

(No Model.)

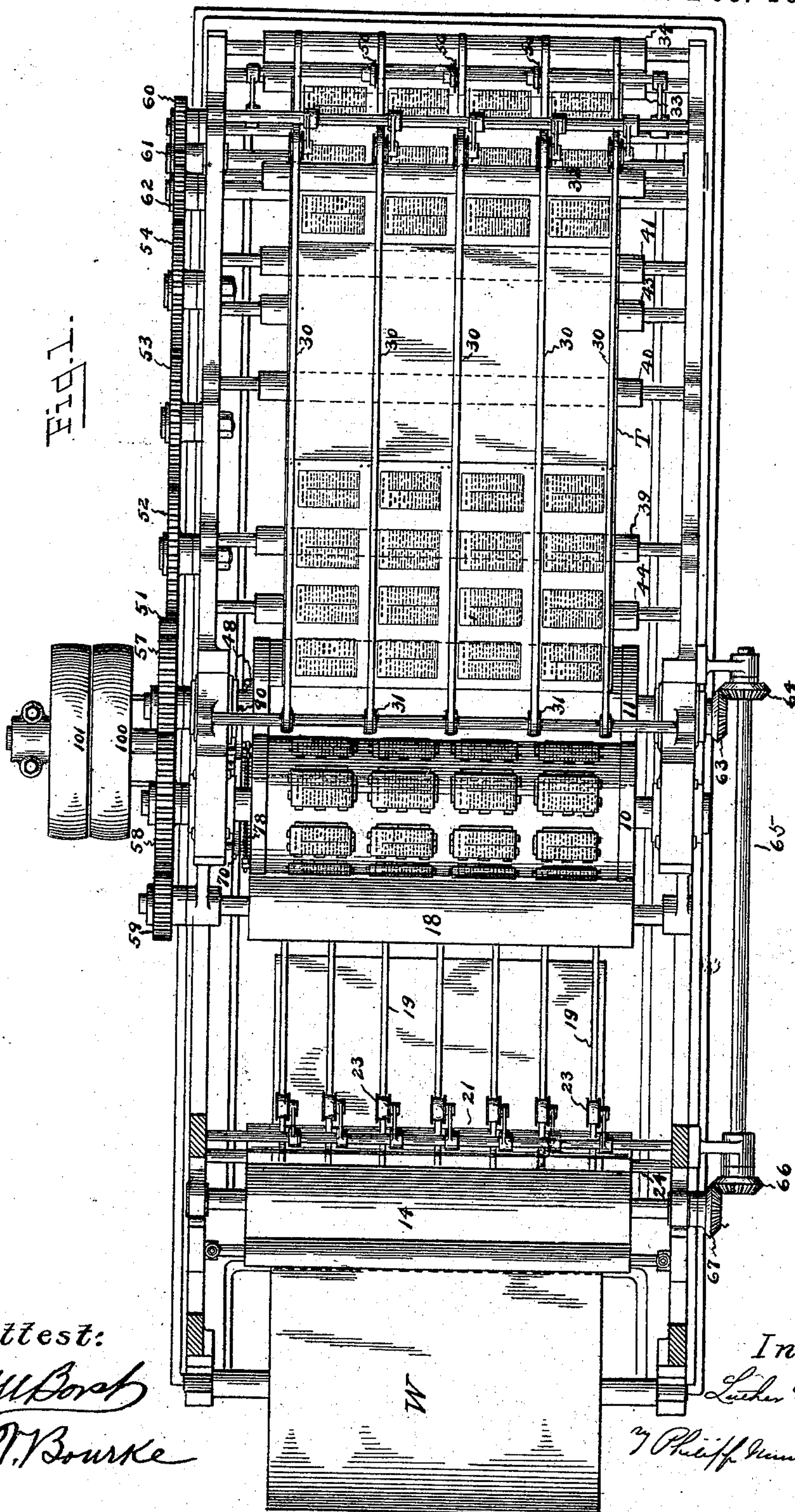
3 Sheets—Sheet 1.

L. C. CROWELL.

SHEET PERFECTING PRINTING MACHINE AND ITS TYMPAN.

No. 573,393.

Patented Dec. 15, 1896.



*Attest:*

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Atty's



(No Model.)

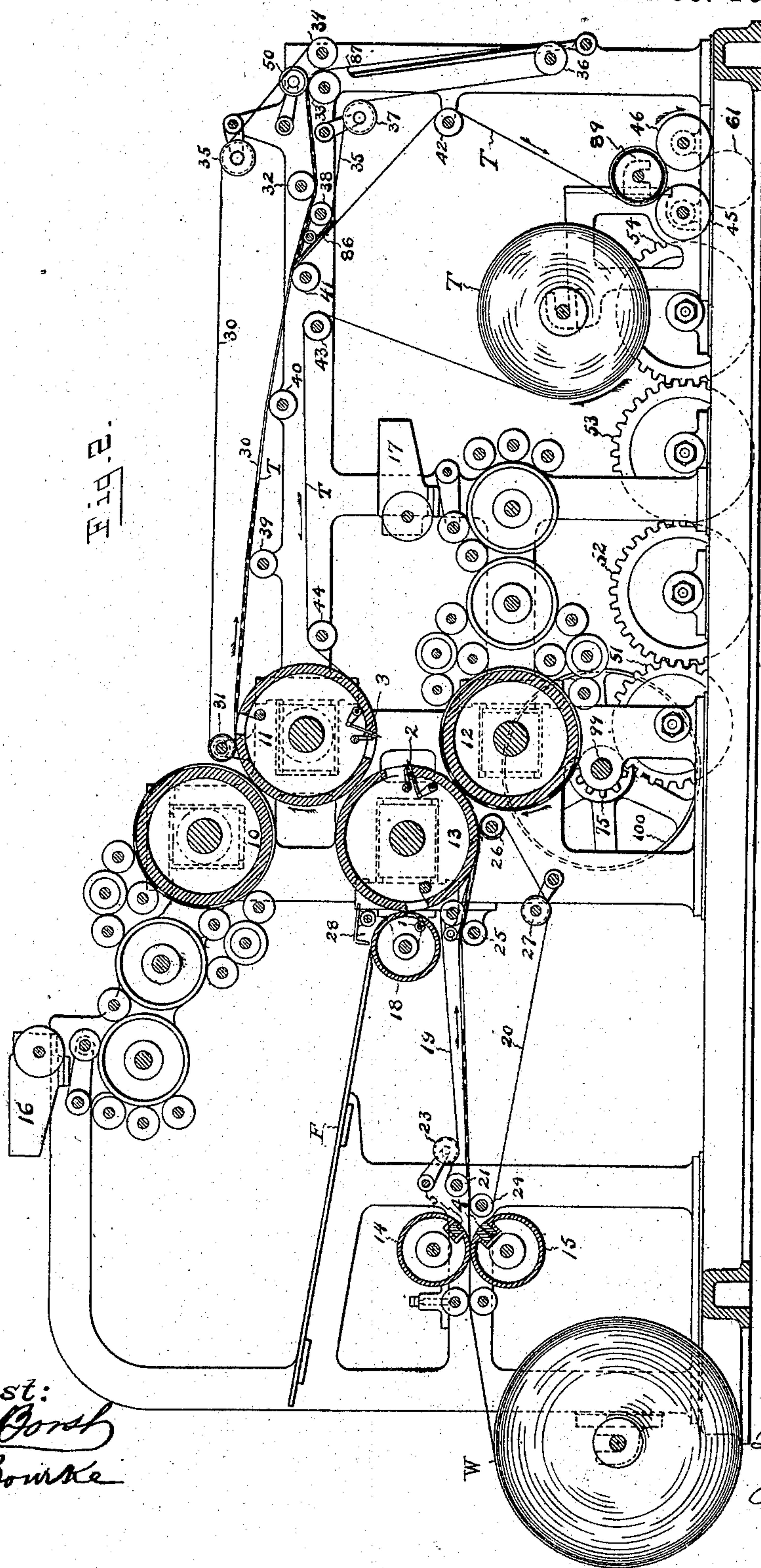
3 Sheets—Sheet 2.

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Attys



(No Model.)

3 Sheets—Sheet 3.

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Fig. 4.

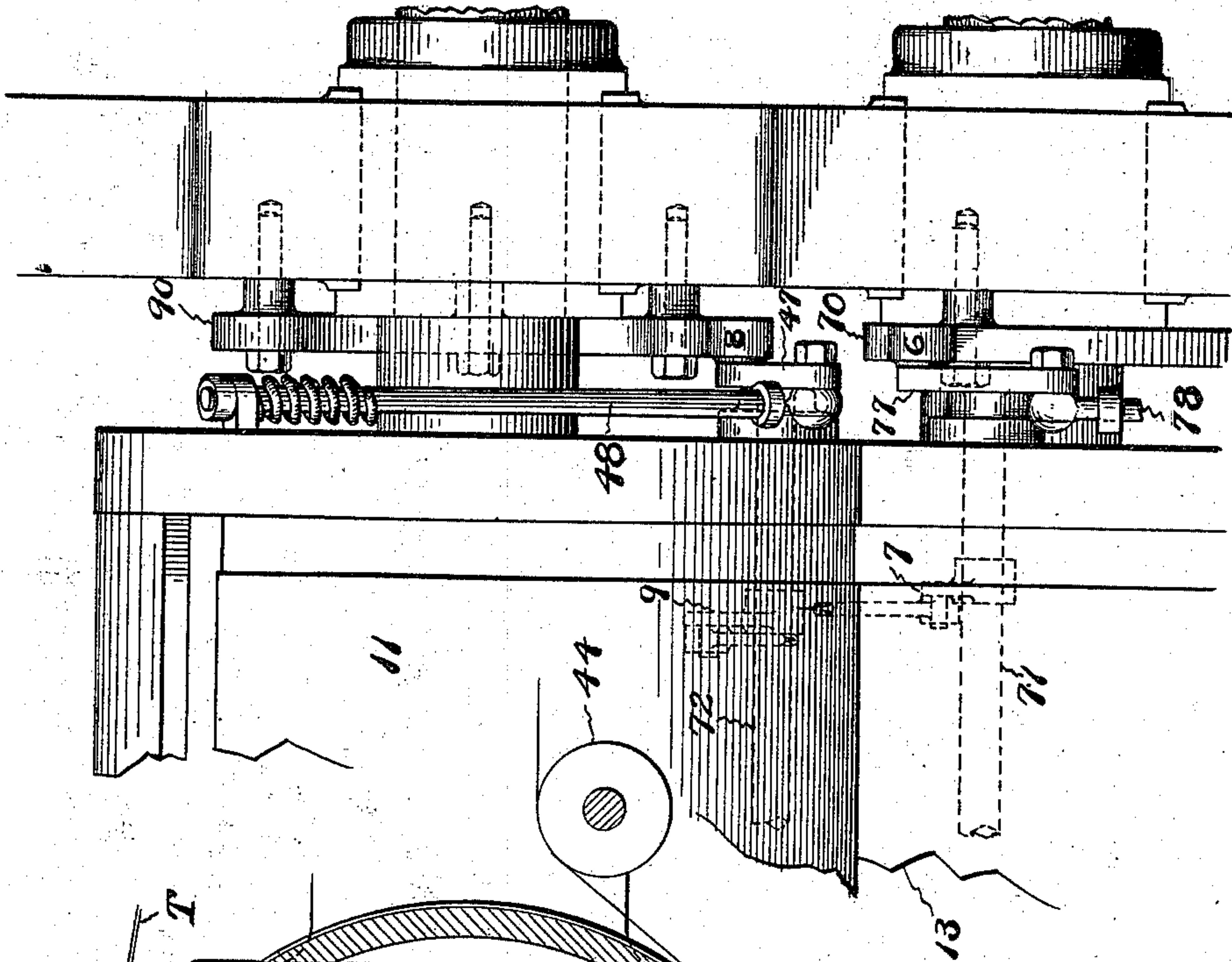
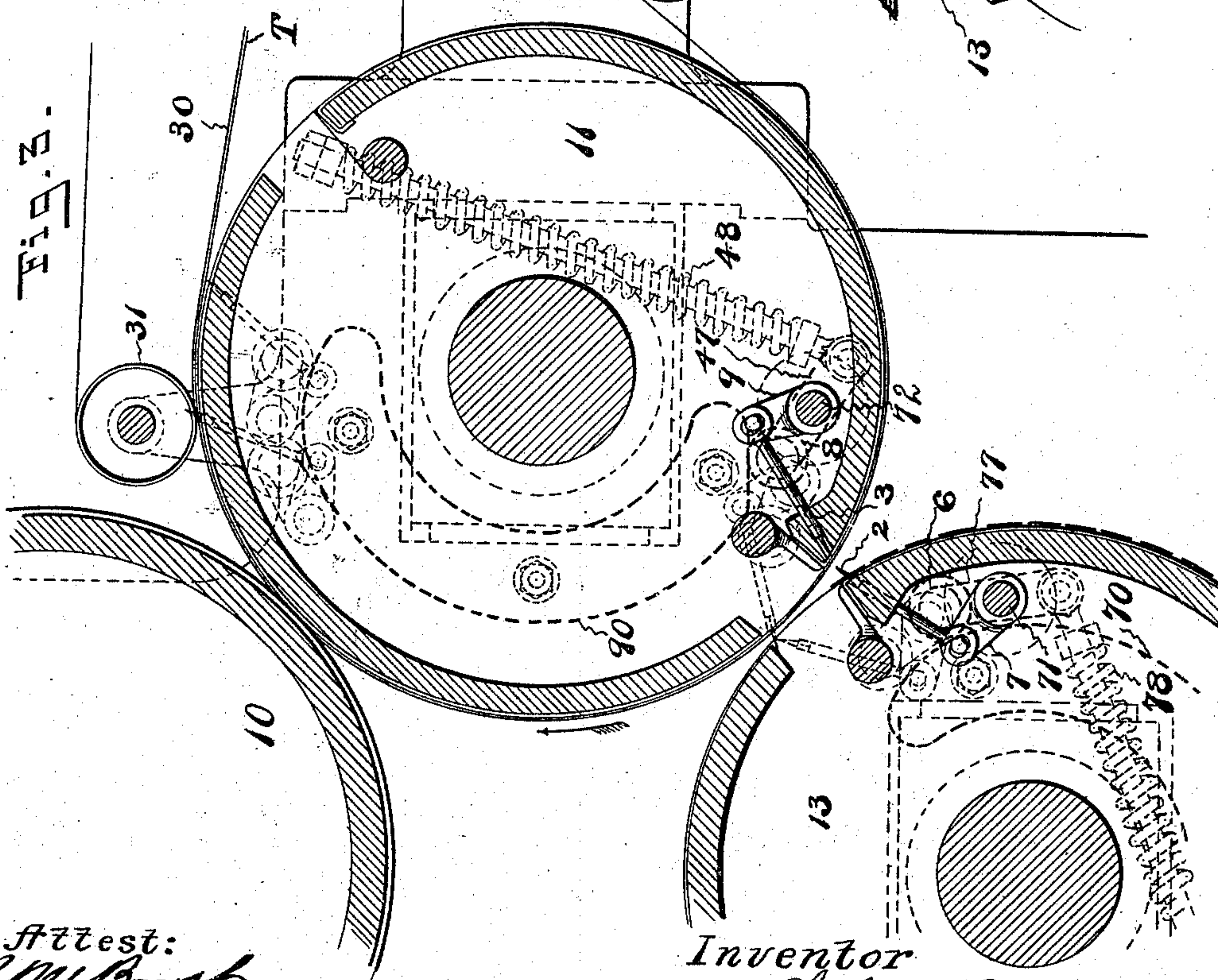


Fig. 3.



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# UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, NEW YORK, ASSIGNOR TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

## SHEET-PERFECTING PRINTING-MACHINE AND ITS TYMPAN.

SPECIFICATION forming part of Letters Patent No. 573,393, dated December 15, 1896.

Application filed May 11, 1895. Serial No. 548,892. (No model.)

*To all whom it may concern:*

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Sheet-Perfecting Printing-Machines and their Tympan, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to means whereby, in a sheet-fed rotary perfecting printing-machine, a long tympan or offset web may be used in connection with the last impression-cylinder, such an offset device in a machine printing heavy work, as engravings, being the most effective in preventing smutting, because it constantly presents a clean portion for contact with the freshly-printed surface of the sheet.

The invention consists in providing the second impression-cylinder, over which this offset-web must travel, with sheet-impaling pins which will operate as positively-acting sheet-controlling devices and not be obstructed in their operation by the presence of the tympan or offset web, but readily penetrate the same and enter the sheets they are to control.

It also includes providing the first impression-cylinder with like pins for conveying each sheet through the first printing operation and transferring it to the tympan-clad second impression-cylinder.

It further includes utilizing the tympan or offset web as a sheet-conveyer in delivering the printed product.

The accompanying drawings illustrate practical embodiments of this invention in which—

Figure 1 is a plan view from which the inking apparatus of the uppermost form-cylinder is removed; and Fig. 2 is a longitudinal sectional elevation of a rotary sheet-fed printing-machine, Fig. 2 including the feed-board and inking mechanism, which are omitted from Fig. 1. Fig. 3 is an enlarged sectional elevation of the impression-cylinders from one to the other of which the sheets are transferred, various positions of the sheet-holding

pins being shown in dotted lines; and Fig. 4 is a partial end elevation of the same.

The printing mechanism in its general features does not differ from ordinary printing-machines, being composed of form-cylinders 10 12 and interposed blanket or impression cylinders 11 13, all of which cylinders are suitably mounted in journals in the framework and geared together so as to run in unison and in proper printing relation, the form-cylinders 10 12 being provided with suitable inking mechanisms, as is indicated by the inking-fountains 16 17, and the whole being provided with sheet introducing and delivering mechanisms, the particular examples of which will be hereinafter described. These printing-cylinders are geared together by toothed wheels so as to revolve in the proper directions and in unison. Of these wheels, 58 is fast on the shaft of cylinder 10, wheel 57 is fast on the shaft of cylinder 11, and the wheels on the shaft of cylinders 12 and 13 are obscured from view. The driving-shaft 99 is provided with the usual fast and loose pulleys 100 101, and at its opposite end carries a pinion 75, which meshes with the wheel on the shaft of the cylinder 12, and also with one, 51, of a train of wheels 51 52 53 54 62 61 60 for a purpose that will be hereinafter explained.

This machine is shown as provided with two means for feeding it with sheets. One means is the feed-table F, fixed above a feeding-cylinder 18, which is driven in unison with the impression-cylinder 13 by means of a pinion 59, geared with its wheel 58, said receiving-cylinder 18 being provided with a set of sheet-grippers 1 and being surmounted with a set of sheet-gages 28 in the usual manner. A pile of sheets laid upon this table F and fed one by one up to the gages 28 will, by the ordinary operation well understood, be taken by the grippers 1 and delivered to the sheet receiving and carrying mechanism of the impression-cylinder 13. The other sheet-feeding mechanism shown is an arrangement for operating from a rolled web W of paper, which, being led between cutting-cylinders 14 15, is partially severed upon transverse lines by



means of perforating or partially-severing blade 4 and cooperating cutting-slots 5 in said cylinders, which perforated web is fed onward toward the impression-cylinder 15 by means of  
 5 sets of tapes 19 20, the former being stretched from pulleys 21, adjacent to the cutting-cylinder 14, to and returned over pulleys near said impression-cylinder 13 and rendered taut by adjusting or stretching pulleys 23, and the  
 10 tapes 20 being led over pulleys 24 near the cutting-cylinder 15, extending over pulleys 25 and 26, being returned from the latter over stretching-pulleys 27. These tapes 19 20, where they are bent over the pulleys 25, are  
 15 in nipping contact, and as they are moved at the same surface speed as the printing mechanisms, and such speed is greater than that at which the cutting-cylinders 14 15 are run, the latter being driven from the cylinder 12  
 20 by means of beveled pinions 63 64, counter-shaft 65, and beveled pinions 66 67, it follows that when the leading end of the perforated web is nipped at the pulleys 25 the forward portion or sheet-section thereof will be de-  
 25 tached from the web and fed onward to the cylinder 13. Neither of these sheet-feeding mechanisms is novel, and they are introduced here simply to illustrate the hand-feeding of sheets and the automatic production of sheets  
 30 from a web and the feeding of the same to the printing mechanisms.

Inasmuch as that surface of the sheet printed upon by the first form-cylinder immediately passes into contact with the second im-  
 35 pression-cylinder, it is requisite that the latter cylinder shall be provided with a protecting-tympan for receiving the offset from the freshly-printed sheet, and in order to produce the most perfect work it is desirable that said  
 40 protecting-tympan shall be a web so moved as to present a sufficiently clean portion for receiving the freshly-printed surface of the sheet, and preferably that this tympan-web shall travel with the surface of the second  
 45 impression-cylinder and thus constantly present a clean surface for receiving the freshly-printed matter carried into contact with it. This preferable tympan is found in a long web of paper or similar material that, led inward  
 50 from a supply-roll, is passed over the second impression-cylinder and guided outward to and rolled up on a winding mandrel or core 89.

As herein shown, the shaft of the rolled-up tympan-web is supported to turn in suitable  
 55 journals provided in brackets rising from the framework, and its end is led inward over rollers 43 44 and passes around the second impression-cylinder 11. Upon leaving the surface of this cylinder it might go direct to  
 60 its wind-up roller, but preferably it passes over rollers 39, 40, 41, and 42 to a winding mandrel or core 89. While other winding-up mechanism might be employed, that shown is preferred. It consists of propelling-rollers  
 65 45 46, upon which it frictionally rests, which rollers are driven in the proper direction and at the surface speed of the printing mechan-

isms by means of the pinions 60 61 62, which receive their motion through the train 75, 51, 52, 53, and 54 from the impression-cylinder 70 12. The tympan-web is thus wound up evenly and at a surface speed conforming to that at which it moves on the impression-cylinder 11 in passing around the same. This tympan or offset web running over the sec- 75 ond impression-cylinder provides its surface with a continuous blanket for the reception of the offset from the printed sheet, which blanket having a width greater than that of the printing form necessarily covers the points 80 at which the sheet-controlling devices must operate, and, as these sheet-controlling devices must positively control the sheet in order to produce perfect register of the mat- 85 ter printed upon the opposite faces of the sheets, and ordinary grippers in the cylinder 13 cannot operate to deliver a sheet to the cylinder 11, and in the cylinder 11 grippers cannot operate to receive such sheet without breaking the tympan or offset web, hence 90 such sheet-holding devices cannot practically be applied where such an offset-web is employed. In order, however, to obtain the beneficial results arising from the use of such a tympan or offset web, and yet accomplish 95 the positive control of the sheets, so as to secure perfect register, the cylinders operating as sheet carrying and transferring devices are provided with sheet-holding pins, which may 100 operate in connection with the tympan-web to manipulate the sheets and carry and transfer the same without injury to the tympan-web, which will simply be perforated as the pins are protruded through it to impale the sheets. By the use of such pins not only may 105 the long tympan or offset web be used without injury where sheets are printed and be reused until practically surcharged with ink and destroyed thereby, but the pins will also operate, when projected through the tympan, 110 to cause it to move concertedly with the sheet carried by the pins, and thus smoothly underlie the same while it is being printed upon. These pins may simply project from such cylinders at the proper points, but will prefer- 115 ably be mounted in these cylinders so as to reciprocate, and thus be projected and withdrawn in the operations of engaging and releasing the sheets.

Thus the sheet-impaling pins 2 are mount- 120 ed to reciprocate radially in the shell of the cylinder 13, being connected to rock-arms 7, projecting from a rock-shaft 71, journaled in the cylinder-heads and vibrated by means of a rock-arm 77, whose bowl travels in contact 125 with a stationary outside cam 70, secured to the framework, said shaft being held normally, so as to keep the pins withdrawn, by means of a spring-moved shaft 78. The like sheet-pins 3 in the cylinder 11 are constructed 130 and operated in like manner, being attached to rock-arms 9, projecting from the rock-shaft 72, the rock-arm 47 of which is moved by means of its bowl 8 running in contact with



an outside cam 90, fixed to the framework, the normal or withdrawn position of said pins being secured by means of a spring-rod 48.

The construction of the cam 70 is such that when the point where the cylinders 18 and 13 run nearest in contact is reached the pins 2 will have been projected beyond the periphery of the cylinder 13 and have impaled a sheet carried by the grippers 1 of the cylinder 18, so that as the cylinder 13 further moves onward it will hold and carry the sheet released from the grippers 1.

As the pins 2 maintain their outward protrusion until the point where the cylinders 13 and 11 run nearest in contact is reached and passed, it follows that said pins will be projected through any sheet fed to the cylinder 13 by the tapes 19 20, so as to carry onward the same, as is shown in Fig. 2, where a sheet under the control of the pins 2 is shown as having its leading end controlled by said pins, while its body is rolled into printing contact with the forms on the surface of the cylinder 12. The sheet thus printed and carried onward by the pins 2 has its leading end delivered to the pins 3 of the cylinder 11 as said pins approach and pass each other, as shown in Fig. 3, the full lines showing the sheet in full control of the pins 2 and the dotted lines the position of the pins when the sheet is in the full control of the pins 3, the pins 2 retiring within the cylinder 13 and the pins 3 being projected from the cylinder 11, as shown. As this sheet is carried onward by the pins 3 it is laid upon the surface of the cylinder 11 and has its unprinted side pressed in contact with the form carried by the cylinder 10, thus being perfected, and any imprint or impression set off from its first printed side toward the cylinder 11 is taken up by the tympan-web T, which travels with it. When the tapes 30 are reached, the head of the sheet is carried between said tapes and the tympan or offset web T at or just in advance of the pulleys 31, the pins 3 will be withdrawn within the cylinder, thus releasing the sheet to be carried onward between the tapes 30 and the tympan T.

The tapes 30, which coact with the tympan-web as a delivery for the sheets, run over pulleys 31, in contact with the tympan, up to the rollers 41, where they leave the tympan and proceed under rollers 32, over rollers 33, around the rollers 34, and return over tightening-pulleys 35. At the rolls 41, where the pathway of the sheets and that of the tympan T separate, a set of conductors 86 are provided to direct the sheets into the pathway formed in part by the continuation of the tapes 30 and by means of tapes 35, that extend from the rollers 38 over the rollers 33, extend downward in front of the fly-frame 87, and return over pulleys 36 and tightening-pulleys 37.

The tapes 30 and 35 are shown as carrying the sheets to a final-delivery mechanism shown as a fly-frame 87, which, as is well

known, is a primitive device for the purpose. It is, however, to be taken herein as a representative of any of the existing forms of sheet-delivery mechanism.

What is claimed is—

1. In a perfecting printing-machine, the combination of a tympan-web, with the second impression-cylinder, means for feeding printed sheets thereto, and impaling-pins carried by said cylinder and projecting through the tympan to engage the sheets, and cause the same to travel concertedly, substantially as described.

2. In a perfecting printing-machine, the combination with the second impression-cylinder, provided with impaling-pins, and a tympan-web traveling over the same, of a primary impression-cylinder provided with impaling-pins for carrying sheets to and delivering the same in register to the second impression-cylinder, substantially as described.

3. In a perfecting printing-machine, the combination of a tympan-web, with the second impression-cylinder, means for feeding sheets thereto, impaling-pins carried by said cylinder and projecting through the tympan to engage the sheets, and cause the same to travel concertedly, and, means for carrying said tympan-web, outward toward the delivery end of the machine, substantially as described.

4. In a perfecting printing-machine, the combination with the second impression-cylinder, a tympan-web traveling over it, and, impaling-pins carried by said cylinder and projecting through the tympan to engage the sheets, of a primary impression-cylinder provided with impaling-pins for carrying sheets to the second impression-cylinder, substantially as described.

5. In a perfecting printing-machine, the combination with the second impression-cylinder, a tympan-web traveling over it, and, impaling-pins carried by said cylinder and projecting through the tympan to engage the sheets, and cause the same to travel concertedly, of a primary impression-cylinder provided with impaling-pins for carrying sheets to the second impression-cylinder, and means for feeding sheets to the primary impression-cylinder, substantially as described.

6. In a perfecting printing-machine, the combination of a tympan-web, with the second impression-cylinder, means for feeding sheets thereto, impaling-pins carried by said cylinder and means for protruding said pins through the tympan to engage the sheets and withdrawing them to release the sheets, substantially as described.

7. In a perfecting printing-machine, the combination with the second impression-cylinder, a tympan-web traveling over it, and, impaling-pins carried by said cylinder and projecting through the tympan to engage the sheets, of a primary impression-cylinder provided with impaling-pins for carrying sheets to the second impression-cylinder, and means



for reciprocating said pins to receive, transfer and discharge said sheets, substantially as described.

5 8. The combination with the second impression-cylinder and the tympan-web extending over and moving with it, of traveling tapes acting in conjunction with said tympan-web to conduct the printed sheets outward from the printing mechanisms for delivery, substantially as described.

10 9. The combination with the second impression-cylinder, the tympan-web extending over and moving with it, sheet-controlling pins carried by said cylinder and piercing the tympan-web to engage the sheets, and cause the same to travel smoothly together, of delivery-tapes, and means causing said tapes and tympan-web to run together and form a sheet-carrying pathway extending outward from said cylinder, substantially as described.

15 10. The combination with the second impression-cylinder and a tympan-web traveling over the same and operating as a lower support for the sheets delivered from said cylinder, of upper tapes cooperating with the tympan to constitute therewith a carrying-pathway, and lower tapes, extending from the point where the tympan-web and upper tapes separate, and cooperating with the upper tapes to carry the printed sheets to the final-

delivery mechanism, substantially as described.

11. The combination with the second impression-cylinder, a tympan-web traveling over the same, and tapes cooperating with said tympan as a moving pathway for the sheets, of means for directing the tympan abruptly out of the general plane of said pathway, and lower tapes continuing said pathway, substantially as described.

12. The combination with the second impression-cylinder and a tympan-web traveling over the same and operating as a lower support for the sheets delivered from said cylinder, of upper tapes cooperating with the tympan to constitute a carrying-pathway, lower tapes extending from the point where the tympan-web and upper tapes separate and cooperating with the upper tapes to carry the printed sheets to the final-delivery mechanism, and conductors for guiding the sheets onward thereto, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

H. T. MUNSON,  
S. WINTHAL.