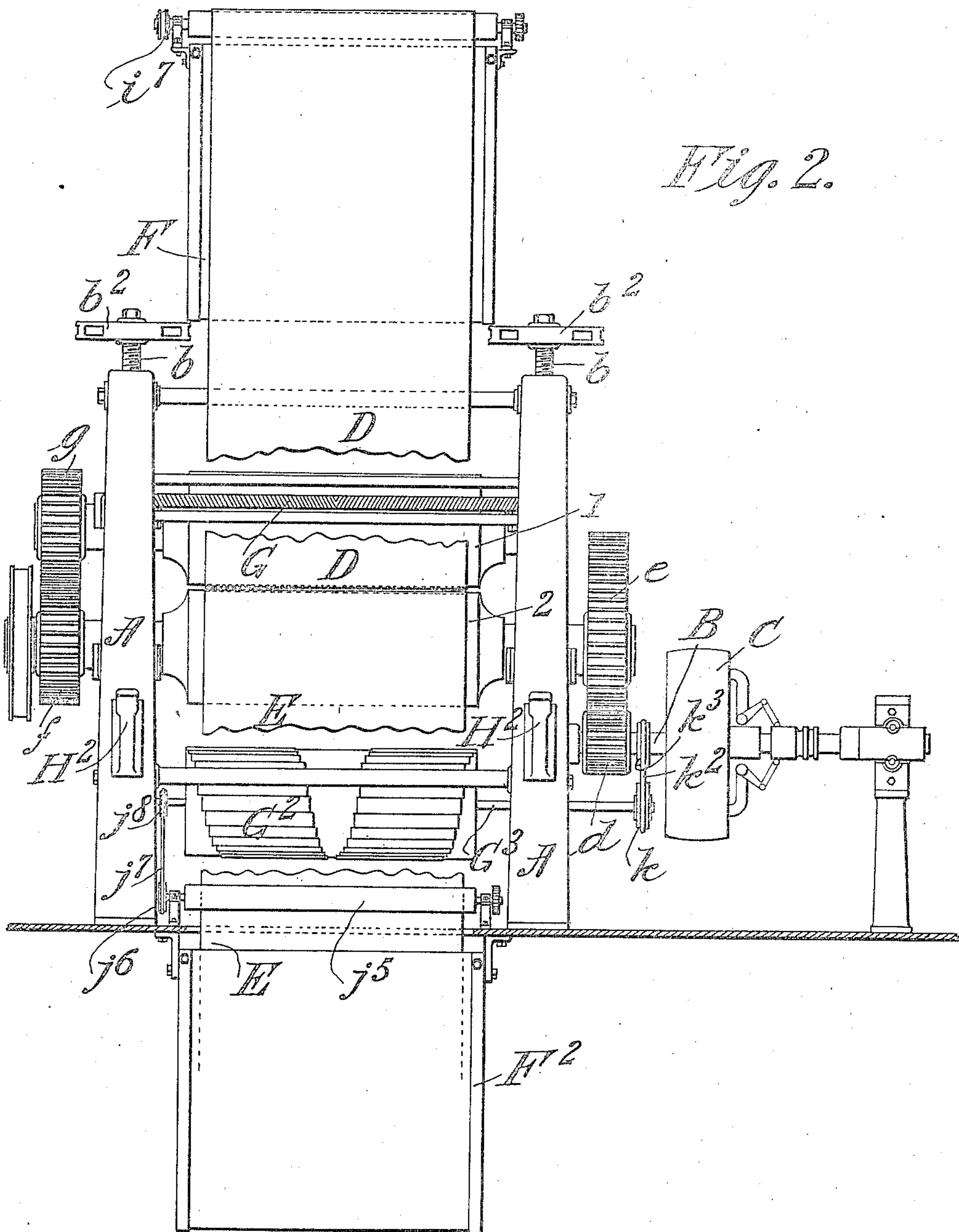


P. W. BIDWELL.
PAPER FINISHING MACHINE.
APPLICATION FILED APR. 2, 1915.

1,155,203.

Patented Sept. 28, 1915.

4 SHEETS—SHEET 2.



WITNESSES:

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4 SHEETS—SHEET 3.

Fig. 4.

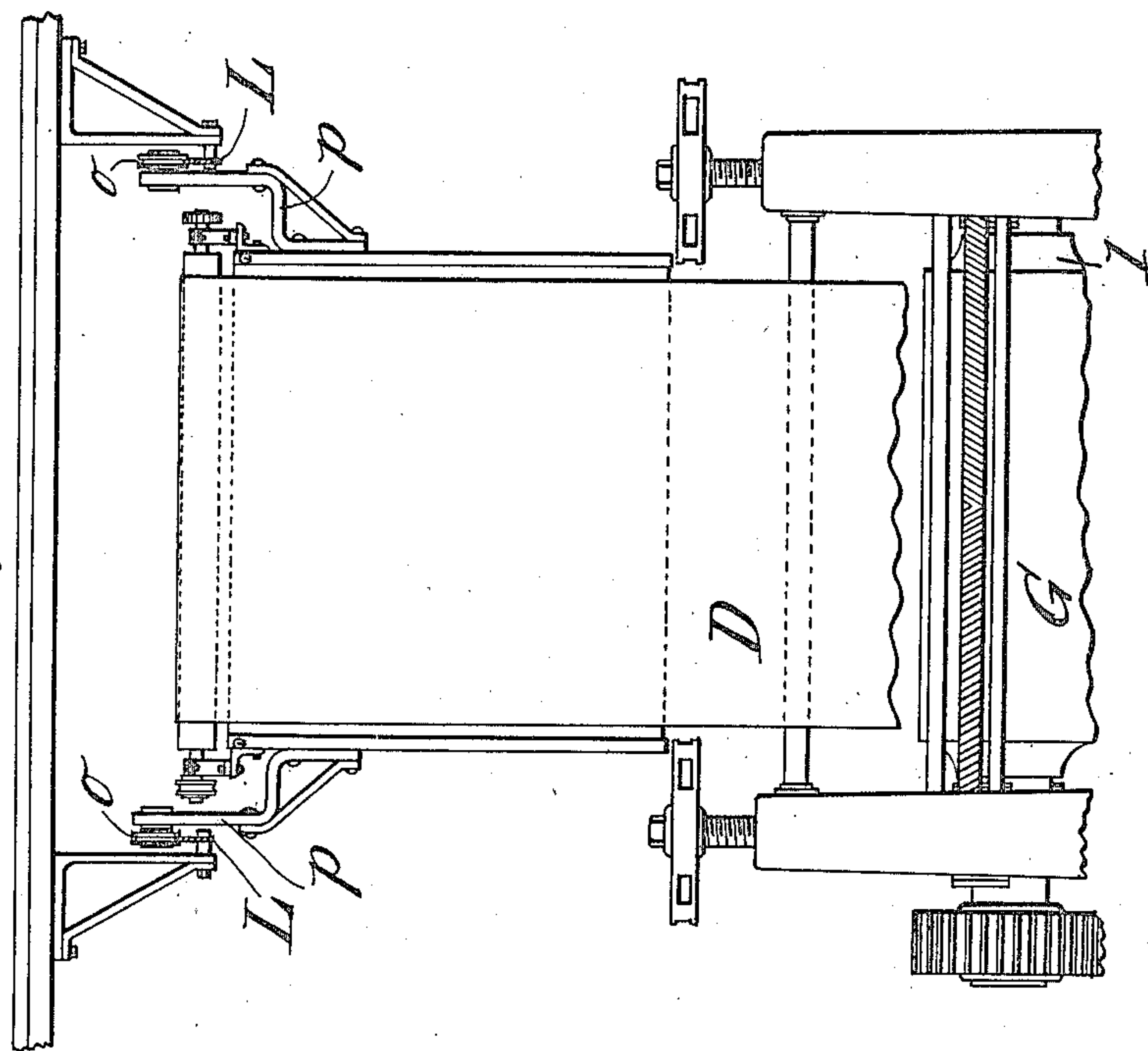
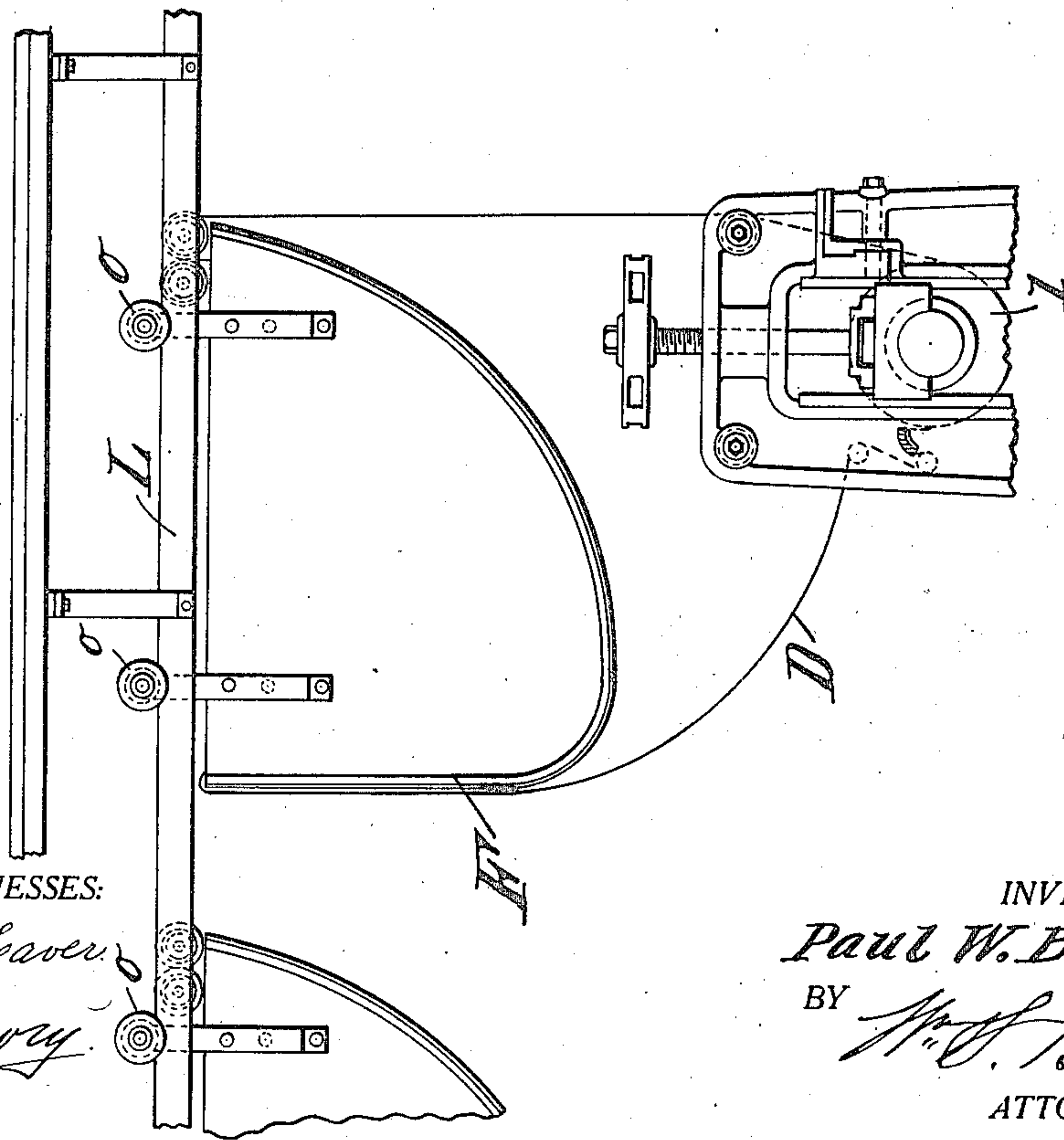


Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 6.

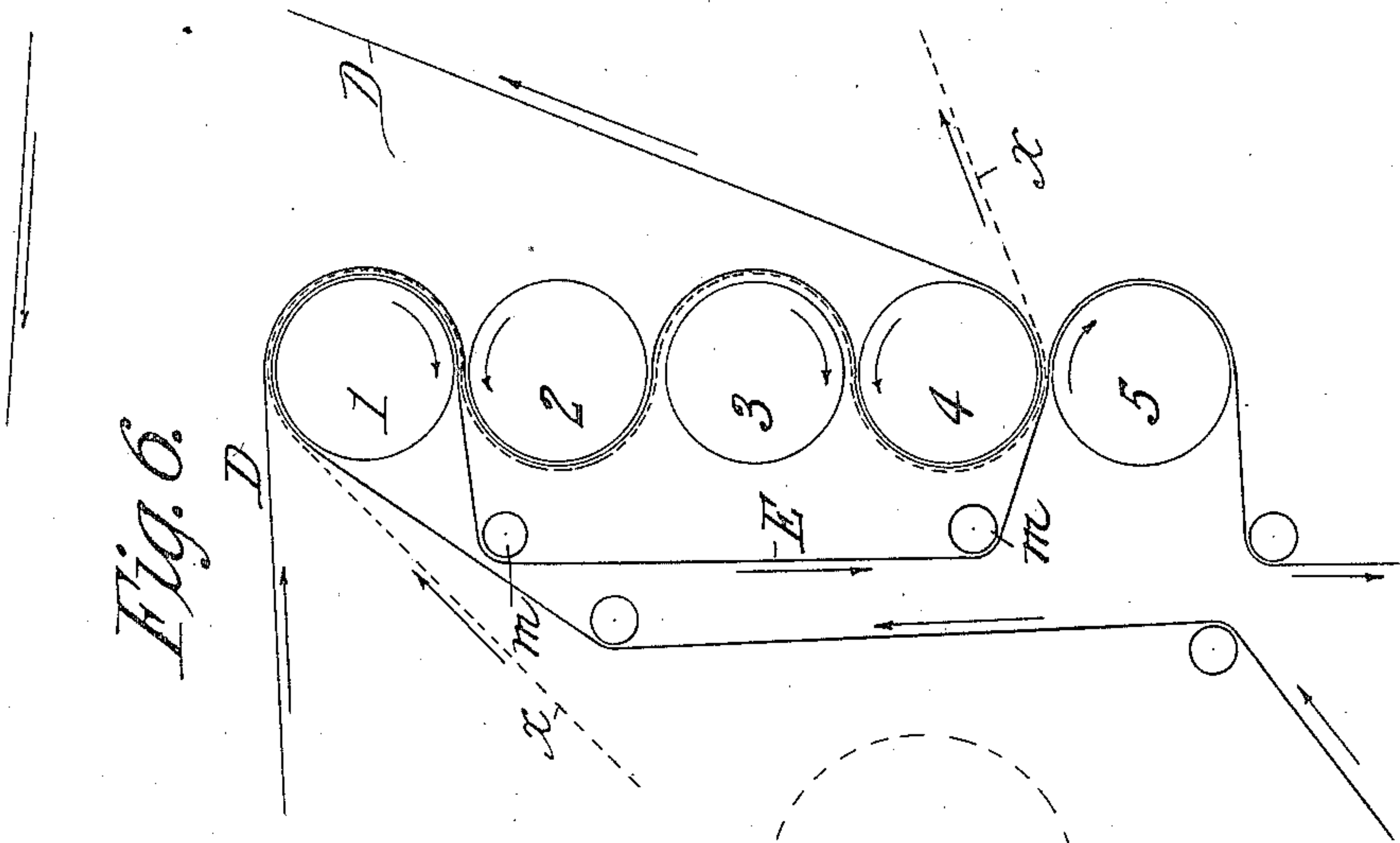
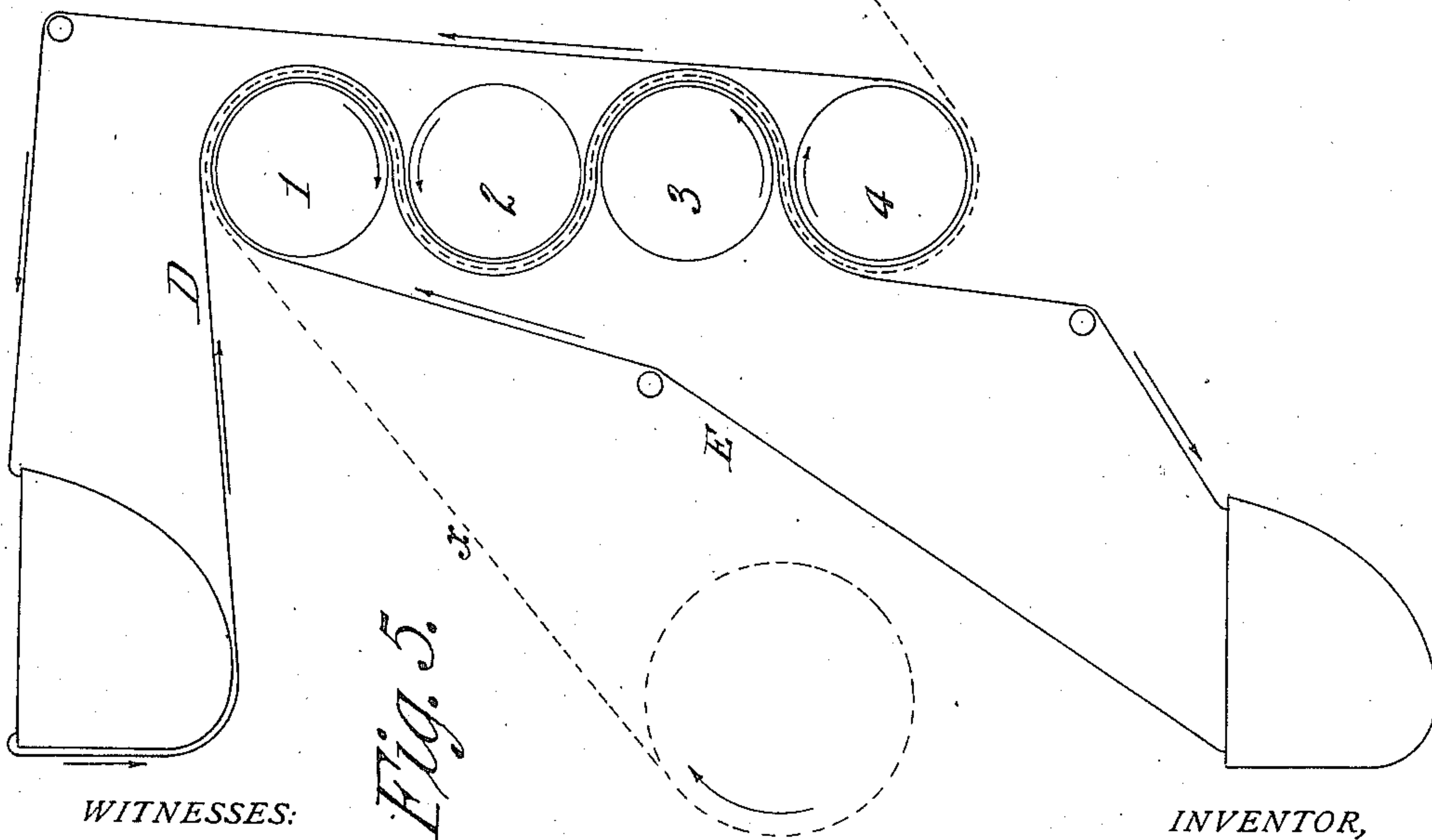


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PAPER-FINISHING MACHINE.

1,155,203.

Specification of Letters Patent.

Patented Sept. 28, 1915.

Application filed April 2, 1915. Serial No. 18,848.

To all whom it may concern:

Be it known that I, PAUL W. BIDWELL, a citizen of the United States of America, and resident of Holyoke, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Paper-Finishing Machines, of which the following is a full, clear, and exact description.

10 This invention relates to machines, for the surface finishing of paper, of a class comprising peripherally coöperative rotative cylinders maintained in pressure one side-
15 wise against another and having cloth or other appropriate material forming working coverings for the faces thereof which are in conjunction, and between which the paper, to partake of a surfacing or finish corresponding to such face coverings for the
20 cylinders, is passed.

A principal object of this invention is to so construct and organize a machine of the general character indicated that the covering or coverings for the co-acting peripheral portions of one or more of the cylinders
25 may be practicably constituted by extremely long endless aprons, to produce cross seam marks in the paper at but infrequent intervals, which aprons, nevertheless, are so
30 mechanically controlled that they acquire folded dispositions at locations comparatively near the cylinders, and within a comparatively small space.

Other objects of the invention, as herein-
35 after rendered apparent, are attained in and by the constructions, and arrangement or combination, of parts embodied in the machine.

The invention is described in conjunction
40 with the accompanying drawings and is defined in the claims.

In the drawings:—Figure 1 is a side elevation of the improved machine, certain appurtenances thereof being shown in vertical section. Fig. 2 is a front elevation of the machine. Figs. 3 and 4 represent in
45 elevations at right angles to each other, a provision for the displacement of the receptacles in which the long aprons may be disposed from working relation to the machine whereby receptacles for other aprons may be brought to place. Figs. 5 and 6 are dia-
50 grammatic views showing modifications or extensions of the idea of means comprised within the present invention and herein-
55 after described.

In the drawings, 1 and 2 represent cylinders of the general character of calender rolls mounted in suitable bearings in the machine frame A, the lower cylinder being
60 represented as journaled in fixed bearings a , while the upper one is journaled in movable bearings a^2 to which cylinders pressure may be applied by the screws b having the operating hand wheels b^2 .

65 B represents the driving shaft of the machine having the clutch pulley C thereon and by the pinion d meshing with the gear wheel e on the extended journal of the lower cylinder 2; and on the extended journal at
70 the opposite end of the cylinder 2 is a spur gear f in mesh with the one g of the same size on the journal of the upper cylinder 1.

D represents a long endless apron which has a running course around the upper cyl-
75 nder 1, and E represents a long endless apron which has a running course around the lower cylinder 2. These aprons, preferably alike as to length, and usually alike as
80 to texture or surface character, are each in their running endless length of several hundred, or even fully or more than a thousand, feet.

For the imparting to the paper to be finished a cloth-like surface, the aprons are
85 made of textile material, either comparatively fine or coarse as required for the nature of the work to be performed in the machine; and by making the aprons extremely
90 long, more or less nearly as above stated, the transverse seam mark in each of the aprons will be brought to its working relation between the peripheral coöperative cylinders of the machine.

Means comparatively close to the cylin-
95 ders are provided for causing a disposition of the portions of the aprons which are away from the cylinders in reversed loops or folds and within small space for the occupancy thereof; and to this end I provide upwardly
100 open receptacle F and F^2 , adjacent, and one above, and the other below, the cylinders. These upwardly open receptacles are rounded at the side and bottom thereof and are supported in stationary positions in any
105 suitable manner, one, for instance, being by brackets h suspended from the ceiling, and the other by brackets h^2 suspended below the floor, which latter is apertured for the free run of the lower apron by one course thereof
110 to and into the receptacle and by the other course thereof out and away from the latter.

i , i^2 and i^3 represent rods or high tension rolls for the course of the apron running from the upper receptacle to a half encircling engagement down and around the upper cylinder 1; and i^4 and i^5 represent a pair of positively driven feed rolls having their location near the open edge of the receptacle at the side thereof for the incoming of the tape. These feed rolls are geared together, and one thereof is driven in any suitable manner, as by a driving band i^6 running around a pulley i^7 thereon and driven by a pulley i^8 on a line shafting. These as shown are supported on the receptacle F.

A roll or other guide for the course of the apron D which has its returning course to the receptacle F is represented at i^9 .

Located in relation to the course of the apron D running from the receptacle F to the upper cylinder and adjacent the latter is a device for the lateral expansion of the apron whereby it will run, comparatively taut and unwrinkled in its width, to the cylinder. And this device which is represented by G in the stated situation is what may be termed as a curved surfaced herringbone plate, the ribs or serrations from the middle to one end thereof being inclined reversely to those comprised between the middle and the other end of the plate so that under the tendency exerted by the reversed ribs or serrations to outwardly spread the apron passing thereover the desired effect is accomplished.

The apron E for its course running from the receptacle F² to and with a half encircling engagement around the lower cylinder 2 has provided therefor the tension rods or guide rolls adjacent the lower cylinder 2; and in position to be rounded by the course of the apron E running to such cylinder is a device G² to have the same operative or expanding effect on the apron as the above mentioned one G. This is represented as what is commercially known as a barrel expander, and in itself not my invention, it being mentioned as to its nature, however, that it comprises a rotative cylinder having blades or slates sinuously or helically arranged around the roll and internal means for distending such blades at the side in engagement with the apron or belt running thereover and retracting them at the opposite side. This barrel expander is shown as having on its shaft G³ a pulley k around which runs a driving band k^2 driven from a pulley k^3 fixed on the driving shaft of the machine.

Adjacent the open edge of the receptacle F² at which the course of the apron E enters on its return from the cylinder 2 are a pair of positively driven feed rolls j^4 and j^5 , the same being geared together and one thereof having a pulley j^6 is engaged by the driving band j^7 which runs around the pulley j^8 on

the shaft G³ of the rotative expander, and derives its motion from such shaft.

j^9 represents the guiding rod or roll for the course of the apron E returning to the receptacle, the same having its location suitably between the feed rolls j^4 , j^5 and the cylinder.

While I have shown and referred to apron expanding devices G and G² of different specific characters, but both having substantially the same operative effect, it is to be here stated that both expanders may be of herringbone-plate type, or both may be of the rotative blade and barrel type.

In Fig. 1, H represents a supply roll of paper to be surface finished, H² representing supporting brackets therefor, and J represents the take-up or winding roll of the paper. J² represents the supporting brackets therefor, and x represents the course of the paper running from the supply to the take-up roll between the coöperative cylinders and the aprons forming continuously running or working faces of such cylinders.

Each endless apron of the extreme length heretofore emphasized, upon being positively drawn at the receiving side of the curve-bottomed receptacle and precipitated thereinto will automatically dispose itself into reversed folds as measurably indicated at y so that all thereof except its comparatively short portions running to the cylinders and returning from the cylinders will be compactly disposed and accommodated in a comparatively small space.

It is, of course, manifest that the paper, dry, or much or little moistened, and being subjected to the action of the machine, receives surfacing corresponding to the character of the surfacing of the apron or aprons employed.

If surfacing is only required on one side of the paper, only one of the aprons is employed in conjunction with one of the cylinders.

The machine may be adapted or equipped for imparting repeated surface finishings on one or both sides of the paper, and it may also be adapted or equipped for imparting a surface finishing action several times to one side of the paper and a lessened number of surface finishing actions to the other side; and in this connection reference is made to the diagrammatic view, Fig. 5, wherein the cylinders 1, 2, 3 and 4 are represented, around and between which run the aprons D and E, the paper guidance being such as to receive two surface finishings on both of the sides thereof.

The paper being subjected to the action of but three cylinders will receive double surface finishings on both of its sides, while if the number of cylinders were increased, a corresponding increased number of finishings on both sides would be acquired.

Fig. 6 shows an arrangement of 5 cylinders designated by consecutive numerals around and between all of which one of the aprons has its running course, while the other apron E is by the guide rolls *m m* after partially encircling the cylinder 1 diverted from its course around and between the cylinders 2, 3 and 4 and again carried only between the cylinders 4 and 5. Under this arrangement the paper receives the four finishings on its top side and but two on its under side; and, of course, variations may be made in the number of the cylinders and the running arrangements of the aprons whereby other relatively excessive surface finishing to one side is acquired beyond that imparted to the other side of the paper. Such variations of finish are often very desirable especially of what is known as cover papers, blotting paper and some other grades.

The cylinders of the set, of whatever number, may be composed of steel, chilled iron or other metal, cotton, paper, husk or other fibrous material or a mixture of materials whereby the cylinders are hard and unyielding, or possessed of more or less resiliency or elasticity.

Cylinders of one or more of the kinds as just referred to may be employed in the machine as found best adapted to meet the surface finishing requirements thereof.

Indication is made in Figs. 3 and 4 of the manner in which receptacles for the accommodation, compactly of the aprons are movably supported so that one may be displaced from its working relation to the machine proper to permit another one of the receptacles to be brought to working position.

L represents a trackway from which by the trolleys or wheels *o* carried by the brackets *p* secured on the opposite sides of the receptacle, the latter has a suspension and running support.

Assuming that it is desirable to substitute for use in the machine an apron carried in one of the receptacles by another carried in a similar receptacle therefor, the one apron is disconnected at its transverse seam and run into its receiver which is then moved along on the trackway (the driving band for the receptacle-carried feed rolls being, of course, temporarily disconnected), and then the other apron and its carrying receptacle is brought to place, the ends thereof carried in relation to their guiding means and to the cylinders and joined or seamed.

I claim:—

1. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, an endless apron running around one of the cylinders and having long courses, and between which cylinders and apron the paper to be finished is passed, and means comparatively close to said cylinders for causing a

disposition of the apron in reversed folds, whereby the machine in its entirety and comprising such long apron requires but comparatively small space of occupancy.

2. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, a pair of endless aprons having long courses and running around the respective cylinders and between which cylinders and their appurtenant aprons the paper to be finished is passed, and means comparatively close to said cylinders for causing dispositions of the aprons in reversed folds.

3. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, an endless apron running around one of the cylinders and having long courses, and between which cylinders and apron the paper to be finished is passed, means comparatively close to said cylinders for causing a disposition of the apron in a multiplicity of reversed folds or loops, means, between the apron folding means and the cylinder to which it is appurtenant, for imparting a transversely expanding tension to the apron.

4. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, an endless apron running around one of the cylinders and having long courses, and between which cylinders and apron the paper to be finished is passed, an upwardly open receptacle adjacent the cylinders within which the apron will assume a disposition in reversed loose folds or plaits, and guiding means for the apron.

5. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, endless aprons having long courses and having running engagements around the cylinders and between which apron engaged cylinders the paper to be finished is passed, upwardly open receptacles suitably adjacent the cylinders within which the aprons will assume dispositions in reversed loose folds or plaits, and means for guiding the courses of the endless aprons, from the cylinders to the receptacles, which comprise positively driven feed rolls.

6. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, endless aprons having long courses and having running engagements around the cylinders and between which apron engaged cylinders and apron the paper to be finished is passed, upwardly open receptacles adjacent the cylinders within which the aprons will assume a disposition in reversed loose folds or plaits, positively driven rolls for exerting a feeding action of a course of each apron from the cylinder with which it has its run-

ning engagement into its receptacle, and means for guiding the other course of each apron from its receptacle to its cylinder.

7. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, an endless apron having long courses running around one of the cylinders and between which cylinders and apron the paper to be finished is passed, an upwardly open receptacle adjacent the cylinders, means for guiding the apron into and away from the receptacle, whereby it will assume a disposition therein in reversed loose folds or plaits, and a support for the receptacle on which it is movably mounted whereby it, with the apron, disengaged from its cylinder, carried therein may be moved from its operative relation to the cylinders to permit the substitution in the place thereof of another apron-accommodating receptacle.

8. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, an endless apron having long courses running around one of the cylinders and between which cylinders and apron the paper to be finished is passed, an upwardly open receptacle adjacent the cylinders within which the apron will assume a disposition in reversed loose folds or plaits, means for guiding the apron into and away from the receptacle and a trackway and trolleys running thereon and by which the receptacle is movably carried.

9. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, endless aprons having long courses and having running engagements around the cylinders, upwardly open receptacles suitably adjacent the cylinders within which the aprons will assume dispositions in reversed loose folds or plaits, coacting rolls, carried by the receptacles, for feeding courses of the aprons for their entrance into the latter, and means for positively driving such feed rolls.

10. In a machine for surface finishing paper, in combination, adjacent, peripherally coacting cylinders under pressure, endless aprons having long courses and having running engagements around the cylinders, upwardly open receptacles suitably adjacent the cylinders within which the aprons will assume dispositions in reversed loose folds or plaits, coacting rolls, means carried by the receptacles, for feeding courses of the

aprons for their entrance into the latter, means for positively driving such feed rolls, and supports on which the receptacles are movably mounted.

11. In a machine for surface finishing paper, in combination, a plurality of adjacent peripherally coöperative cylinders, under pressure and rotatively driven, long endless aprons running around said cylinders, and having the courses thereof brought to facewise relations and compression between one of said cylinders and the next, and between and subject to which the paper to be finished is to be passed, and means comparatively close to said cylinders for causing a disposition of the portions of the respective aprons which are away from the cylinders in reversed loops or folds.

12. In a machine for surface finishing paper in combination, upper and lower cylinders and one or more cylinders intermediate therebetween, all rotatively driven and peripherally coöperative under pressure, a pair of long endless aprons running around said cylinders, and having the courses thereof brought to facewise relations and compressions between cylinders of the said set and between which the paper to be finished is to be passed, one of said aprons having guiding means therefor, relatively to the cylinders whereby it has a less number of impingements by and between adjacent pairs of the cylinders than the number of such impingements to which the other apron is subjected, and means comparatively close to the cylinders for causing dispositions of the aprons in reversed folds or loops.

13. In a machine for surface finishing paper, in combination, outwardly located cylinders, and a plurality of cylinders relatively intermediately located between the outer ones, and each cylinder of the series being peripherally coöperative, under compression, with the one next thereto, and all rotatively driven, and endless aprons, one thereof running around, subject to impingement between all of the cylinders, and the other thereof being guided to have running engagement around and impingement by a less number of the cylinders.

Signed by me at Springfield, Mass., in presence of two subscribing witnesses.

PAUL W. BIDWELL.

Witnesses:

G. R. DRISCOLL,
J. D. LONG.