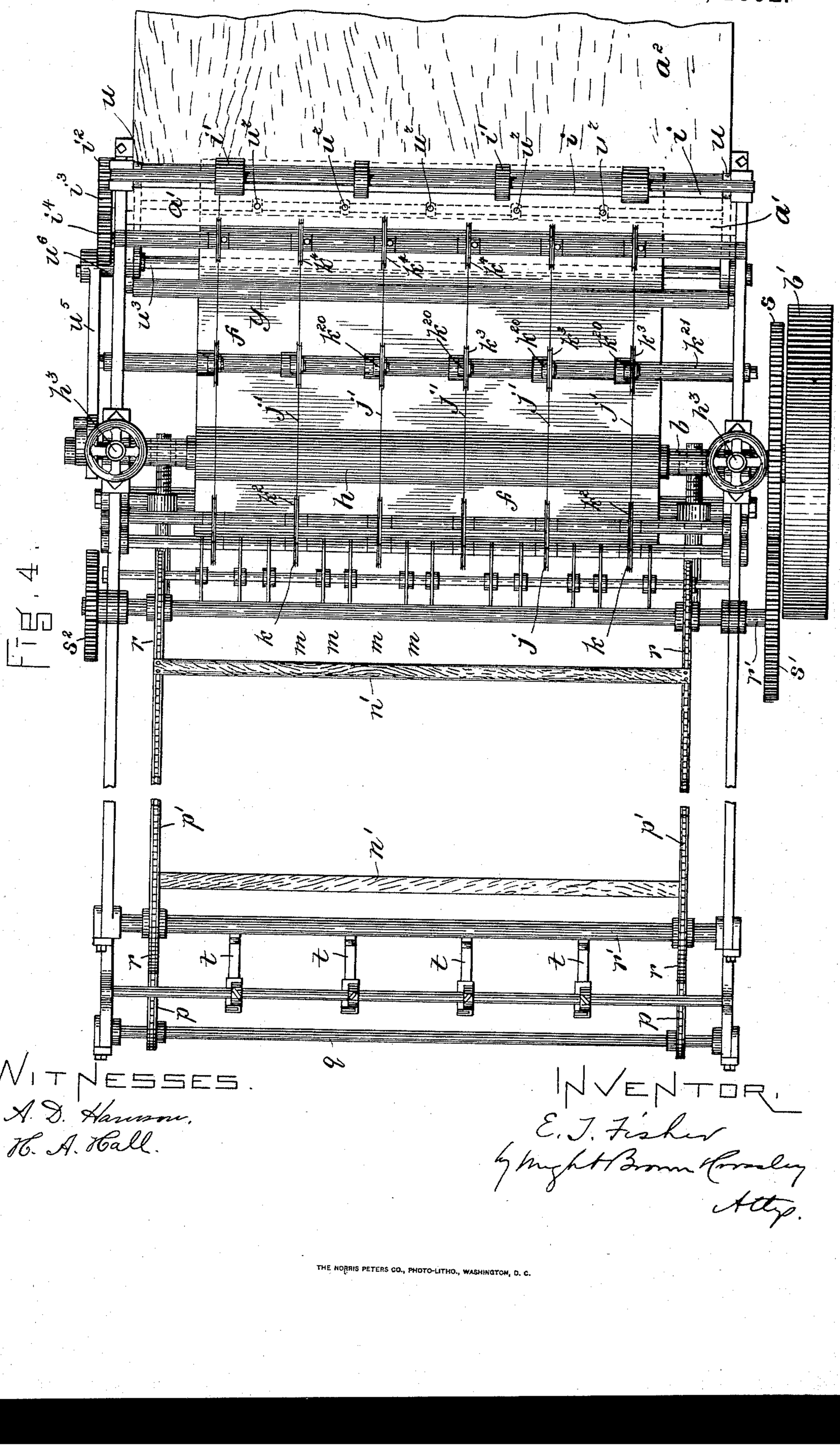

FIG. 4.

WITNESSES.
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UNITED STATES PATENT OFFICE.

EDMOND T. FISHER, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-THIRD TO FRED K. PARKER, OF SAME PLACE.

PAPER-DAMPENING MACHINE.

SPECIFICATION forming part of Letters Patent No. 483,738, dated October 4, 1892.

Application filed February 23, 1892. Serial No. 422,342. (No model.)

To all whom it may concern:

Be it known that I, EDMOND T. FISHER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Paper-Dampening Machines, of which the following is a specification.

This invention has for its object to provide an efficient machine or apparatus for dampening sheets of paper rapidly and uniformly, the invention being intended chiefly for dampening sheets of paper preparatory to printing thereon by the process of lithography.

The invention consists in the several improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification, Figure 1 represents a side elevation of a paper-dampening machine provided with my improvements. Fig. 2 represents a longitudinal vertical section of the same. Fig. 2ª represents a perspective view of a portion of the machine. Fig. 3 represents an end elevation. Fig. 4 represents a top view.

The same letters and numerals of reference indicate the same parts in all the figures.

In the drawings, *a* represents the supporting-frame having bearings for the shaft *b*, supporting the main cylinder *c*, over which the paper to be moistened passes. The cylinder *c* is rotated in the direction indicated by the arrow in Fig. 2 by any suitable mechanism—such, for example, as a belt—running on a pulley *b'*, affixed to one end of said shaft.

d represents a water-tank attached to the frame below the cylinder *c*.

e represents a guide-roll, which is journaled in bearings attached to the frame and is arranged so that its lower portion is submerged in the water in the tank *d*, the roll *e* being parallel with the cylinder *c*.

f represents an endless band or apron, which may be of any suitable flexible material and is preferably of rubber. Said band is supported by the cylinder *c*, the guide-roll *e*, and another guide-roll *g*, which is journaled in bearings in the frame of the machine at a higher point than the roll *e* and in front of the cylinder *c*, the highest part of the guide-roll *g* being preferably at about the same height as the highest part of the cylinder *c*, as shown in Figs. 1 and 2.

h represents a pressure-roll, which is arranged over the cylinder *c* and is preferably composed of a rigid shaft or core 2 and an elastic peripheral portion or covering 3, which is or may be of rubber, like the material of the rolls of clothes-wringers. The roll *h* is arranged to bear with a yielding pressure on the band *f* at the point where the latter is supported by the cylinder *c* and to exert a wringing or water-expelling pressure upon said band and upon the sheets of paper supported and carried along thereby, as hereinafter described.

It will be observed that the band *f* is caused by the roll *e* to pass through the water in the tank *d*, said band being moved progressively by the rotation of the cylinder *c*. The band is therefore caused to raise water from the tank and carry it over the guide-roll *g*. Sheets of paper to be moistened are delivered by feed-rolls *i i'* to the band *f* at the point where said band passes over the roll *g*. The sheets delivered by the feed-rolls are carried along by the horizontal portion of the band to the meeting-point of the cylinder *c* and squeezing-roll *h* and in their passage absord water from the band. The squeezing-roll *h* co-operates with the cylinder *c* in exerting pressure upon the sheets as they pass over said cylinder, the surplus water in the sheets being thus expressed and caused to flow back upon the portion of the band between the cylinder *c* and guide-roll *g*. The water that flows back helps to saturate the paper between the cylinder *c* and guide-roll *g*, thus facilitating the thorough dampening of the paper. The paper passes in a uniformly-moistened state from between the squeezing-roll *h* and cylinder *c*.

To prevent the paper from sticking to the cylinder *c* and squeezing-roll *h* as it emerges from between said cylinder and roll, I provide two series of fine cords or tapes *j j'*. The cords *j* are arranged to bear upon the upper or outer surface of the band *f*, and are supported by said band, its guide-rolls *e* and *g*, and by independent guide-rolls *k* and *k'*, the rollers *k* being arranged to guide the cords *j* away from the periphery of the cylinder *c*

and from the meeting-point of said cylinder and the squeezing-roll h, while the rollers k' are arranged to guide said cords j away from the band f at a point between the rolls e and g. The cords j' are supported by the squeezing-roll h and by independent guide-rolls k^2 k^3 k^4, arranged as shown in Fig. 2, the rolls k^2 being arranged to guide the cords j upwardly from the meeting-point of the squeezing-roll h and cylinder c, while the rolls k^4 are arrange to co-operate with the squeezing-roll h in holding the cords j' in contact with the upper surfaces of the sheets of paper upon the band f. It will be seen that as the paper emerges from between the squeezing-roll h and cylinder c it is prevented by the cords j from adhering to the periphery of the cylinder c and passing downwardly thereon, and by the cords j' from adhering to the periphery of the squeezing-roll h and passing upwardly thereon. The cords j are caused by the guide-rolls k to extend horizontally for a short distance from the meeting-point of the squeezing-roll h and cylinder c, so that said cords guide the paper away from said meeting-point and deliver it to guide bars or shoes m, which project over the rolls k and prevent the paper from following the cords j as they pass downwardly over said rolls.

The shoes m have their upper edges arranged to constitute extensions or continuations of the support afforded for the paper by the cords j, the rear ends of said shoes being arranged to deliver the advancing edges of the sheets to jaws n n', which are arranged to grasp and carry forward the sheets of paper, and to release the same and allow them to drop upon a table o after having been withdrawn from the shoes m. Said jaws are mounted upon sprocket-chains p p', each jaw being composed of a bar, preferably provided with a rubber lip or paper grasping portion n^2. Each jaw is affixed at or near its ends to a sprocket-chain, there being two pairs of chains, one pair supporting the jaws n and the other the jaws n'. The chain p is mounted on sprocket-wheels affixed to shafts q q, while the chain p' is mounted on larger sprocket-wheels r r, affixed to shafts r' r', arranged above the shafts q q. Movement is imparted to the chains p p', in the direction indicated by the arrow in Fig. 2, by means of a gear s, affixed to the shaft b, and meshing with a gear s' affixed to one of the shafts r'. Said shaft r' has a similar gear s^2, meshing with a gear s^3, affixed to one of the shafts q. It will be noticed that each pair of chains p is provided with jaws n n, and each pair of chains p' is provided with jaws n' n'. Said jaws are arranged so that a jaw n will co-operate with a jaw n' in grasping the end of a sheet of paper projecting from the rear ends of the shoes m, the jaws coming together at that point, as shown in Fig. 2, and closing upon the paper. The movement of the chains causes the jaws to carry the paper along until the jaw n' is raised by its upward passage over the rear sprocket-wheels r, the sheet of paper being released and allowed to drop upon a table o. To prevent the paper from adhering to the upper jaw as it passes upwardly over the rear sprocket-wheels r, I provide adjustable fingers t, arranged to strike the end of the sheet just as the jaws release it, and thus prevent any tendency of the sheet to rise, the forward movement of the sheet due to any momentum it may possess being arrested by said fingers, so that the sheet falls by gravitation to the table o.

The feed-roll i at the front end of the machine is positively rotated by means of gears i^2 i^3 i^4, (shown in dotted lines in Fig. 1,) the gear i^4 being affixed to the roll g and the gear i^2 to the roll i, the gear i^3 being intermediate. The roll g is rotated by the band f, the latter acting as a belt, and imparts motion through said gears to the feed-roll i. The upper feed-roll i' rotates loosely and simply serves to hold the paper down upon the driven roll i. The roll i' is vertically movable, its shaft being journaled in bearings in vertically-movable arms u, which are pivotally connected at u' with oscillating arms u^2, affixed to a rock-shaft u^3. Said rock-shaft is oscillated to alternately raise and lower the roll i' by means of cams u^4 u^4 on the shaft b, said cams being shown in dotted lines in Figs. 1 and 2, and arms or rods u^5, each bearing at one end against one of the cams u^4, and connected at its opposite end with an arm u^6, affixed to the rock-shaft u^3. The roll i' tends to press the inner ends of the rods u^5 against the cams u^4, said rods being preferably provided with trundle-rolls at their inner ends bearing upon the cams. The revolution of the cams u^4 therefore causes the roll i' to alternately rise and fall in a manner which will be readily understood by an inspection of Figs. 1 and 2. The arm u^2 is provided with a series of vertical stop-fingers u^7, the upper ends of which are vertically movable in orifices in the paper-supporting bed or table a', between the feed-rolls and the band-supporting roll g. The stop-fingers u^7 are of such length that when the roll i' is depressed the upper ends of said fingers are below the table a'; but when the roll i' is raised to permit the insertion of a sheet of paper between the rolls i i' the stop-fingers u^7 project above the table a' and act as gages or stops by which the operator may position the front end or edge of the sheet inserted between the feed-rolls. When the roll i' is depressed to bear on the sheet and cause its movement by the rotation of the roll i, the stop-fingers are withdrawn and become inoperative, so that the sheet is moved by the feed-rolls across the table a' and presented to the meeting-points of the rolls g and k^4.

The squeezing-roll h is journaled in vertically-sliding boxes h', which are pressed upwardly by springs h^2, so that the roll h is normally separated from the cylinder c. The roll h is pressed downwardly upon the cylinder by means of adjusting-screws h^3, bearing upon

the boxes h', said screws being provided with check-nuts h^4, whereby they may be locked or held at any desired adjustment.

The guide-roll e, which causes the immersion of the band f in the water in the tank d, may be adjusted to vary the tension of the band, said roll being journaled in bearings affixed to frame-pieces e', which are pivoted at e^2 to the supporting-frame, and may be moved or rocked on their pivots by means of adjusting-screws e^3, the screw-threaded inner portions of which are engaged with fixed nuts e^4 on the supporting-frame, said screws being engaged with the frames e' in such manner that the endwise movement of the screws caused by their rotation will cause them to tip the frame-pieces e' upon their pivots. When the frame-pieces e' are moved so as to move the bearings of the roll e in the direction indicated by the arrow x in Fig. 2, the band f is tightened, as will be readily seen.

The operation of the machine above described is as follows: The operator, standing at the feed-table a^2, inserts the forward edge of a sheet of paper between the rolls $i\,i'$ whenever the roll i' is raised to permit such insertion, the extent of the insertion of the sheet being determined by the stop-fingers w^7. The roll i' is then depressed and the sheet is grasped and fed forward, first by the rolls $i\,i'$ and then by the band f and the cords j, said cords being held against the upper surfaces of the sheets by means of the roll y, hereinafter mentioned, the sheet being thus subjected to the liquid carried by the band f, and at the same time interposed between the cords $j\,j'$. The sheet becomes sufficiently saturated in its passage from the roll g to the meeting-point of the cylinder c and squeezing-roll h, the surplus water being expressed from the sheet by the roll h and caused to flow back upon the approaching portion of the sheet, as already described. As the sheet emerges from between the roll h and cylinder c it is supported by the horizontal portions of the cords j until it reaches the shoes m, and is further supported by said shoes until its forward edge is in a position to be grasped by the jaws $n\,n'$. Said jaws are timed so as to co-operate in grasping the sheet at about the time that the sheet is projected far enough to come within the grasp of said jaws, and as the sheet is carried along by the jaws it gradually sags toward the table o, as shown in Fig. 1, in which z represents the sheet. The said jaws separate and release the forward edge of the sheet at the time required to enable the sheet to drop upon the table. The action of the machine is automatic, with the exception of the insertion of the sheets between the feed-rolls, this being the only attention required on the part of the operator.

It will be seen from the foregoing that the machine is simple in its construction and is adapted to rapidly, efficiently, and uniformly dampen sheets of paper or other material.

I prefer to slightly depress the band f at a point between the roll g and cylinder c, in order to press the cords j closely against the sheets and in order to form an accumulation of water upon the upper surface of the band. To this end I arrange a small roll y between the roll g and cylinder c, said roll being arranged to give the band a slight downward deflection, as shown in Fig. 2, thus causing an accumulation of water by gravitation at the points where the roll y bears upon the band. I find that by thus depressing the band a better result is produced in dampening and carrying forward the paper.

In practice I prefer to make the feed-roll i' in a number of sections, all mounted on a shaft, as shown in Fig. 4, instead of making one continuous roll.

The guide rolls or pulleys k' and k^3 are mounted on independently-adjustable arms k^{20}, each formed on a hub or sleeve which is attached by a set-screw k^{22} to a shaft k^{21}. Said guide-rolls are therefore independently adjustable, so that each of the cords can be adjusted independently to give it the required tension. The cords are necessarily very fine and slender, so that they will not injuriously indent the paper. I prefer to make said cords of fine silk thread.

The jaws $n\,n'$ are preferably supported and prevented from sagging while they are grasping the paper by means of brackets p^{10}, affixed to the supporting-frame.

I do not limit myself to the chains $p\,p'$ as the means for supporting and carrying the jaws $n\,n'$, and I may support and carry said jaws by any other suitable means.

I claim—

1. In a paper-dampening machine, the combination of an endless band or apron, a cylinder and guide-rolls supporting the same, means for wetting said band, a squeezing-roll arranged to co-operate with said cylinder in expressing water from a sheet of material carried by said band, two series of endless cords, and guides or supports therefor, the lower series being arranged to bear on the under side of said sheet and to guide the sheet away from the periphery of the cylinder, while the upper series is arranged to bear on the upper side of the sheet and to guide the sheet away from the periphery of the squeezing-roll, as set forth.

2. In a paper-dampening machine, the combination of an endless band or apron, a cylinder and guide-rolls supporting the same, means for wetting said band, a squeezing-roll arranged to co-operate with said cylinder in expressing water from a sheet of material carried by said band, two series of endless cords, and guides or supports therefor, and means for independently adjusting the tension of said cords, as set forth.

3. The combination of the endless band, pressure-rolls between which said band passes, the upper and lower series of cords arranged to pass, with the band, between said rolls,

guides which cause the two series of cords to diverge in passing from said rolls, and fixed shoes or guides to which a sheet is guided or delivered by the lower cords, as set forth.

4. The combination of the endless band, pressure-rolls between which said band passes, the upper and lower series of cords arranged to pass, with the band, between said rolls, guides which cause the two series of cords to diverge in passing from said rolls, fixed shoes or guides to which a sheet is guided or delivered by the lower cords, traveling jaws arranged to grasp and carry forward the sheets delivered to said fixed guides, and means for operating said jaws, as set forth.

5. The combination, with the paper dampening and delivering mechanism, including the cords $j\,j'$, of the traveling sheet-grasping jaws, and the stop-fingers adapted to arrest the sheets at a point where they are released by said jaws, as set forth.

6. The combination, with the endless band, its supporting-rolls, and the cords $j\,j'$, of the roll y, arranged to deflect a portion of the band, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of February, A. D. 1892.

EDMOND T. FISHER.

Witnesses:
C. F. BROWN,
A. D. HARRISON.