J. P. KNAPP & G. E. PANCOAST.

WEB MANIPULATING MECHANISM.

APPLICATION FILED JAN. 7, 1901.

948,548.

Patented Feb. 8, 1910.

4 SHEETS—SHEET 1.

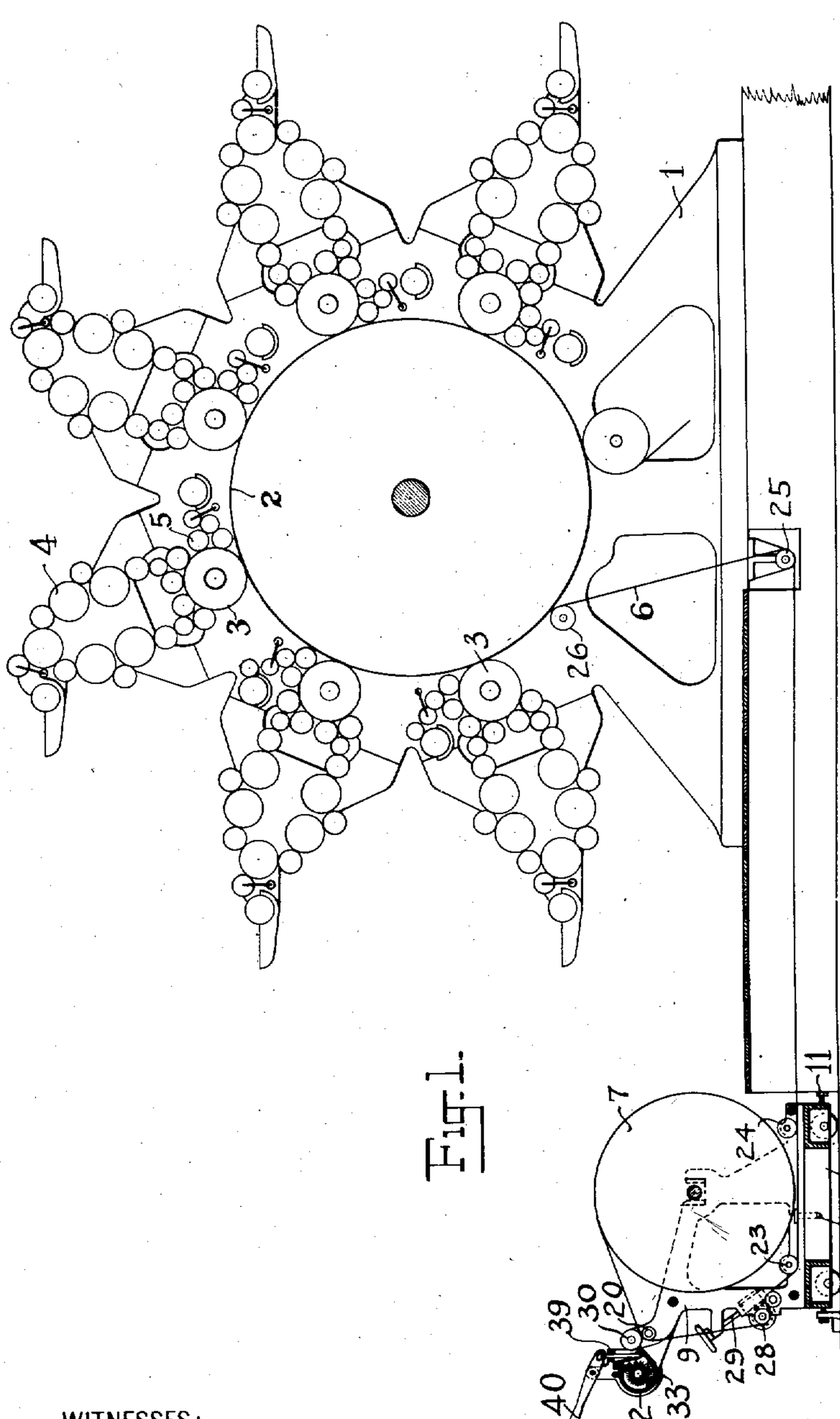

Fig. 1.

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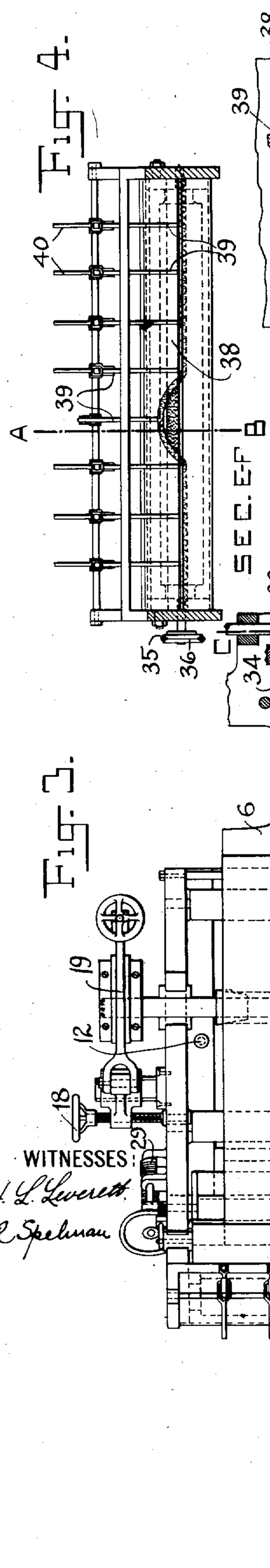
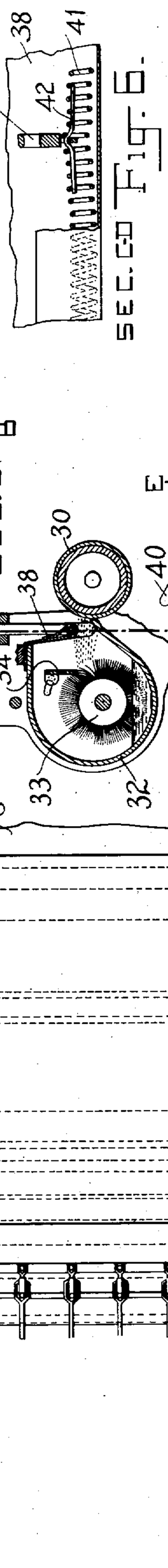


Fig. 4.



SEC. C-D Fig. 6.

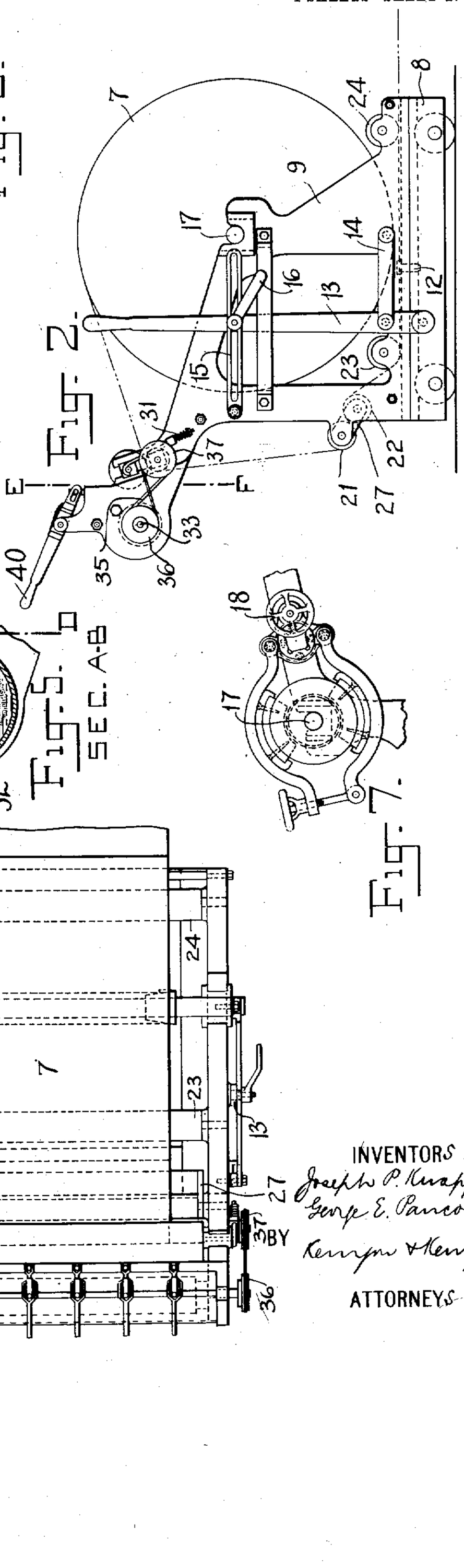


Fig. 2.

Fig. 5.

Fig. 7.

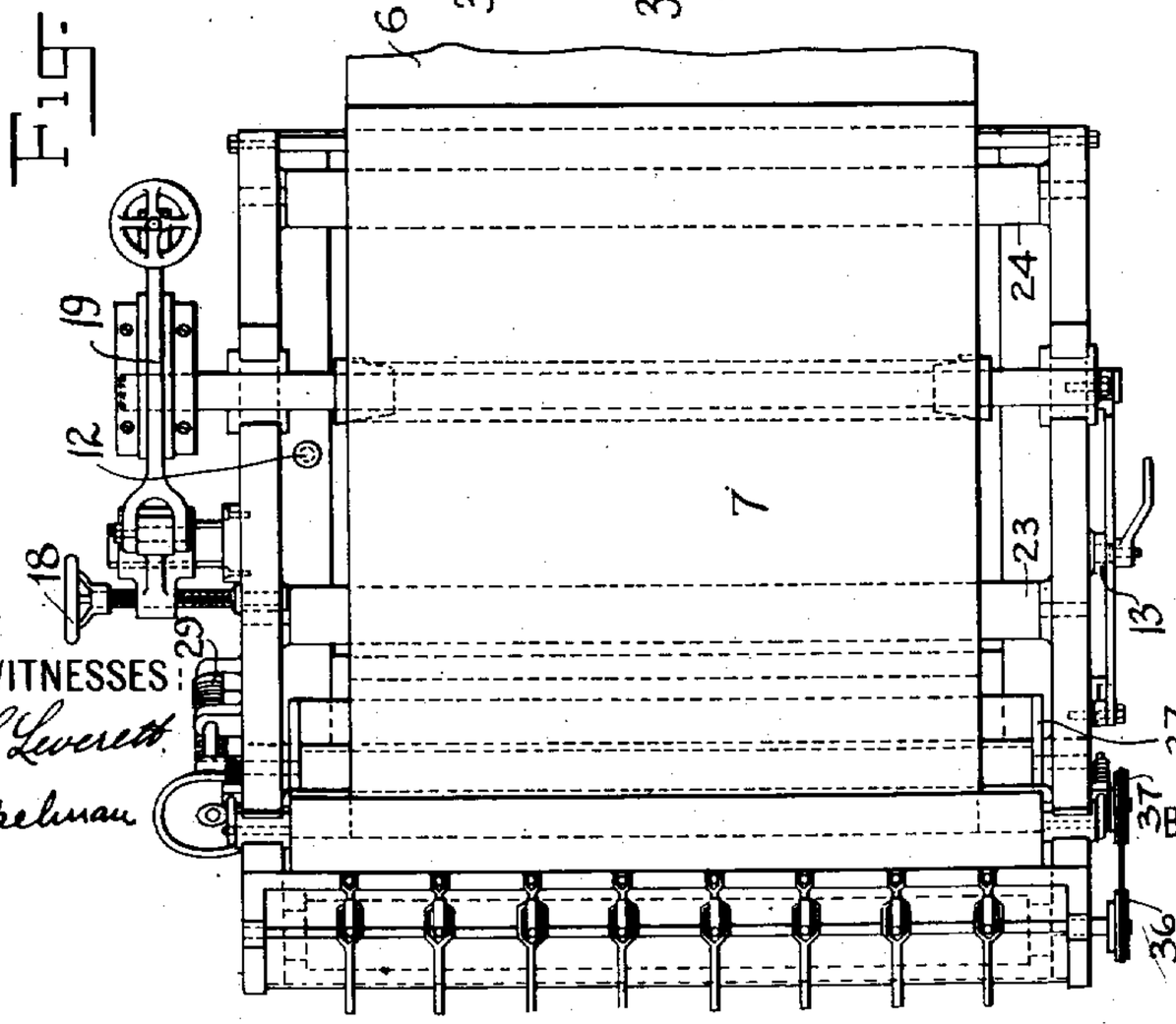


Fig. 3.

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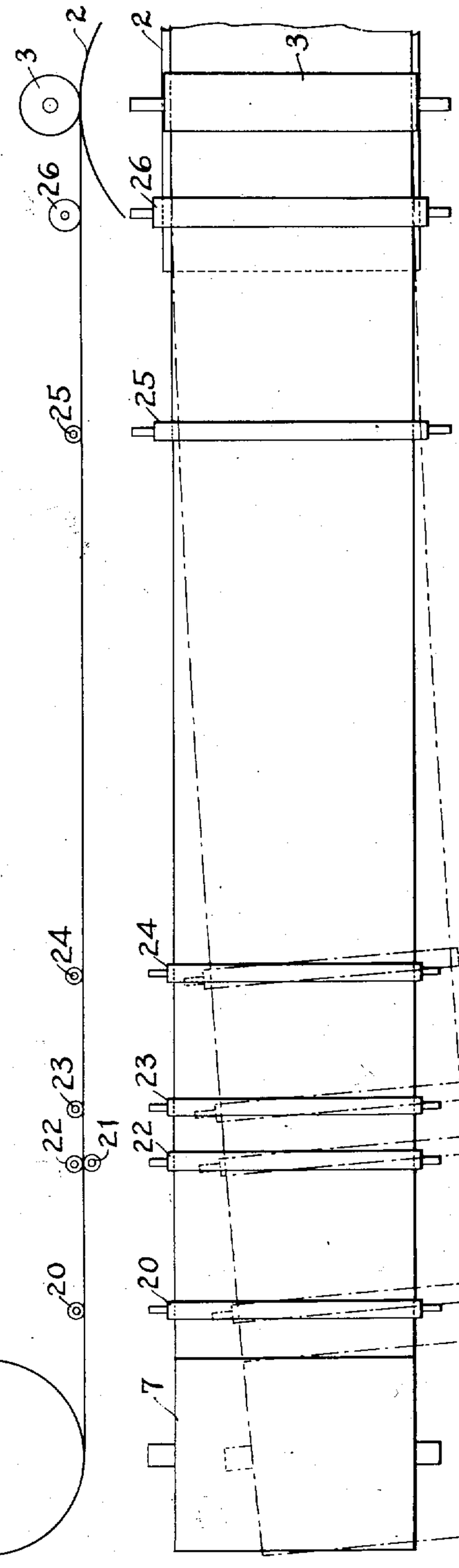

Fig. 8.

Fig. 9.

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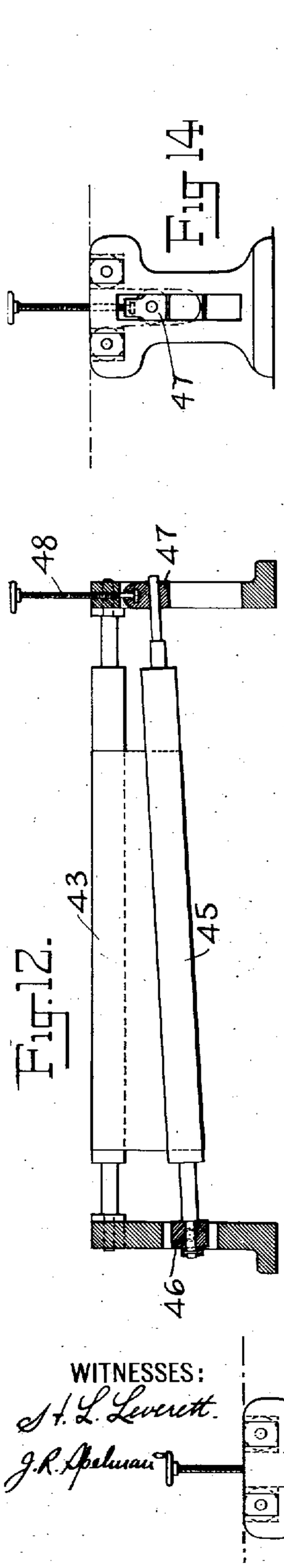

Fig. 14.

Fig. 12.

Fig. 13.

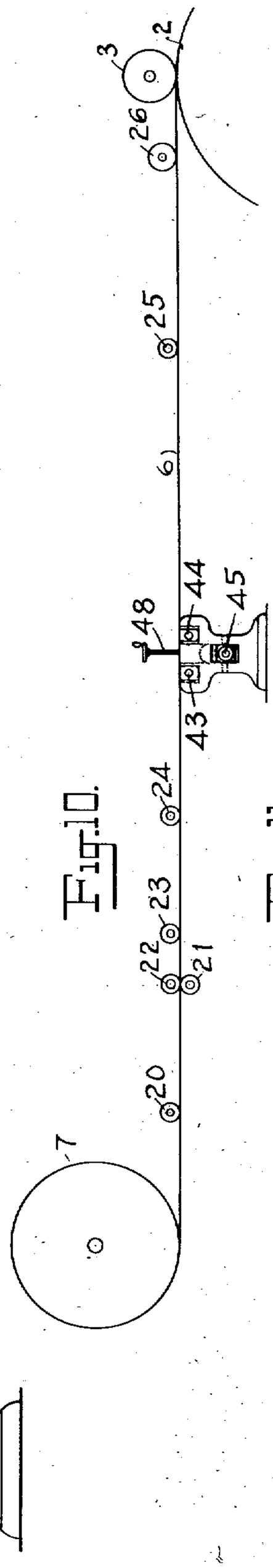

Fig. 10.

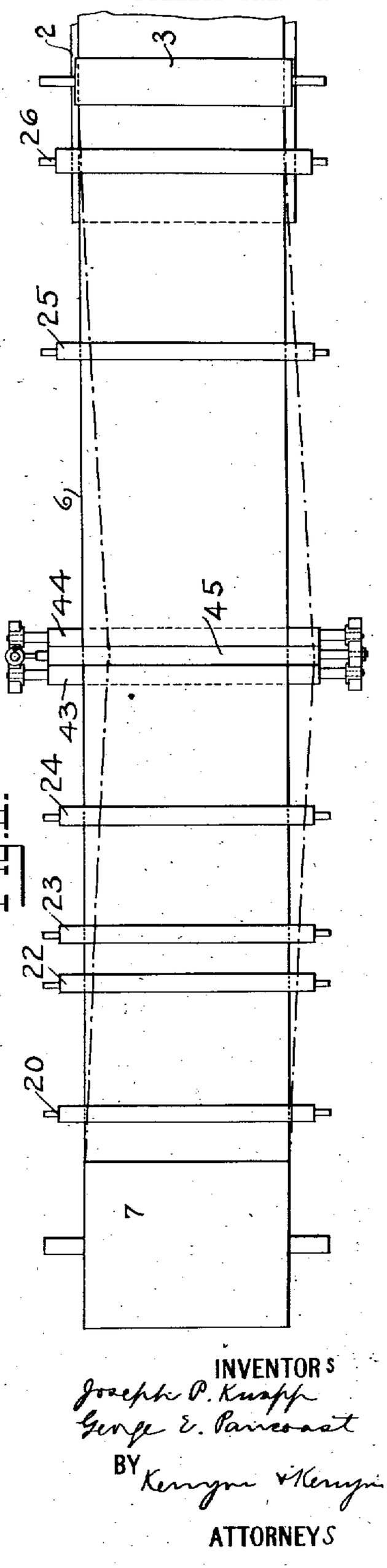

Fig. 11.

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UNITED STATES PATENT OFFICE.

JOSEPH P. KNAPP, OF NEW YORK, AND GEORGE E. PANCOAST, OF BROOKLYN, NEW YORK, ASSIGNORS TO AMERICAN LITHOGRAPHIC COMPANY, A CORPORATION OF NEW YORK.

WEB-MANIPULATING MECHANISM.

948,548. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed January 7, 1901. Serial No. 42,370.

To all whom it may concern:

Be it known that we, JOSEPH P. KNAPP, a citizen of the United States, and a resident of New York city, county and State of New York, and GEORGE E. PANCOAST, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Web-Manipulating Mechanism, of which the following is a specification.

This invention relates to mechanism for manipulating paper or similar fabric in web form, and more particularly to mechanism for feeding the web to web-manipulating machines having continuously moving cylindrical web-forwarding surfaces.

Heretofore great difficulties have been experienced in feeding the web to machines of the class referred to, and especially to those machines in which the web forwarding surfaces make unbroken pressure contact with the web and continuously operate in such contact, as they do, for example, in the rotary planographic printing machine invented by George E. Pancoast and made the subject of a co-pending application for a patent filed January 29, 1900, Serial No. 3170. The difficulties are mainly due to the lack of uniformity in the fabric as it comes from the manufacturer. While the texture and condition of the fabric forming a web are usually uniform lengthwise of the web, they are almost universally not uniform widthwise of the web. For example, while the weight or dampness of the fabric forming one side of the web are uniform throughout the length of the web, they are not the same as the weight or dampness of the fabric forming the central part of the web or the other side thereof. This results in an inequality in the length of the web at different parts of its width, which inequality persists and is usually uniform throughout the length of the web. This inequality in the length of the web at different parts of its width, seriously interferes with the travel of the web through the machine, in that the extra material in the longer parts of the web tend to accumulate in advance of the web-forwarding surfaces, with the result that those parts of the web tend to gather into wrinkles and pass through the machine in a wrinkled condition. If the inequalities in the different parts of the web are excessive, or if the web-forwarding surfaces make unbroken pressure contact, wrinkles will form and they are apt to increase in size and in extent until the feed of the web is affected throughout its entire width.

The object of this invention is to provide a mechanism whereby these difficulties in the manipulation of a web may be overcome.

We have found that a defective web may be smoothly fed to and passed through a machine having cylindrical web-forwarding surfaces by so varying the tension, or the length, of the manipulated part of the web locally with relation to its width so as to compensate for or remove the inequalities in the length of the said part of the web at different parts of its width. It usually happens that the irregularities in the fabric of the web widthwise thereof, and the resultant inequalities in the length of the web at different parts of its width, vary more or less uniformly from one side of the web to the other, so that if the web were laid out evenly on a plane surface, it would not extend in a straight line but in the arc of a circle, the degree of the curvature of which would depend on the width of the web and the difference in the length of the two sides thereof. When it is attempted to feed such a web by a pair of cylindrical rollers in the ordinary way, the web tends to creep laterally out of its path to the rollers, and if this is prevented, the long side of the web tends to accumulate in advance of the rollers and pass through them in the form of wrinkles. We have found that such a web may be fed evenly through the rollers by merely varying the tension on the two sides of the web. If the tension on the short side of the web is made greater than that on the longer side of the web, the short side of the web will be slightly retarded so that it will not pass through the rollers as fast as the long side of the web, and if the tension on the two sides is properly adjusted, the difference in the speed at which the two sides of the web travel through the rollers is made equal to the difference in the length of the two sides. This retardation of the web due to the increase in tension thereof may be due to a slight slipping of the rollers upon the web, or it may be due to the fact that the web is stretched by the tension applied thereto and is passed through the rollers in a stretched

condition, or the result may be due to a combination of these conditions. It frequently happens, however, that the irregularities in the fabric of the web widthwise thereof, and the resultant inequalities in the length of the web at different parts of the width, do not vary uniformly from one side of the web to the other. For example, one or both edges of a web may be longer or shorter than the central portion thereof, or there may be a loose or baggy streak or a tight streak throughout a portion of the web intermediate of its edges. The smooth feeding of such a web may be accomplished either by decreasing the length of the longer parts of the web, or by increasing the length of the shorter parts thereof in any suitable way. The longer parts of the web may be shortened by the application of heat to those parts, or, if the web is heated throughout its width, by the application of more heat to the longer parts. The length of the web can be increased locally by a local application of moisture, or by the application of more moisture locally if it is dampened throughout its width, or the shorter parts of the web may be stretched, either permanently or temporarily, by increasing the strain on those parts with or without the application of moisture to the web locally or otherwise. Where the inequalities in the length of the web at different parts of its width are excessive, any or all of the above methods of manipulating the web may be combined to effect the desired result.

The accompanying drawings, which are referred to herein and form a part hereof, illustrate an apparatus constructed in accordance with our invention and adapted to carry out the above described methods of manipulating the web, which methods form the subject matter of another application filed by us simultaneously herewith, Serial Number 42369.

Of these drawings Figure 1 represents a longitudinal section of a web-feeding mechanism adapted to carry out our method as applied to the printing press forming the subject matter of the application referred to, the press being diagrammatically shown; Fig. 2 is a side elevation of the feed mechanism detached; Fig. 3 is a top plan view of the same; Fig. 4 is a front elevation of a damping mechanism employed in the apparatus; Fig. 5 is a section of the same on line *a*—*b*, Fig. 4; Fig. 6 is a sectional view on the line *c*—*d*, Fig. 5; Fig. 7 is a detail; Figs. 8 and 9 are diagrammatic views illustrating the application of the invention to a web which more or less uniformly varies in length from one side to the other. Figs. 10 and 11 are similar views illustrating an improved form of the apparatus; and Figs. 12, 13 and 14 are detail views of features of a modified form of apparatus.

Referring now to the drawings in detail, 1 represents the frame of a multi-color printing press which comprises in the main the large impression drum 2, a series of relatively small printing cylinders 3, and a series of inking and damping mechanisms 4 and 5 respectively, one set for each printing cylinder 3.

6 represents a web of paper which is supplied from a roll 7, and is directed to and around drum 2 between each of the printing cylinders 3, and then to a suitable delivery mechanism not shown. In the press shown the printing cylinders 3 and the drum 2 are circumferentially continuous and work together continuously in whole surface pressure contact. The web 6 is thus given no chance to free itself should it be imperfectly fed to the drum and become disarranged in passing around the same.

While our apparatus is particularly useful in connection with the press of the type shown, it may be advantageously used with other web-manipulating machines having cylindrical web-forwarding surfaces and particularly those in which the web-forwarding surfaces make pressure contact with each other.

The web-feeding apparatus shown comprises a carriage consisting of a base portion 8 and an upper portion 9 in which the web roll 7 is mounted. The base 8 is preferably mounted on rollers, so that it may be readily moved into and out of operative position with relation to the press. When in operative position the carriage is adjustably held against movement by the stops 10 and 11. The upper part 9 of the carriage is adjustably mounted upon the base 8, for a purpose hereinafter explained. As shown the carriage 9 is pivoted at one side to the base, as by a pin 12, and is adjustably connected at the opposite side to the base, as by lever 13, which is pivoted at its lower end to the base 8 and operatively connected to the frame 9 by a link 14. The lever 13 may be locked in various positions by means of a slotted link 15, which is pivoted at one end to the frame 9 and adjustably connected to the lever 13 by a clamp 16. By manipulating the lever 13, the axis of the roll 7 may be set at any desired angle with relation to the axes of the web-forwarding surfaces in the press. The roll 7 is mounted on a spindle or mandrel 17, which may be adjusted longitudinally by means of a screw 18, which engages a tension device 19 in the usual manner. From roll 7 the web is led around a roller 20, then through a tension device comprising a pair of rollers 21 and 22, then under the rollers 23, 24 and 25, and then between a roller 26 and the drum 2. The tension rollers 21 and 22 are mounted in a frame 27 which is centered with the roller 21 and rendered adjustable by means of a

worm wheel 28 and a worm shaft 29. The rollers 21 and 22 are held against rotation, so that by turning the frame 27 on its axis more or less of the surface of the web will be brought in contact with the rollers and its tension varied.

For the purpose of dampening the web a roller 30, having a covering of a suitable absorbent material is arranged opposite the roller 20 and reliably held in contact therewith by means of the spring pressed rods 31. For the purpose of supplying moisture to the roller 30, a water fountain 32 is arranged adjacent to the roller. This fountain may be of any suitable construction. As shown it comprises an inclosing casing 32 in which is mounted a rotary brush 33. A suitable blade or bar 34 is adjustably mounted in the casing 32, so that it can be made to bear more or less upon the surface of the brush on the side thereof adjacent to the roller 30. The brush may be rotated by any suitable means, as by a belt 35 which passes over a pulley 36 on the shaft of the brush and a pulley 37 on the shaft of the guide roller 20. When the roller 33 is revolved the blade 34 will cause the bristles of the brush to throw a spray of water in the direction of the roller 30. For the purpose of regulating the supply of water to the roller 30, any suitable means may be employed. The means shown for this purpose comprises a flexible screen or curtain 38, to the lower edge of which a series of adjustable bars 39 are connected. The bars 39 may be raised or lowered to vary the supply of water to roller 30, or cut it off entirely by any suitable means, those shown consisting of the hand levers 40. In order to avoid sharp angles in the opening of the curtain 38 and to insure a gradual variation in the supply of moisture to the roller 30, the lower edge of the curtain is provided with suitable stiffening means, as a coiled spring 41, which is connected to the lower ends of the rods 39 by elongated connections, as 42. By this construction the formation of sharp angles at the points where the rods 39 are connected to the lower edge of the curtain is avoided.

When a web of paper in the machine is found to be unequal in length at different parts of its width, the shorter parts can be stretched or elongated so as to make the web substantially uniform in length by properly adjusting the opening in the fountain so as to apply the right amount of moisture to the shorter part or parts of the web. In the case of a web which varies in length more or less uniformly from one side to the other, we have found that the web may be made to pass smoothly into the press by so manipulating the upper part 9 of the carriage that the end of the roll 7 upon which the web is longest is farthest from the press and at the same time shifting the roll longitudinally toward the end which is shortest. In performing these operations it is only necessary to keep shifting the roll 7 in the directions referred to until the web passes smoothly into the machine at the proper place laterally thereof. If in feeding a web to the press it cannot be made to run smoothly by means of these adjustments, it is because it does not vary in length uniformly from one side to the other. In such a case it is necessary to resort to the damping operation, or its equivalent, in order to make the variations in the length of the web at different parts of its width uniform, or substantially so. The principles upon which the described adjustments of the roll 7 act to produce the desired results can best be explained by a reference to the diagrams in Figs. 8 and 9. In these diagrams the course of the web from the supply roll 7 to the first printing roll is developed or laid out in a plane, the positions of the various guide rolls in the course of the web being indicated and numbered as in the other figures. A web which is perfectly uniform in length from one side to the other would extend in a straight line when thus laid out and the supply roll 7 would be arranged directly in line with the press with its axis parallel with the axes of the printing and impression cylinder, as shown in full lines. Where a web is uniformly uneven in length from one side to the other, however, it will not extend in a straight line when laid out flat, but in the arc of a circle, as indicated in dotted lines in Fig. 9, and, as there indicated also, such a web must be so directed to the press that the curve formed thereby is normal to the line of contact of the first set of web forwarding surfaces which make whole surface pressure contact therewith. In other words, such a web must be so directed to the press that the line of contact of the first set of web forwarding surfaces will lie in a radius of the curve formed by the web. It follows that, in order to properly direct such a web to the press by manipulating the roll 7, the latter should be shifted from the position shown in full lines in Fig. 9 to some other position such that its axis will lie in a radius of a curve which is normal to the line of contact of the web-forwarding surfaces, as indicated in dotted lines. This is the position which the web roll 7 is given by the adjustment described. In order that such a web may pass smoothly through the press, moreover, the travel of the short side of the web must be made slower than that of the long side thereof in the proportion that the two sides differ in length. Since the cylindrical web-forwarding surfaces tend to advance both sides of the web at the same speed, either the travel of the short side of the web through the web-forwarding surfaces must

be retarded, or the travel of the long side of the web through the forwarding surfaces must be accelerated. We have found that this may be accomplished by varying the tension on the two sides of the web. Thus the travel of the short side of the web may be retarded by applying more tension to that side than at the other side in advance of the web-forwarding surfaces, or the long side of the web may be accelerated by applying more tension to that side at the rear of the web-forwarding surfaces. We prefer to use the former method, as in this way the web-forwarding surfaces themselves may be made use of to produce the desired variations in tension. It will be seen that, by reason of the fact that the web is shorter on one side than on the other a shorter length of web will be paid out at one end of the supply roll than at the other end. It follows that, if the supply roll is retarded in any way, the resulting tension on the web will be the greatest on the short side thereof, since the web-forwarding surfaces tend to advance both sides of the web at the same speed. If a strong enough brake be applied to the roll 7, the difference in the tension on the two sides of the web will be great enough to cause the necessary retardation of the short side of the web through the web-forwarding surfaces. The result will be the same if, instead of applying a brake to the roll 7, the tension be applied directly to the web itself, as by means of the tension rollers 21 and 22.

If the web being fed to the press were perfectly inelastic or non-stretchable, the path of the web through the press would be in the same curve as that formed by the web when not under tension and all of the retardation of the short side of the web would be effected by a slippage between the web-forwarding surfaces. Where the web is more or less elastic, however, as in the case of paper, the greater tension on the short side of the web would reduce the inequality in the length of the two sides of the web, so that the path of the web would lie in a curve of a longer radius than that which would be formed by the web if laid out flat under uniform tension. In this case the retardation would be due partly to the slippage between the web-forwarding surfaces and partly to the fact that the short side of the web is temporarily stretched, or elongated and passed through the rollers in an elongated condition. It will be noted that if a web were sufficiently elastic and no slippage occurred between the web-forwarding surfaces, the inequality in the length of the two sides of the web might be entirely removed by the temporary stretching of the web. In this case the web would pass to the machine in a straight line, as in the case of a perfectly uniform web. As, however, any substantial variation in the tension on the two sides of the web produces a corresponding variation in the slippage thereof between the web-forwarding surfaces, it is usually found necessary to shift the roll 7 to one side or the other of the normal position shown in full lines in Fig. 9. In any event, however, it is only necessary to shift the roll in one direction or the other until the web runs smoothly into the press, the variation in the tension on the two sides of the web always being automatically taken care of by the web-forwarding surfaces. As before stated, if the web cannot be made to run smoothly into the press by adjusting the roll 7, it is because the variations in the length of the web do not vary uniformly from one side to the other. In this case the damping mechanism may be resorted to to produce the desired uniformity.

It will be observed that the adjustment of the roll 7 constitutes a changing of the direction or a re-directing of the course of the web to the press. This re-directing of the course of the web to the press may be accomplished in other ways than by adjusting the roll 7. For example, the result may be accomplished by means of one or more guide rolls or turner bars which are adjustably mounted so that the path of either side of the web from the supply roll to the press may be made longer than the path of the other side. By placing such a roller or set of rollers, moreover, at a point half way between the supply roll and the web-forwarding surfaces, the proper re-directing of the web can be attained without disturbing the position of the supply roll 7. This arrangement is shown in Figs. 10 to 14. As here shown a loop of the web is passed around two stationary rolls 43 and 44 and over an adjustable roll 45. The roll 45 is journaled at one end in a box 46, which is pivotally mounted so that the roll can swing vertically. The opposite end of the roller is journaled in a box 47, which may be adjusted vertically, both above and below the level of the box 46, a screw 48 being provided for this purpose. By this construction it will be seen that the path of either side of the web may be made longer or shorter than that of the other side. Supposing now that the upper side of the web shown in Fig. 11 is longer than the lower side, by raising the adjustable end of the roller 45 the length of the path of the upper side of the web will be made longer than the path of the lower side and the web will take a new direction as indicated in dotted lines, the web being deflected at its medial portion by the inclination of the roller, so that the web will pass from the roller 45 to the press in the desired direction. The direction of the web from supply roll 7 to the roll 45 will be exactly the reverse of that from the roll 45 to the

press. The length of these paths being equal, the roll 7 will not need to be shifted. It will be noted that by this construction the one adjustment of the roll 45 is made to take the place of the two adjustments of the supply roll 7.

This invention in its broader aspects is not limited to the particular apparatus shown and described, nor to the particular apparatus by which it may be carried into effect, as many changes and variations other than those suggested may be made in the apparatus without departing from the main principles of the invention or sacrificing the chief advantages thereof.

What we claim as new and desire to secure by Letters Patent is:—

1. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll, and means for varying the tension on the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

2. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll, and means for varying the length of the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

3. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll, and means for increasing the length of the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

4. A web manipulating mechanism, comprising a support for a roll of paper, means for advancing the web from the roll, and means for increasing the tension on the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

5. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll, and means for damping the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

6. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll, and means for stretching the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

7. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll consisting of web-forwarding surfaces which make unbroken pressure contact with the web and continuously operate in such contact, and means for varying the tension on the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

8. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll consisting of web-forwarding surfaces which make unbroken pressure contact with the web and continuously operate in such contact, and means for varying the length of the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

9. A web manipulating mechanism comprising a support for a roll of paper, means for advancing the web from the roll, consisting of web-forwarding surfaces which make unbroken pressure contact with the web and continuously operate in such contact, and means for increasing the length of the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

10. A web manipulating mechanism, comprising a support for a roll of paper, means for advancing the web from the roll, consisting of web-forwarding surfaces which make unbroken pressure contact with the web and continuously operate in such contact, and means for increasing the tension on the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

11. A web manipulating mechanism, comprising a support for a roll of paper, means for advancing the web from the roll, consisting of web-forwarding surfaces which make unbroken pressure contact with the web and continuously operate in such contact, and means for damping the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

12. A web manipulating mechanism, comprising a support for a roll of paper, means

for advancing the web from the roll, means for damping the web locally with relation to its width, and means for increasing the tension on the dampened part or parts of the web, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

13. A web manipulating mechanism, comprising a support for a roll of paper, means for guiding the web from the roll to the machine, and means for varying the tension of the web locally with relation to its width, whereby inequalities in the length of the web at different parts of its width may be removed or compensated for, substantially as described.

14. A mechanism for feeding webs which vary as to the relative lengths of their opposite sides to a web manipulating machine having web forwarding surfaces operating in rolling contact, comprising means for supporting a web supply roll and means independently of the tension on the web for adjusting the direction from which the web approaches the machine, whereby the web may be passed through the web forwarding surfaces, smoothly, substantially as described.

15. A mechanism for feeding webs which vary in length at their opposite sides to a web manipulating machine having cylindrical web forwarding surfaces operating in pressure contact, comprising a support for a supply roll, means for guiding the web from the supply roll to the machine, means for adjusting the direction from which the web approaches the machine, and means for varying the length of the web locally with relation to its width, so as to remove or compensate for local inequalities in the length of the web, whereby the web may be passed through the web forwarding surfaces smoothly and at predetermined places, substantially as described.

16. A mechanism for feeding webs which vary in length at their opposite sides to a web manipulating machine having cylindrical web forwarding surfaces operating in pressure contact, comprising a support for a supply roll, means for guiding the web from the supply roll to the machine, means for adjusting the direction from which the web approaches the machine, and means for increasing the length of the web locally with relation to its width so as to remove or compensate for local inequalities in the length of the web, whereby the web may be passed through the web forwarding surfaces smoothly and at a predetermined place, substantially as described.

17. A mechanism for feeding webs which vary in length at their opposite sides to a web manipulating machine having cylindrical web forwarding surfaces operating in pressure contact, comprising a support for a supply roll, means for guiding the web from the supply roll to the machine, means for adjusting feed direction from which the web approaches the machine, and means for dampening the web locally with relation to its width, to remove or compensate for local inequalities in the length of the web whereby the web may be passed through the web forwarding surfaces smoothly and at a predetermined place, substantially as described.

18. The combination with a web manipulating machine having web forwarding surfaces operating in rolling contact, of a web feeding mechanism comprising means for supporting a web supply roll, and means for adjusting the angle between the supply roll and the web forwarding surfaces in the machine, whereby the direction from which the web approaches the machine may be varied, substantially as described.

19. The combination with a web manipulating machine having web forwarding surfaces operating in rolling contact, of a web feeding mechanism comprising means for supporting a web supply roll, means for guiding the web from a supply roll to the machine, and means independent of the tension on the web for adjusting the angle between the guiding means and the web forwarding surfaces in the machine, whereby the direction in which the web approaches the machine may be varied, substantially as described.

20. A mechanism for feeding webs to web manipulating machines, comprising means for supplying the web to the machine, means for adjusting the direction from which the web approaches the machine and means for holding said adjusting means in the adjusted position, whereby the web may be passed through the web forwarding surfaces smoothly, substantially as described.

21. A mechanism for feeding webs to a web manipulating machine having web forwarding surfaces operating in rolling contact, comprising means for supplying a web to the machine, and means independent of the relative tensions at different parts of the width of the web for varying the direction from which the web approaches the machine, whereby the web may be passed through the web forwarding surfaces smoothly, substantially as described.

22. A printing press including in combination, a rotary printing couple and means for supplying a web to the printing couple, said means being constructed positively to present the web to the printing couple from various directions, whereby the web may be passed through the printing couple smoothly.

23. A printing press including in combination, a printing couple operating in continuous rolling contact, and means for supplying a web to the printing couple, said means being constructed positively to pre-

sent the web to the printing couple from various directions, whereby the web may be passed through the printing couple smoothly.

24. A mechanism for feeding webs to web manipulating machines including in combination, means for supplying a web to the machine, and means acting upon the portion of the web which approaches the machine for causing the tension on the web locally with relation to its width to vary in accordance with inequalities in the length of the said portion of the web at different parts of its width.

25. A mechanism for feeding webs to web manipulating machines including in combination, means for supplying the web to the machine, and means for maintaining greater strains on the shorter parts of a web having inequalities of length at different parts of its width than on the lower parts.

26. A mechanism for feeding webs to web manipulating machines including in combination, means for directing a web to the machine, and means acting upon the portion of the web approaching the machine for varying the direction from which the web approaches the machine and the tension at opposite sides of the web, whereby inequalities in the length of the web at opposite sides thereof may be compensated for, substantially as described.

27. A mechanism for feeding webs to web manipulating machines including in combination, means for supporting a web roll and means acting upon the portion of the web between the web roll and the machine for varying the direction from which the web approaches the machine, said means being controlled independently of the web, whereby inequalities in the length of the web at opposite sides thereof may be compensated for.

28. A mechanism for feeding webs to machines having web manipulating members operating upon the web with continuous pressure contact, means for directing the web to the machine, said means being constructed to cause the web to approach the machine from different directions and to vary the tension at different parts of the web in such manner as to compensate for inequalities in the length of the web at different parts thereof, substantially as described.

29. A mechanism for feeding webs to machines having web manipulating members operating upon the web with continuous pressure contact, means for supporting a web roll and means acting upon the portion of the web approaching the machine for varying the direction from which the web approaches the machine and the tension at opposite sides of the web, whereby inequalities in the length of the web at opposite sides thereof may be compensated for.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

JOSEPH P. KNAPP.
GEORGE E. PANCOAST.

Witnesses:
GEO. H. BARNES,
W. P. TENEYCK.

Correction in Letters Patent No. 948,548.

It is hereby certified that in Letters Patent No. 948,548, granted February 8, 1910, upon the application of Joseph P. Knapp, of New York, and George E. Pancoast, of Brooklyn, New York, for an improvement in "Web-Manipulating Mechanism," an error appears in the printed specification requiring correction as follows: Page 7, line 20, the word "lower" should read *longer;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 26th day of April, A. D., 1910.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.

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