

No. 662,861.

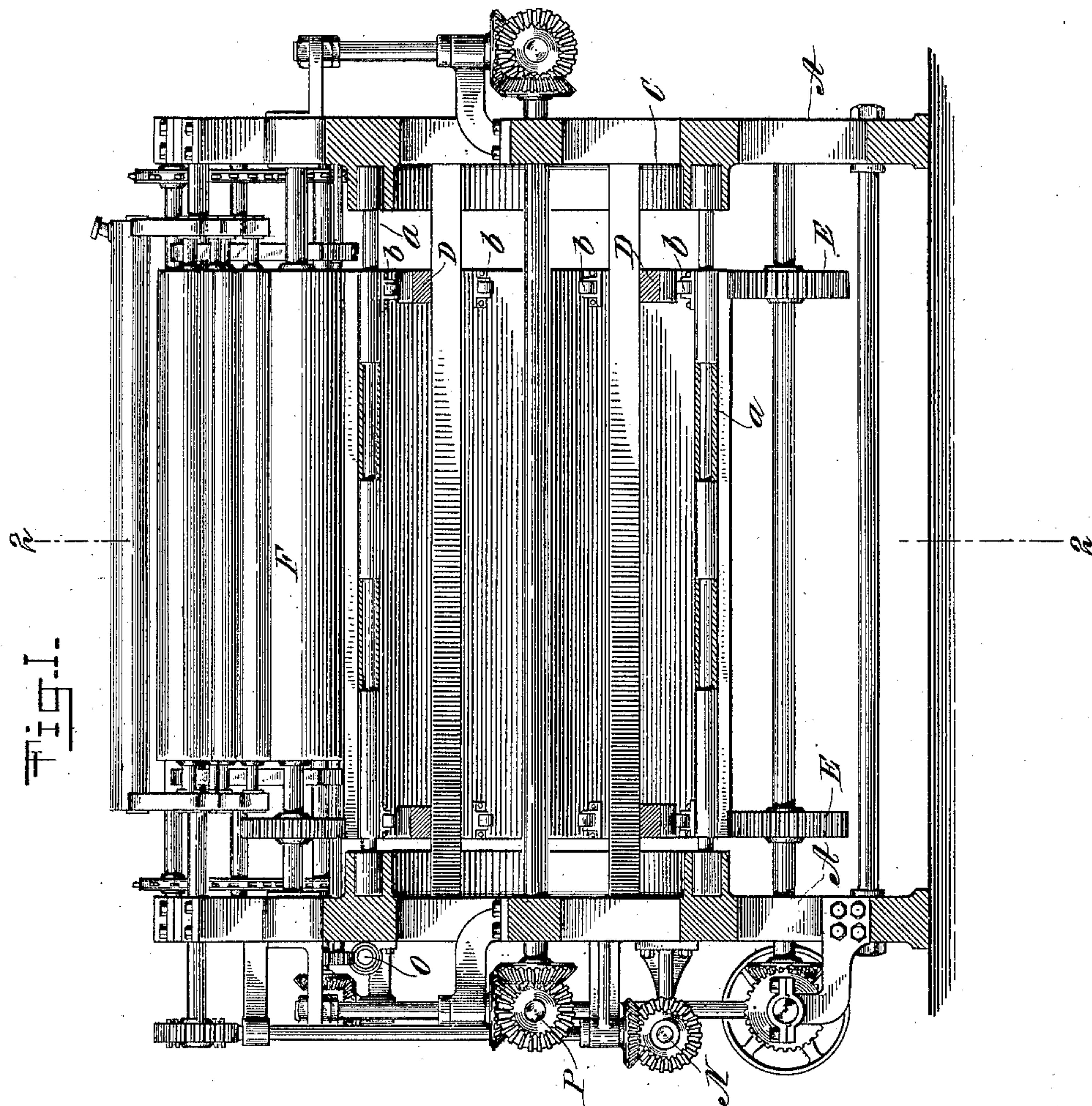
Patented Nov. 27, 1900.

E. HETT.
PRINTING PRESS.

(Application filed Mar. 6, 1899.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:

George M. Hett
Sidney Mann.

INVENTOR

Edward Hett

BY

Kenyon & Kenyon
ATTORNEYS

No. 662,861.

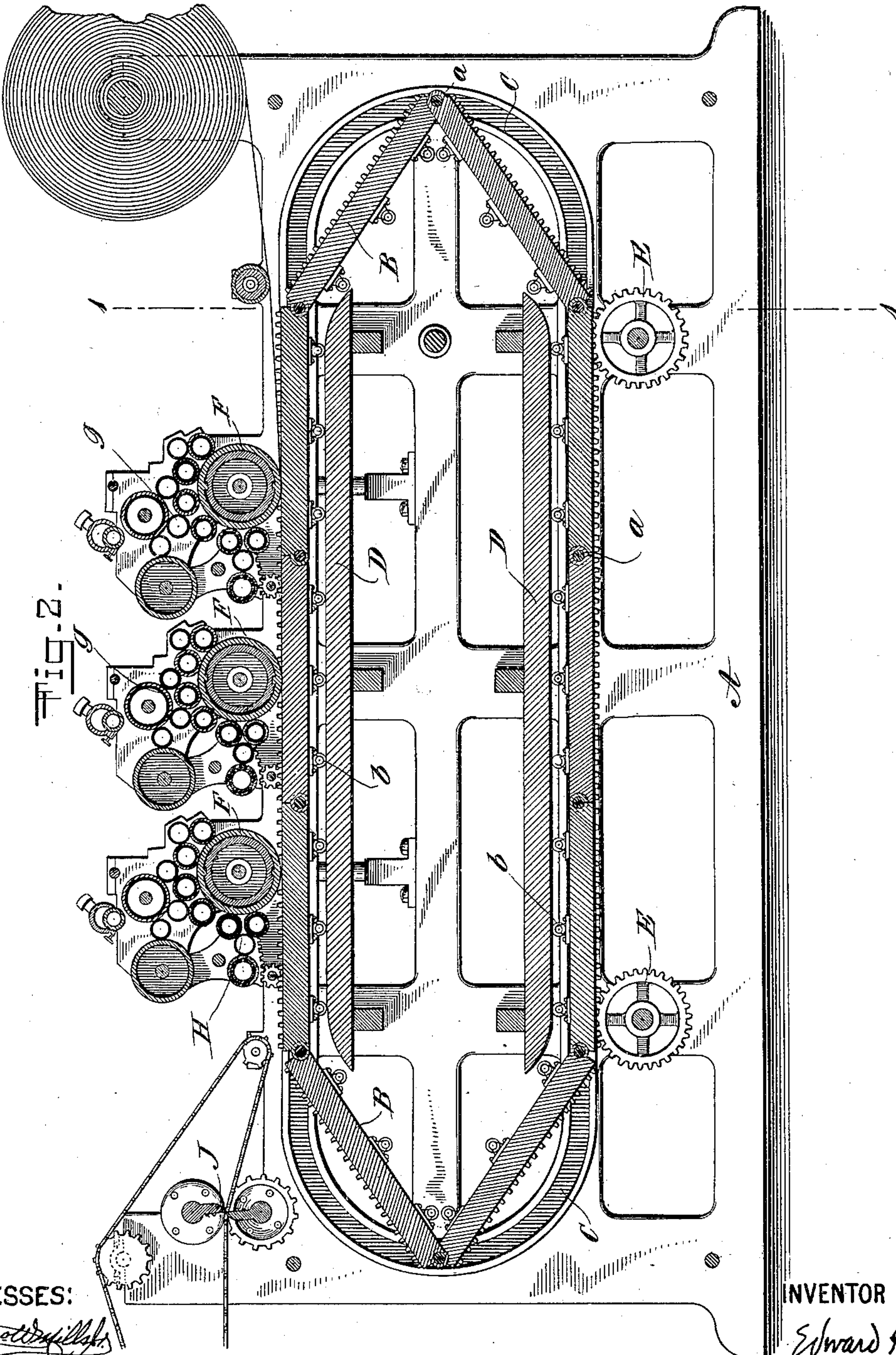
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(Application filed Mar. 6, 1899.)

(No Model.)

4 Sheets—Sheet 2.



WITNESSES:

Geoffrey H. Hett
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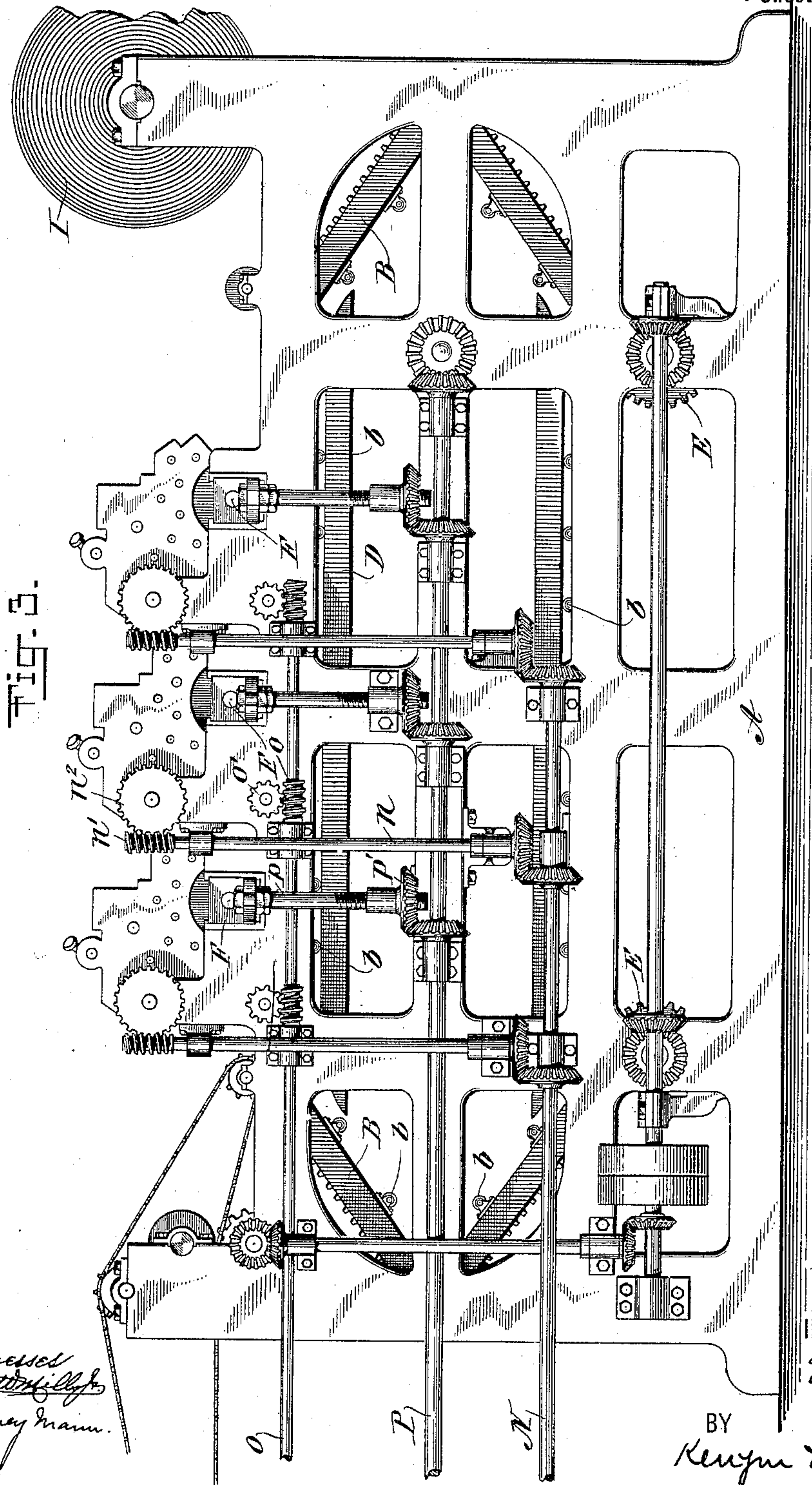
Patented Nov. 27, 1900.

E. HETT.
PRINTING PRESS.

(Application filed Mar. 6, 1899.)

(No Model.)

4 Sheets—Sheet 3.



Witnesses
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No. 662,861.

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(No Model.)

4 Sheets—Sheet 4.

Fig. 4.

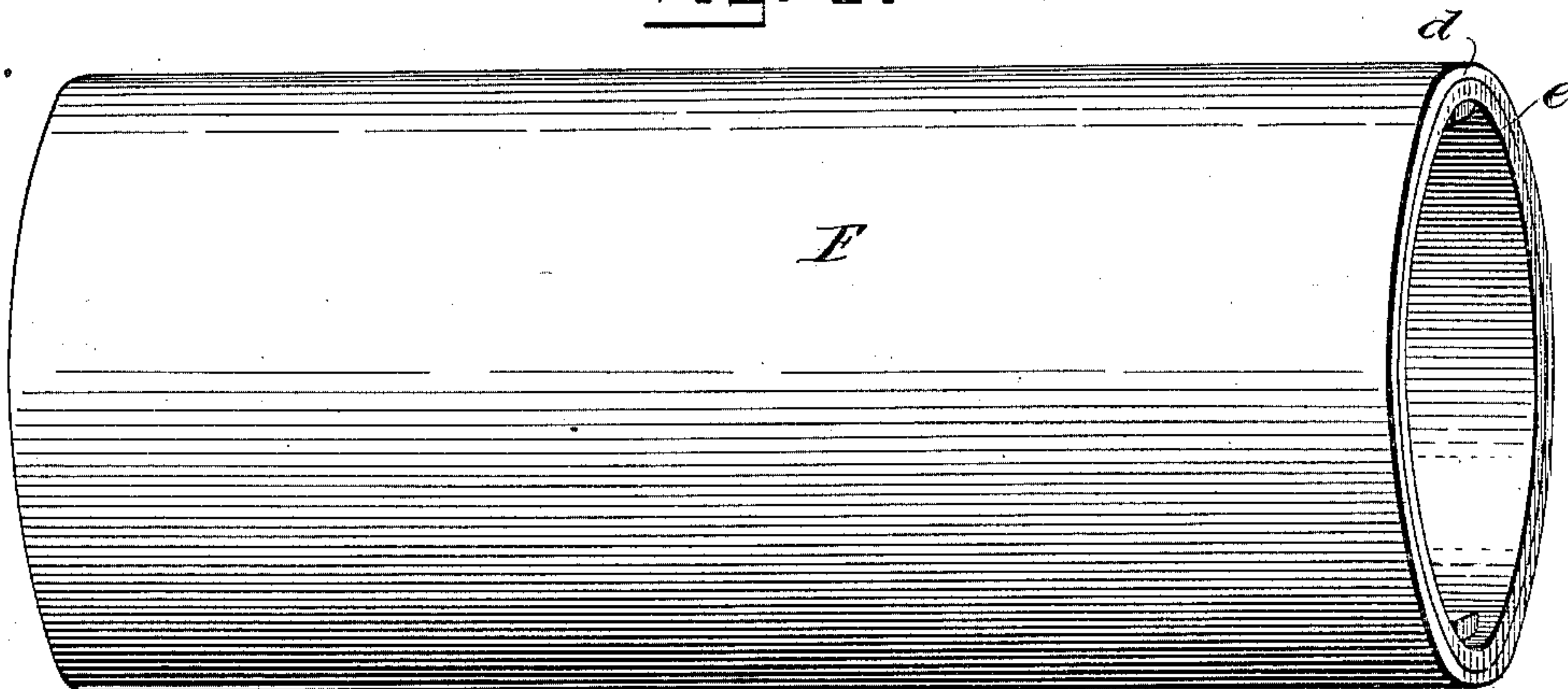
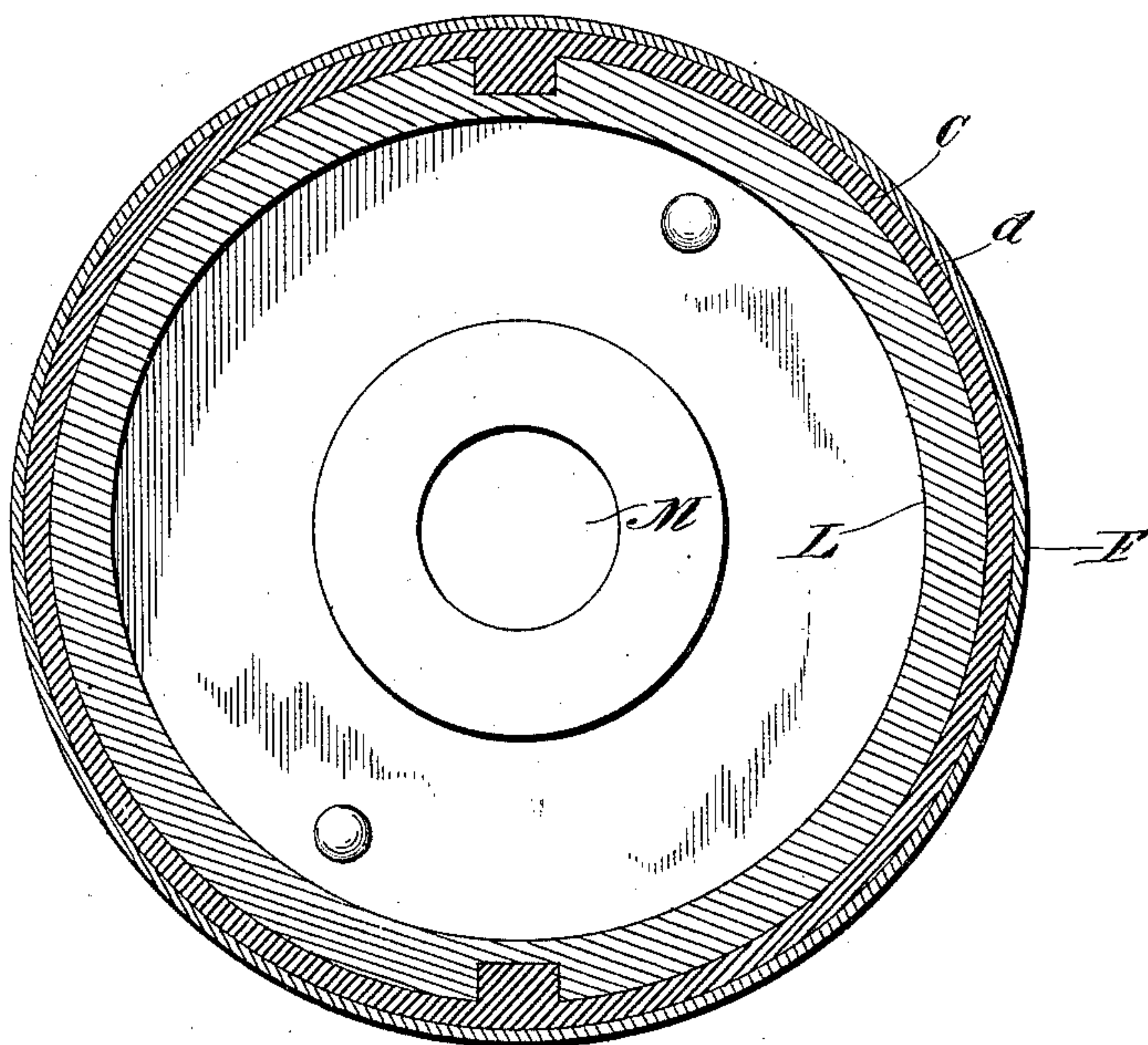


Fig. 5.



WITNESSES:

Scott & Mills
Sidney Mann

INVENTOR

Edward Hett

BY

Kenyon & Kenyon
ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD HETT, OF NEW YORK, N. Y.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 662,861, dated November 27, 1900.

Application filed March 6, 1899. Serial No. 707,925. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, and a resident of New York, (New Dorp,) in the county of Richmond,
5 State of New York, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

The present invention relates to printing-presses, and especially to multicolor planographic or lithographic printing-presses.

It has for its object to combine the advantages of printing by a curved or cylindrical printing-surface rolling upon a flat impression-surface and of printing by a series of
15 such printing-couples, with the advantages of rapidity, perfection, and economy characterizing the rotary-press principle of printing on the web by a curved or cylindrical printing-surface or a series of such surfaces upon a
20 curved impression surface or drum.

The invention consists of the new combinations and arrangements of apparatus herein described and claimed.

In the accompanying drawings, which form
25 a part hereof, a machine is represented which embodies my invention in its preferred form and all parts of it.

Figure 1 is a vertical cross-section of the machine, taken on the line 1 1 of Fig. 2. Fig.
30 2 is a vertical longitudinal section taken on the line 2 2 of Fig. 1. Fig. 3 is a side elevation showing the gearing and connected parts for operating the principal moving parts of the machine. Fig. 4 is a detail view of the
35 tubular printing-surface, and Fig. 5 is a detail sectional view of the tubular printing-surface and its interior support.

Like letters of reference indicate the same parts in all the views.

40 In practical use for printing purposes the mechanism of the drawings presupposes a preliminary preparation of the series of printing-surfaces before they come to the press—such, for example, as is set out in my pending application, Serial No. 695,281, filed November 2, 1898, including a preliminary transferring to the printing-surfaces—such as is set out, for instance, in my pending application, Serial No. 703,082, filed January 23, 1899.
50 The permanent adjustment in some approved manner of the series of tubular printing-surfaces to such related system of transferring

and to each other and to the flat impression-surfaces, respectively, is also presupposed. Moreover, the printing-surfaces are assumed
55 to have been suitably developed in any well-known way into lithographic or relief printing-surfaces or other character of printing-surface as desired.

The drawings show a series of flat impression-surfaces and three printing-surfaces corresponding thereto; but it will be understood that a greater or less number of impression-surfaces or of printing-surfaces may be used without departing from the spirit of my in-
65 vention so long as there is a plurality of impression-surfaces.

A is a portion of the main frame of the press.

B B B, &c., are a series of flat impression-surfaces pivoted together, as indicated at *a*,
70 so as to form an endless chain.

C C are guideways in the main frame, in which the extremities of the pivots *a* slide or roll to hold the chain of impression-surfaces
75 in place and guide them as they are driven in operation.

D D are two supporting and guiding tracks forming part of the main frame of the machine or connected firmly thereto, and upon
80 which travel two or more series of rollers *b*, with which the impression-surfaces are provided, as shown, the whole serving to maintain the impression-surfaces in a perfectly level and fixed plane while moving success-
85 sively under the printing-surfaces in the operation of printing.

E E are gear-wheels whose teeth, meshing with the teeth of suitable racks *e* upon the outer edges of the impression-surfaces, drive
90 the latter, as shown.

F F F are the tubular printing-surfaces, a series of which, each corresponding in circumference with the length of the impression-surfaces, are arranged upon the impression-
95 face of the said impression-surfaces, respectively. The printing-surfaces are tubular, as shown, and are fitted to and supported by and removable from an interior support L, which is shown as a hollow cylinder suitably supported on the shaft M. I prefer to make the printing-surface accurately adjustable on the interior support or the support adjustable on the shaft. The interior support L is prefer-
100

ably arranged so as to support the printing-tube from end to end and at every point of the circumference, and to that end the supporting-cylinder L is externally tapered from
 5 end to end, and the printing-tube F is correspondingly tapered internally and is an accurate fit for the support. The tube has inner splines and the support corresponding
 10 slots, as shown in Fig. 5, the splines sliding in the slots. To place the tube on the support, it is slid on from one end, and it may be slid up to and against an adjustable stop and held there by any suitable means. It is
 15 removed by simply slipping it off endwise after removing the locking devices. The details of the mode of combination of the tube and its support need not be further described. The printing-surfaces are driven positively
 20 with the impression-surfaces by means of the gears *m*, fixed on the shafts M of the supports L and meshing with the racks *e*. The tubular printing-surface itself is primarily a planographic surface, which is preferably circumferentially continuous, and it is also preferably
 25 a composite tube consisting of an inner strengthening-shell—as, for example, of copper—and an outer surface layer of a different metal—as, for example, of zinc—applied, preferably, by electrolytic deposition
 30 of the zinc upon the copper or by casting the zinc under pressure. The inner shell, as of copper, is represented at *c*, and the outer surface, as of zinc, at *d*, in Figs. 4 and 5. The cylindrical printing-surface may, however, be
 35 made by casting a zinc tube or by casting a solid zinc cylinder or in any other desired manner or of any other suitable material. This outer surface of the printing-tube must, however, be of suitable material to receive
 40 as a transfer the design or picture that is to be printed—for example, after the manner of transferring in lithography—the surface being, as heretofore stated, planographic for the purpose of receiving such transfer. The
 45 surface must also be of such a character as to be capable of subsequent development into and acting as a printing-surface of the character desired, whether planographic, relief, or otherwise.

50 I prefer to employ a series of printing-surfaces such as I have described and in such a multicolor-press as is shown in the drawings. In such case the series of original planographic printing-tubes are identical primarily
 55 in size and surface character and adapted to receive a series of related transfers of registering designs, each surface printing ordinarily a different color.

60 G G G are suitable systems of ink-supply mechanisms, each comprising ink-fountain, ductor-roller, and distributing-rollers. H H H are suitable systems of dampening mechanisms. I is the paper-roll and a feed-controlling mechanism suitable for feeding paper on
 65 the web to the printing and impression surfaces. J is a suitable cutting and delivery mechanism. These or any other suitable de-

vices for inking, dampening, feeding, cutting, and delivery may be employed, as my invention does not relate to the details thereof. 70

My invention is intended to combine the advantages of printing with a curved printing-surface upon a flat impression-surface and the advantages of printing with a curved printing-surface upon a curved impression
 75 surface or drum. It involves connecting together in an endless series and preferably pivoting together, as it were, in an endless chain a series of flat impression-surfaces, so that they shall in the operation of printing
 80 move one after the other beneath the printing surface or surfaces endlessly and always in the same direction and preferably in a straight line, while the printing surface or surfaces themselves rotate relatively to the
 85 said impression-surfaces and to each other and preferably rotate in fixed positions. To accomplish this in its preferred form, the main frame of the press is provided with the continuous guides or ways C, one on each
 90 side thereof, in which guides or ways the ends of the pivots by which the impression-surfaces are connected together are held against any other motion except the prescribed motion
 95 imposed upon them by the driving-wheels E, a continuous motion toward and beneath and away from the printing surface or surfaces and around and toward and beneath and away from it or them again, and so on. Motion is
 100 imparted to the endless chain of impression-surfaces by gear-wheels on each side of the press, whose cogs or teeth act upon corresponding teeth which are continuous on either
 105 side of the whole series of impression-surfaces. To support the impression-surfaces during the operation of printing, a solid bed or track forming part of the main frame of the machine is provided, upon and across which
 110 the impression-surfaces move, being each provided with a series of small rollers to diminish friction. A similar bed or track is also provided at the lower portion of the main
 115 frame, which is instrumental in controlling and facilitating the movement of the impression-surfaces on their way to the position occupied by them during the act of printing. The
 120 printing-surfaces are actuated in their revolution by gears meshing with the gearing of the impression-surfaces, so that the movement of the impression-surfaces imparts a
 125 positive rotating movement to the printing-surfaces, which otherwise are during the printing operation fixed in their positions in the preferred form of my invention, both with respect to the impression-surfaces and with respect to each other where more than one is
 130 employed. It is apparent that one or more printing-surfaces may be employed, as desired. Moreover, sheets may be fed to the press and printed as distinguished from printing upon the web, in which case the cutting devices will not be employed. The surface of these impression-plates, which, however, forms no part of this invention, may be

of the character best adapted for planographic work or of a character admitting of the advantages secured by the use of make-ready or of any character desired for planographic, relief, intaglio, or other form of printing. Some of the other advantages accruing from this combination and operation of printing and impression surfaces are its adaptability to so many different kinds of printing; the accurate register that may be maintained from color to color where impression-surfaces, together with the paper to be printed, pass under one printing-surface after another in succession as distinguished from there being a separate impression-surface for each printing-surface; any given point on any impression-surface always registers with the same point on any printing-surface, so that in typographic work or relief or intaglio printing the process of make-ready may be applied to the said impression-surfaces where a single printing-cylinder is used; the various parts of the mechanism are more readily accessible; in fact, many of the advantages of straight-line printing and of printing upon a great central drum surrounded by a series of printing-surfaces are united in a press constructed according to my invention.

It is manifest that the apparatus for forcing the ink-supply systems and the dampening mechanisms away from the printing-surfaces, such as I have described in connection with other applications, may be employed. Suitable apparatus with suitable trains of gearing are shown in Fig. 3, where shaft N operates to raise and lower the inking mechanisms, O the dampening mechanisms, and P the printing-surfaces themselves. The shaft N is connected to the inking mechanisms by means of the vertical shafts n , which are provided at their upper ends with worms n' , meshing with the worm-wheels n^2 , secured to the inking-frames. The shaft O is connected with the damping mechanisms by means of the worms o thereon, which mesh with the worm-wheels o' , secured to the frames of the damping mechanisms, as shown. The shaft P is connected with the boxes in which the shafts of the printing-form supports are journaled by means of the vertical pressure-bars p , the threaded lower ends of which engage with suitable nuts formed in the hubs of the gears p' , as indicated in Fig. 3. These parts are duplicated on the opposite sides of the machine, as indicated in Fig. 1, the two sets of mechanism being connected by a shaft p^2 . The shafts N, O, and P may be operated and controlled by hand or by any suitable mechanism—such, for instance, as that shown and described in the patent granted to me November 21, 1899, No. 637,569.

The dampening mechanism may of course be omitted in presses where that feature of planographic work is not employed.

For the purposes of the invention in its broadest expression it is not necessary that

the impression-surfaces be pivotally connected as contradistinguished from rigidly connected, nor is it necessary that the printing-surfaces should rotate in a fixed position, although I prefer those constructions and peculiar advantages attend both.

The invention is of special advantage and importance in connection with planographic printing-surfaces and planographic printing.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a continuous cylindrical printing-surface with a series of flat impression-surfaces connected together in an endless series, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as described.

2. The combination of a series of continuous cylindrical printing-surfaces with a series of flat impression-surfaces connected together in an endless series, each corresponding in length to the circumference of the printing-surfaces and driven positively therewith, substantially as described.

3. The combination of a continuous cylindrical printing-surface with a series of flat impression-surfaces connected together in an endless series each corresponding in length to the circumference of the printing-surface and driven positively therewith, and suitable paper controlling and delivering devices for printing on the web, substantially as described.

4. The combination of a series of continuous cylindrical printing-surfaces with a series of flat impression-surfaces connected together in an endless series, each corresponding in length to the circumference of the printing-surfaces and driven positively therewith, and suitable paper controlling and delivering devices for printing on the web, substantially as described.

5. The combination of a continuous cylindrical planographic printing-surface with a series of flat impression-surfaces connected together in an endless series, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as described.

6. The combination of a series of continuous cylindrical planographic printing-surfaces with a series of flat impression-surfaces connected together in an endless series, each corresponding in length to the circumference of the printing-surfaces and driven positively therewith, substantially as described.

7. The combination of a series of continuous cylindrical planographic printing-surfaces with a series of flat impression-surfaces connected together in an endless series, each corresponding in length to the circumference of the printing-surfaces and driven positively therewith, and suitable paper controlling and delivering devices for printing on the web, substantially as described.

8. The combination of a tubular printing-

9. The combination of a series of tubular printing-surfaces each having an interior support from which it is removable, with a series of flat impression-surfaces connected together in an endless series and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, substantially as set forth.

11. The combination of a series of plano-graphic tubular printing-surfaces each having an interior support from which it is removable, with a series of flat impression-surfaces connected together in an endless series, and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, substantially as set forth.

13. The combination of a series of tubular printing-surfaces, each having an interior support from which it is removable, with a series of flat impression-surfaces connected together in an endless series and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as described.

15. The combination of a series of plano-graphic tubular printing-surfaces each having an interior support from which it is removable, with a series of flat impression-surfaces connected together in an endless series, and corresponding in length to the circumference of the printing-surfaces and driven

16. The combination of a tubular printing-surface having an interior support from which it is removable, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as set forth.

18. The combination of a planographic tubular printing-surface having an interior support from which it is removable, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as set forth.

20. The combination of a tubular printing-surface having an interior support from which it is removable, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as set forth.

22. The combination of a planographic tubular printing-surface having an interior support from which it is removable, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as set forth.

23. The combination of a series of planographic tubular printing-surfaces each having an interior support from which it is re-

movable, with a series of flat impression-surfaces pivoted together in an endless chain and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as set forth.

24. The combination of a tubular printing-surface having an interior support from which it is removable, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, suitable paper controlling and delivery devices for printing on the web, and suitable paper-cutting devices, substantially as set forth.

25. The combination of a planographic tubular printing-surface having an interior support from which it is removable, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, suitable paper controlling and delivery devices for printing on the web, and suitable paper-cutting devices, substantially as set forth.

26. The combination of a series of planographic tubular printing-surfaces each having an interior support from which it is removable, with a series of flat impression-surfaces pivoted together in an endless chain and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, suitable paper controlling and delivery devices for printing on the web, and suitable paper-cutting devices, substantially as set forth.

27. The combination of a tubular printing-surface having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as set forth.

28. The combination of a series of tubular printing-surfaces each having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, substantially as set forth.

29. The combination of a planographic tubular printing-surface having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as set forth.

30. The combination of a series of planographic tubular printing-surfaces each having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, substantially as set forth.

31. The combination of a tubular printing-surface having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as set forth.

32. The combination of a series of tubular printing-surfaces each having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as set forth.

33. The combination of a planographic tubular printing-surface having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as set forth.

34. The combination of a series of planographic printing-surfaces each having an interior support from which it is removable, and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain and corresponding in length to the circumference of the printing-surfaces and driven positively therewith, and suitable paper controlling and delivery devices for printing on the web, substantially as set forth.

35. The combination of a tubular printing-surface having an interior support from which it is removable and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface, said chain of impression-surfaces being driven positively with the printing-surface and arranged to move in a straight line under the printing-surface during the operation of printing, substantially as set forth.

55 40. The combination of a series of tubular printing-surfaces, each having an interior support from which it is removable and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surfaces, said chain of impression-surfaces being driven positively with the printing-surfaces and arranged to move in a straight line under the printing - surfaces during the operation of printing, and suitable paper controlling and

45. The combination of a planographic tubular printing-surface having an interior support from which it is removable and adapted to rotate in a fixed position during the opera-

tion of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each corresponding in length to the circumference of the printing-surface, said chain
5 of impression-surfaces being driven positively with the printing-surface and arranged to move in a straight line under the printing-surface during the operation of printing, and suitable paper controlling and delivering de-
10 vices for printing on the web, and suitable paper-cutting devices, substantially as set forth.

46. The combination of a series of planographic tubular printing-surfaces, each hav-
15 ing an interior support from which it is removable and adapted to rotate in a fixed position during the operation of printing, with a series of flat impression-surfaces pivoted together in an endless chain, each correspond-
20 ing in length to the circumference of the printing-surfaces, said chain of impression-surfaces being driven positively with the printing-surfaces and arranged to move in a straight line under the printing-surfaces dur-
25 ing the operation of printing, and suitable paper controlling and delivering devices for printing on the web, and suitable paper-cutting devices, substantially as set forth.

47. The combination with a series of con-
30 tinuous cylindrical printing-surfaces, of a series of flat impression-surfaces connected together in an endless chain, and means for simultaneously separating the printing-surfaces from the impression-surfaces, substan-
35 tially as described.

48. The combination with a series of continuous cylindrical planographic printing-surfaces, of a series of flat impression-sur-
40 faces connected together in an endless chain, and means for simultaneously separating the printing-surfaces from the impression-surfaces, substantially as described.

49. The combination with a series of continuous cylindrical printing-surfaces, of a
45 series of flat impression-surfaces connected together in an endless chain, means for simultaneously separating the printing-surfaces from the impression-surfaces, and suitable paper controlling and delivering devices
50 for printing on the web, substantially as set forth.

50. The combination with a series of continuous cylindrical planographic printing-surfaces, of a series of flat impression-surfaces
55 connected together in an endless chain, means for simultaneously separating the printing-surfaces from the impression-surfaces, and suitable paper controlling and delivering devices for printing on the web, substantially
60 as set forth.

51. The combination with a series of continuous cylindrical printing-surfaces, of a series of flat impression-surfaces connected to-
65 gether in an endless chain, a series of inking mechanisms, one for each printing-surface, means for simultaneously separating the printing-surfaces from the impression-sur-

faces, and means for simultaneously separating the inking mechanisms from the printing-surfaces, substantially as described.

52. The combination with a series of continuous cylindrical printing-surfaces, of a series of flat impression-surfaces connected to-
70 gether in an endless chain, a series of inking mechanisms, one for each printing-surface, means for simultaneously separating the printing-surfaces from the impression-sur-
75 faces, means for simultaneously separating the inking mechanisms from the printing-surfaces, and suitable paper controlling and delivering devices for printing on the web, sub-
80 stantially as described.

53. The combination with a series of continuous cylindrical planographic printing-surfaces, of a series of flat impression-sur-
85 faces connected together in an endless chain, a series of inking and damping mechanisms, one for each printing-surface, means for simultaneously separating the printing-surfaces from the impression-surfaces, and means
90 for simultaneously separating the inking and damping mechanisms from the printing-surfaces, substantially as set forth.

54. The combination with a series of continuous cylindrical planographic printing-surfaces, of a series of flat impression-sur-
95 faces connected together in an endless chain, a series of inking and damping mechanisms, one for each printing-surface, means for simultaneously separating the printing-surfaces from the impression-surfaces, means
100 for simultaneously separating the inking and damping mechanisms from the printing-surfaces, and suitable paper controlling and delivering devices for printing on the web, sub-
105 stantially as described.

55. The combination of a circumferentially-continuous curved printing-surface with a series of flat impression-surfaces connected to-
110 gether in an endless series, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as described.

56. The combination of a series of circumferentially-continuous curved printing-sur-
115 faces with a series of flat impression-surfaces connected together in an endless series, each corresponding in length to the circumference of the printing-surfaces and driven positively therewith, substantially as described.

57. The combination of a circumferentially-continuous curved planographic printing-surface with a series of flat impression-sur-
125 faces connected together in an endless series, each corresponding in length to the circumference of the printing-surface and driven positively therewith, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD HETT.

Witnesses:

GEO. W. MILLS, Jr.,

EDWIN SEGER.