(No Model.)

7 Sheets—Sheet 1.

F. VAN BENTHUYSEN.

PAPER FEEDING MACHINE.

No. 555,422. Patented Feb. 25, 1896.

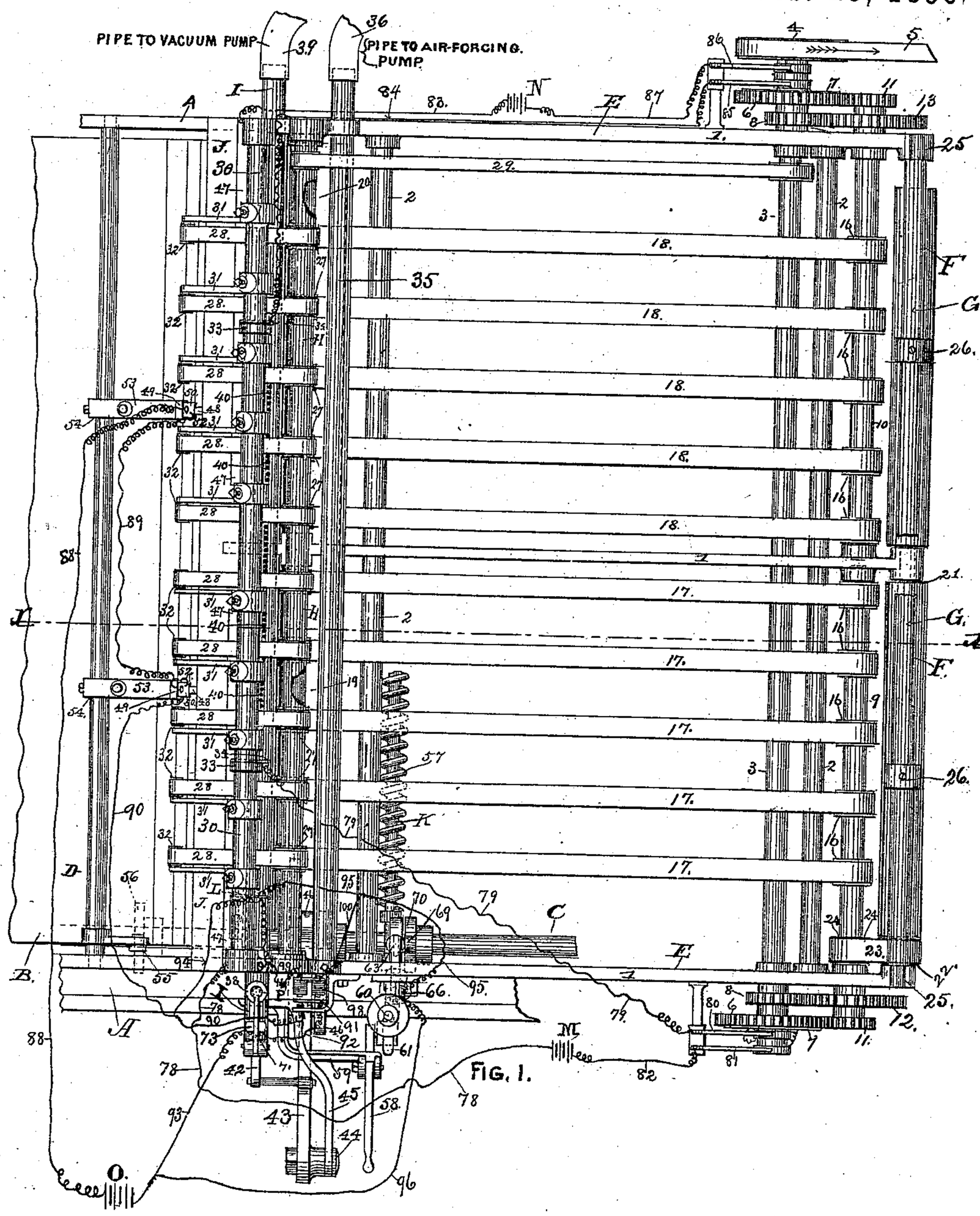

FIG. 1.

WITNESSES:
B. B. Bauer,
E. M. Chapman Jr.

INVENTOR:
FRANK VAN BENTHUYSEN,
BY Williams W. Goo.
ATTORNEY.

(No Model.) 7 Sheets—Sheet 2.

F. VAN BENTHUYSEN.

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No. 555,422. Patented Feb. 25, 1896.

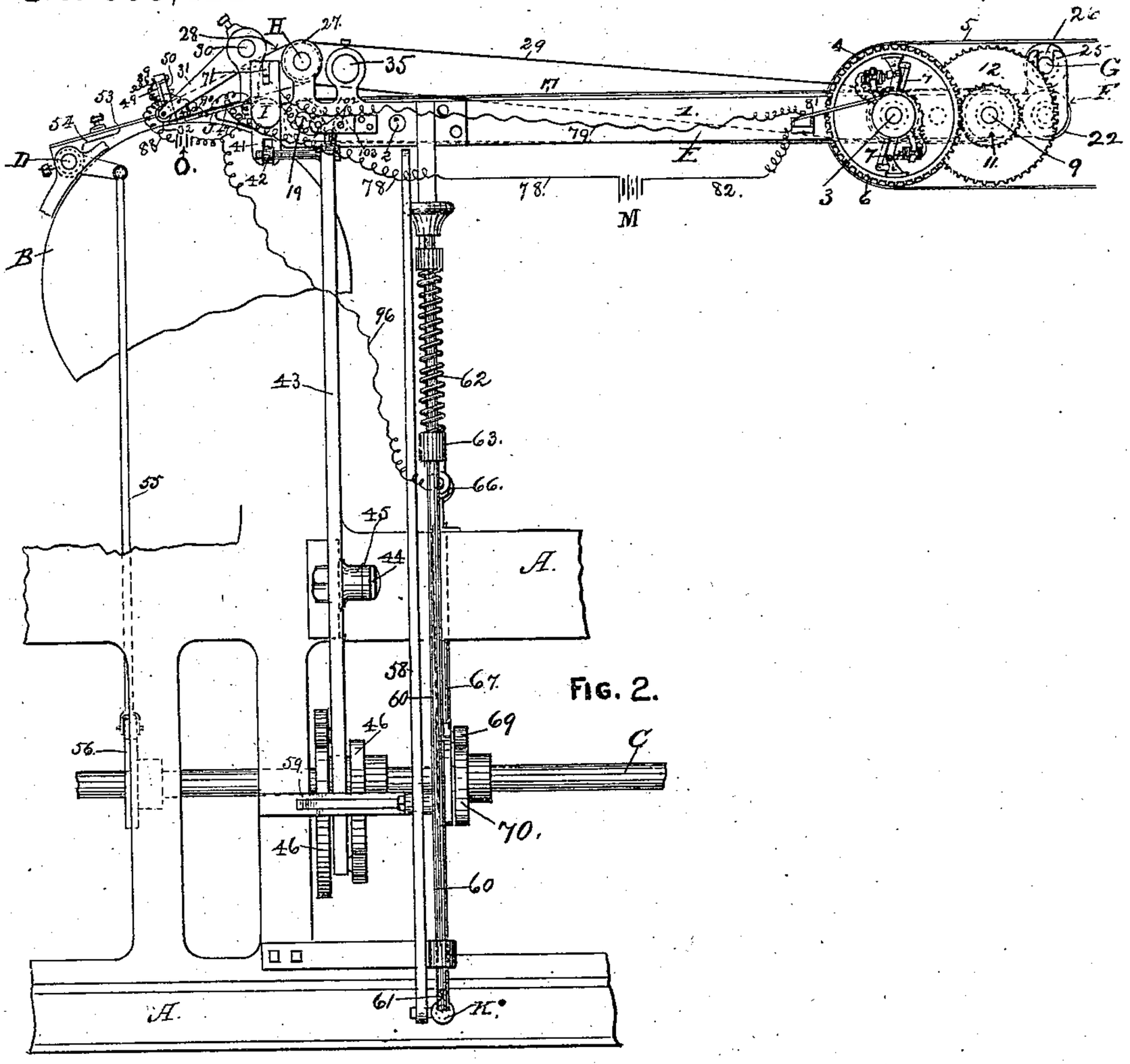

FIG. 2.

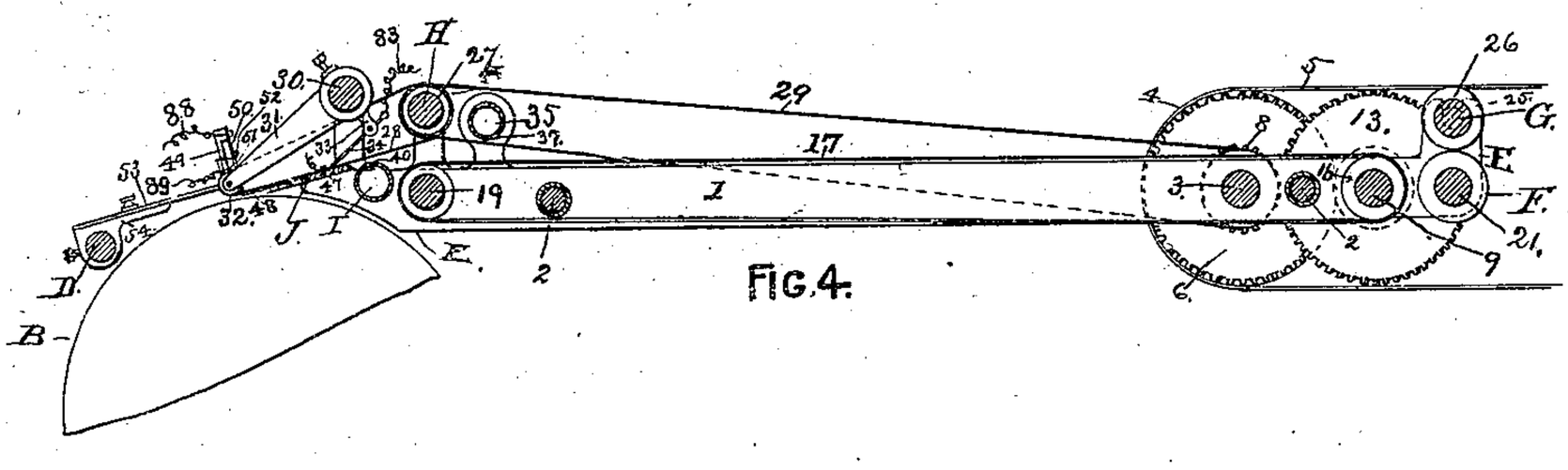

FIG. 4.

WITNESSES:
S. B. Brewer,
E. Y. Chapman Jr.

INVENTOR;
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(No Model.) 7 Sheets—Sheet 3.

F. VAN BENTHUYSEN.

PAPER FEEDING MACHINE.

No. 555,422. Patented Feb. 25, 1896.

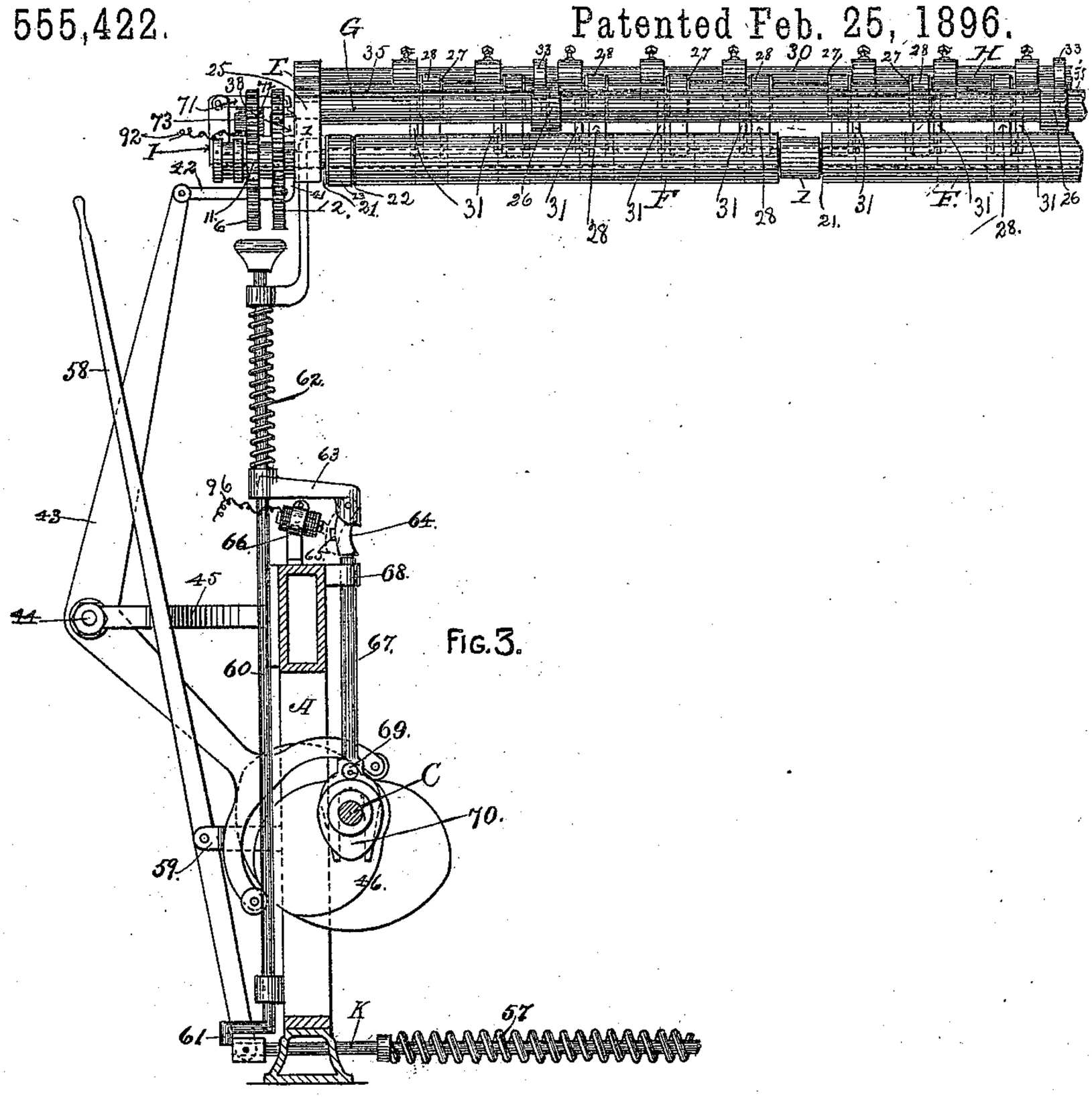

FIG. 3.

FIG. 6.

FIG. 5.

WITNESSES:
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(No Model.) 7 Sheets—Sheet 4.

F. VAN BENTHUYSEN.

PAPER FEEDING MACHINE.

No. 555,422. Patented Feb. 25, 1896.

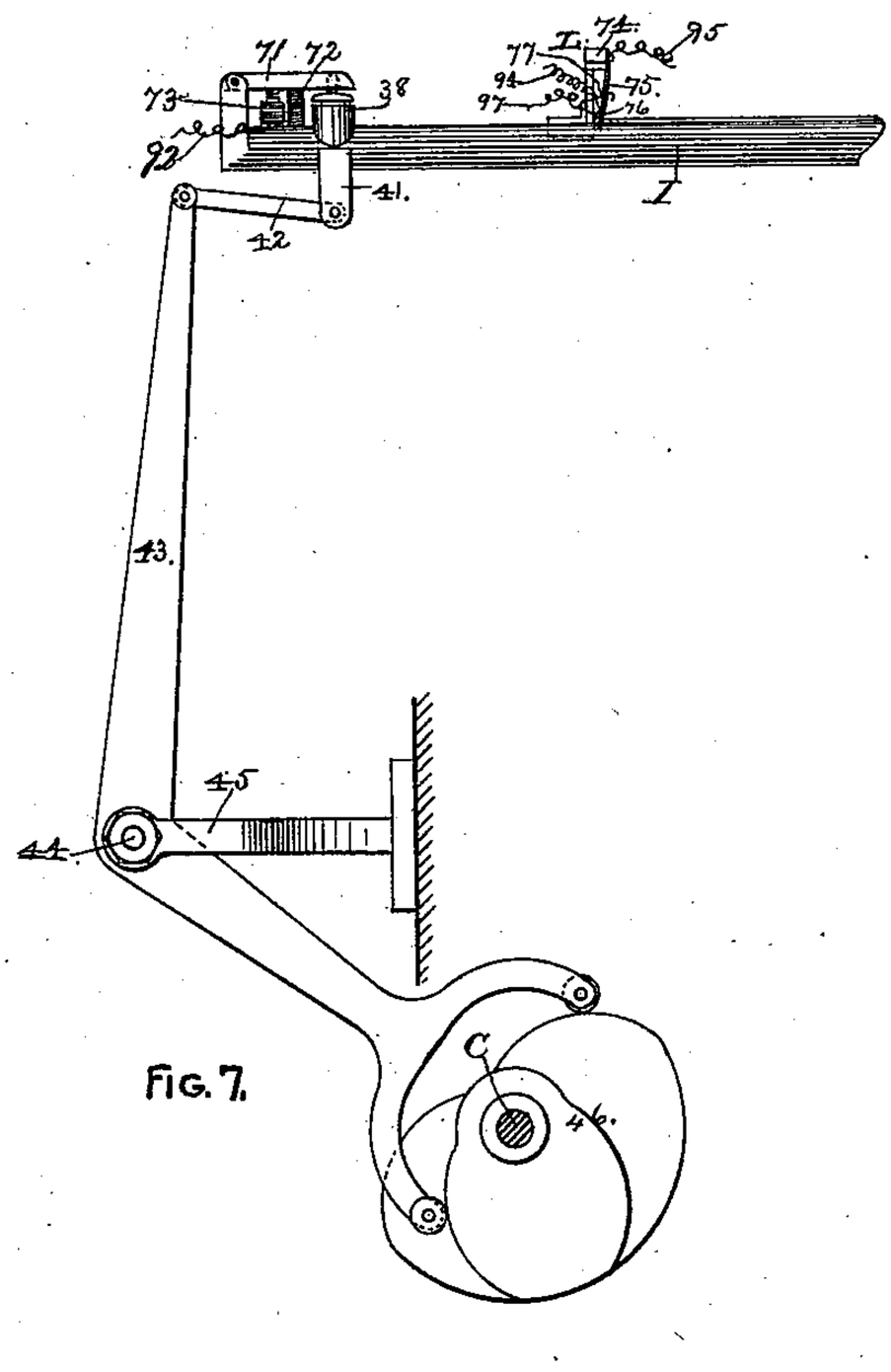

Fig. 7.

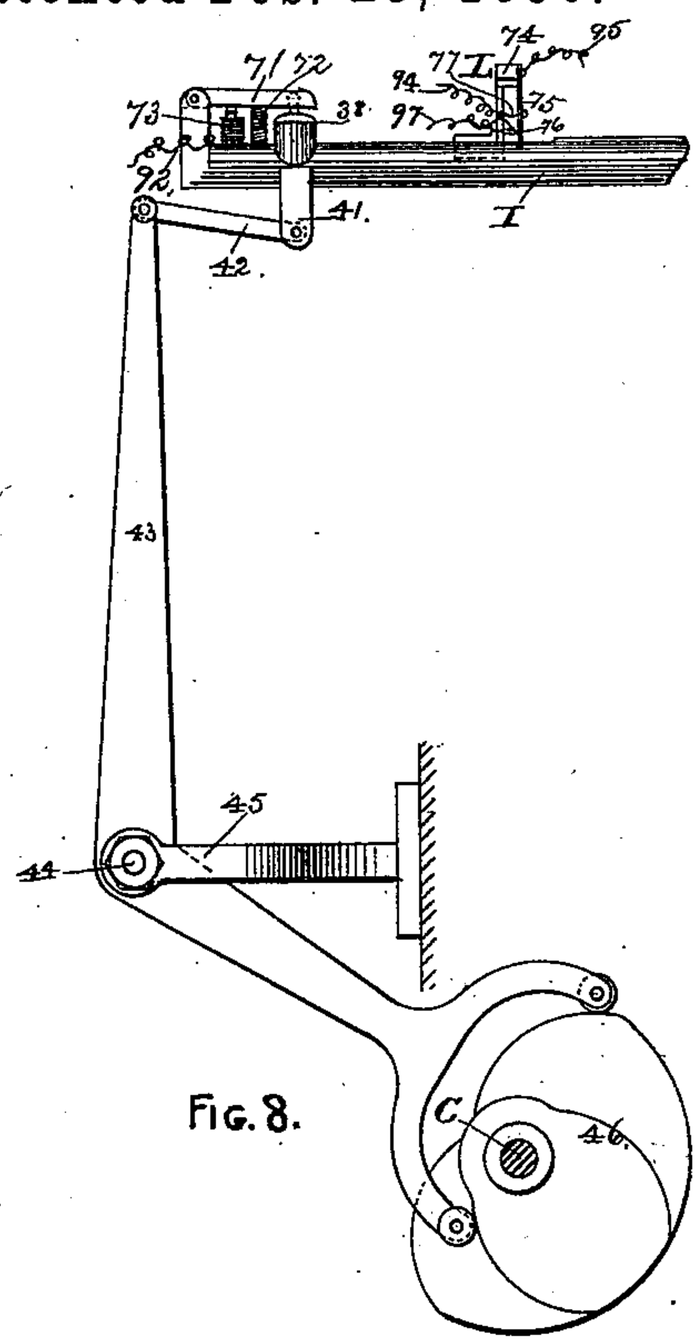

Fig. 8.

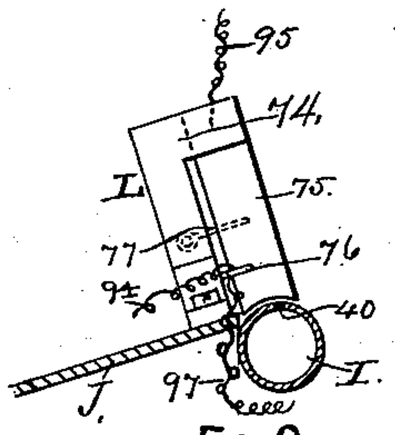

Fig. 9.

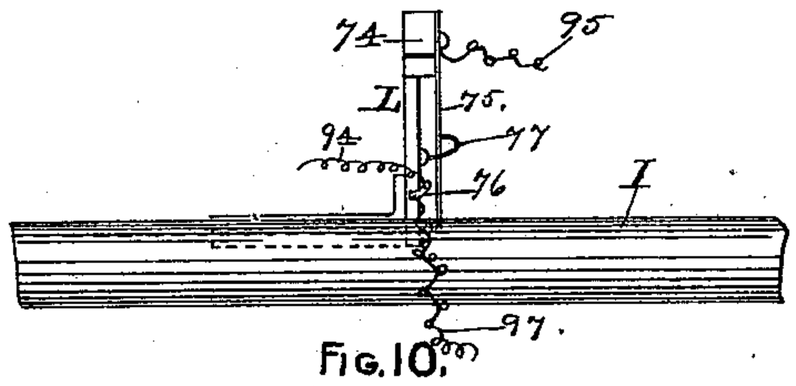

Fig. 10.

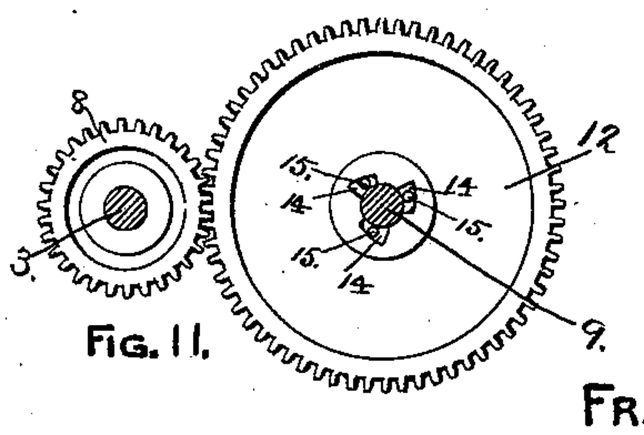

Fig. 11.

WITNESSES:
S. B. Brenner
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(No Model.) 7 Sheets—Sheet 5.

F. VAN BENTHUYSEN.

PAPER FEEDING MACHINE.

No. 555,422. Patented Feb. 25, 1896.

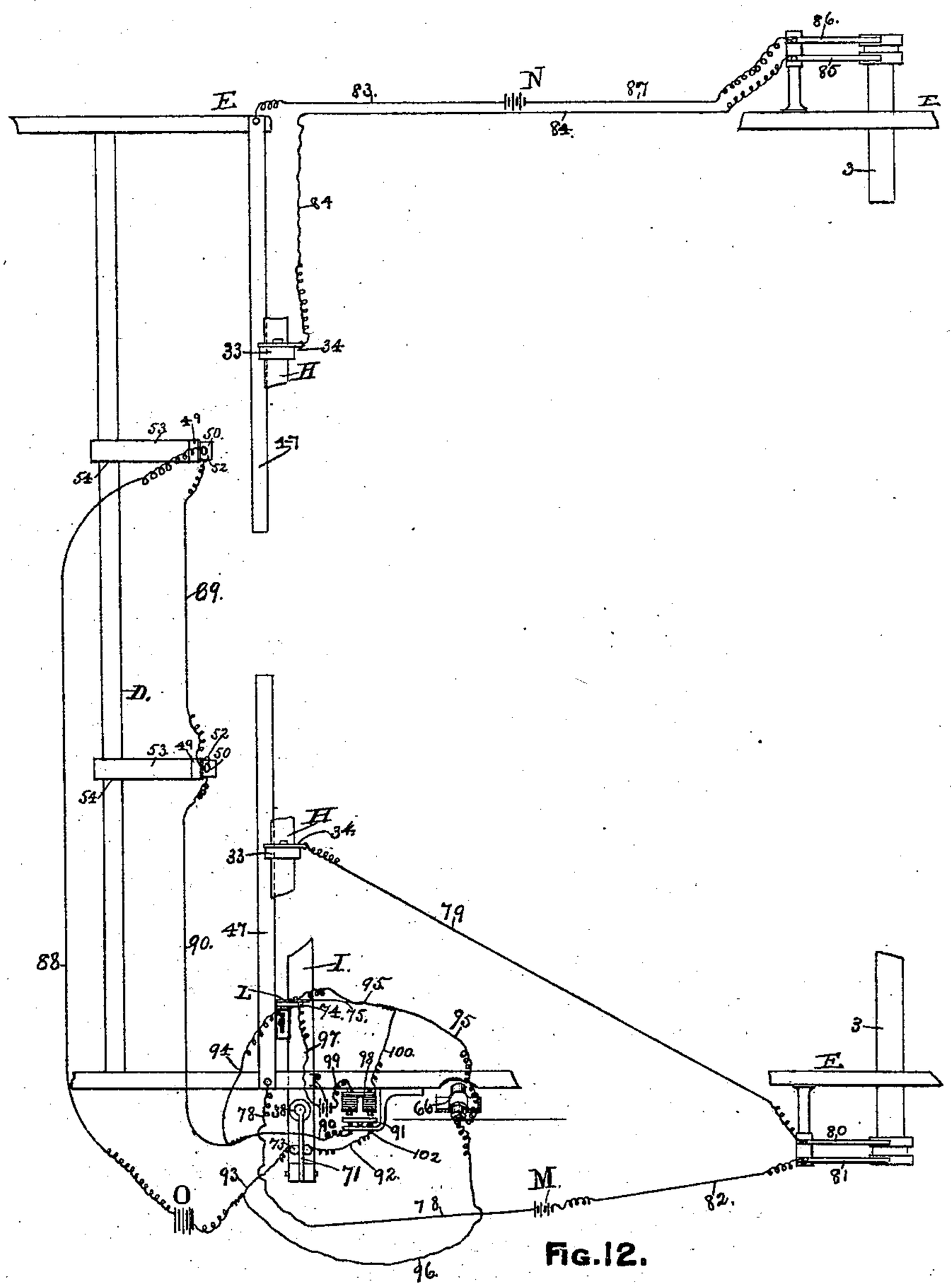

FIG. 12.

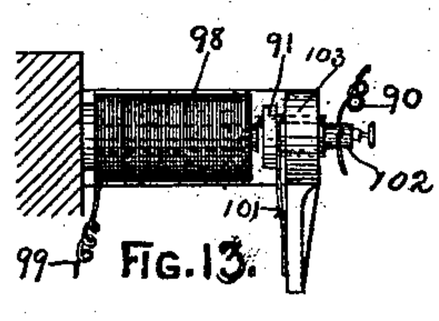

FIG. 13.

WITNESSES:

B. B. Brewer.

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BY

William W. Goes

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(No Model.)

7 Sheets—Sheet 6.

F. VAN BENTHUYSEN.

PAPER FEEDING MACHINE.

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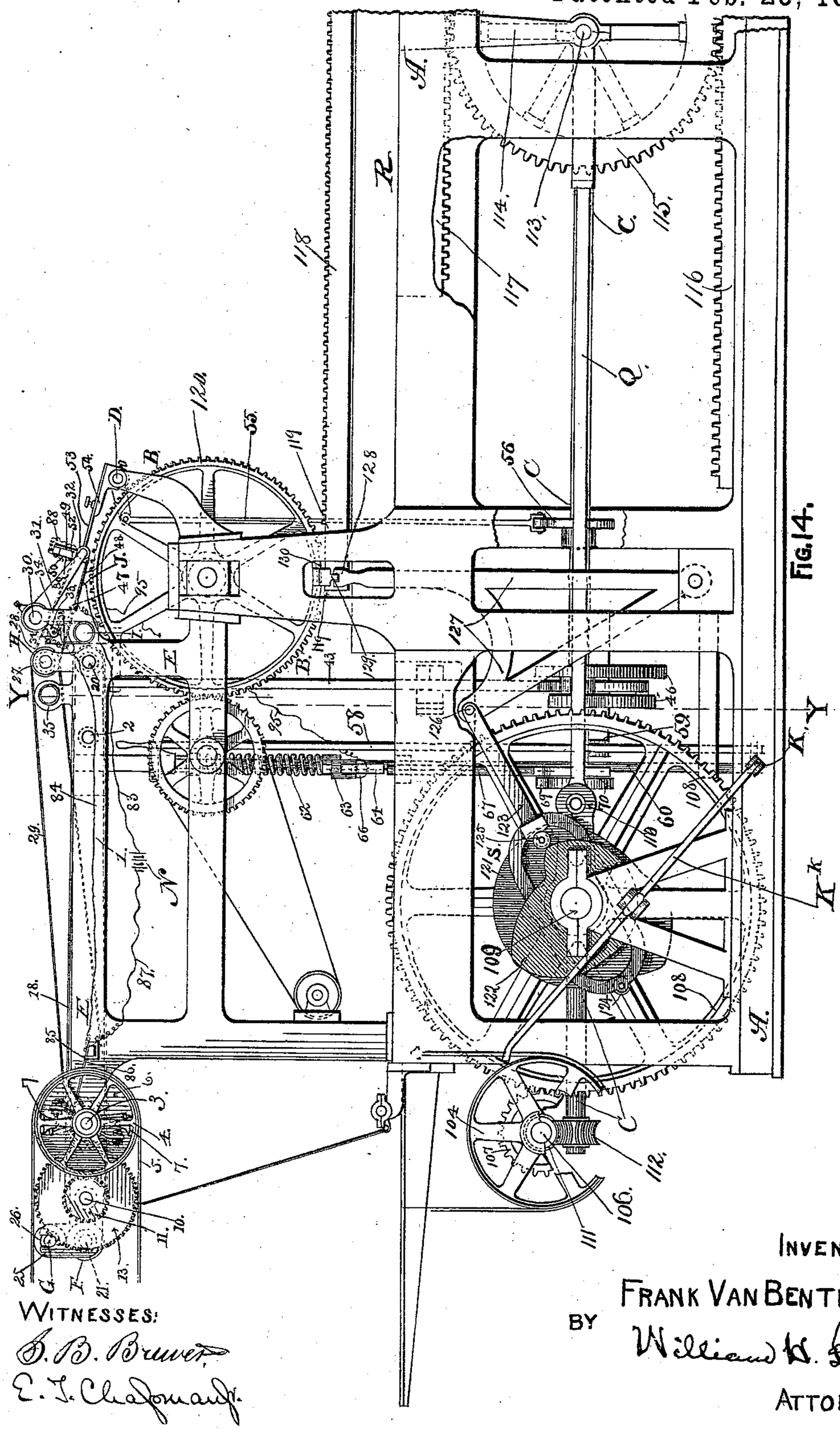

FIG. 14.

WITNESSES:

S. B. Brewer

E. L. Chapman Jr.

INVENTOR:

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BY William W. Lowe.

ATTORNEY.

(No Model.) 7 Sheets—Sheet 7.

F. VAN BENTHUYSEN.

PAPER FEEDING MACHINE.

No. 555,422. Patented Feb. 25, 1896.

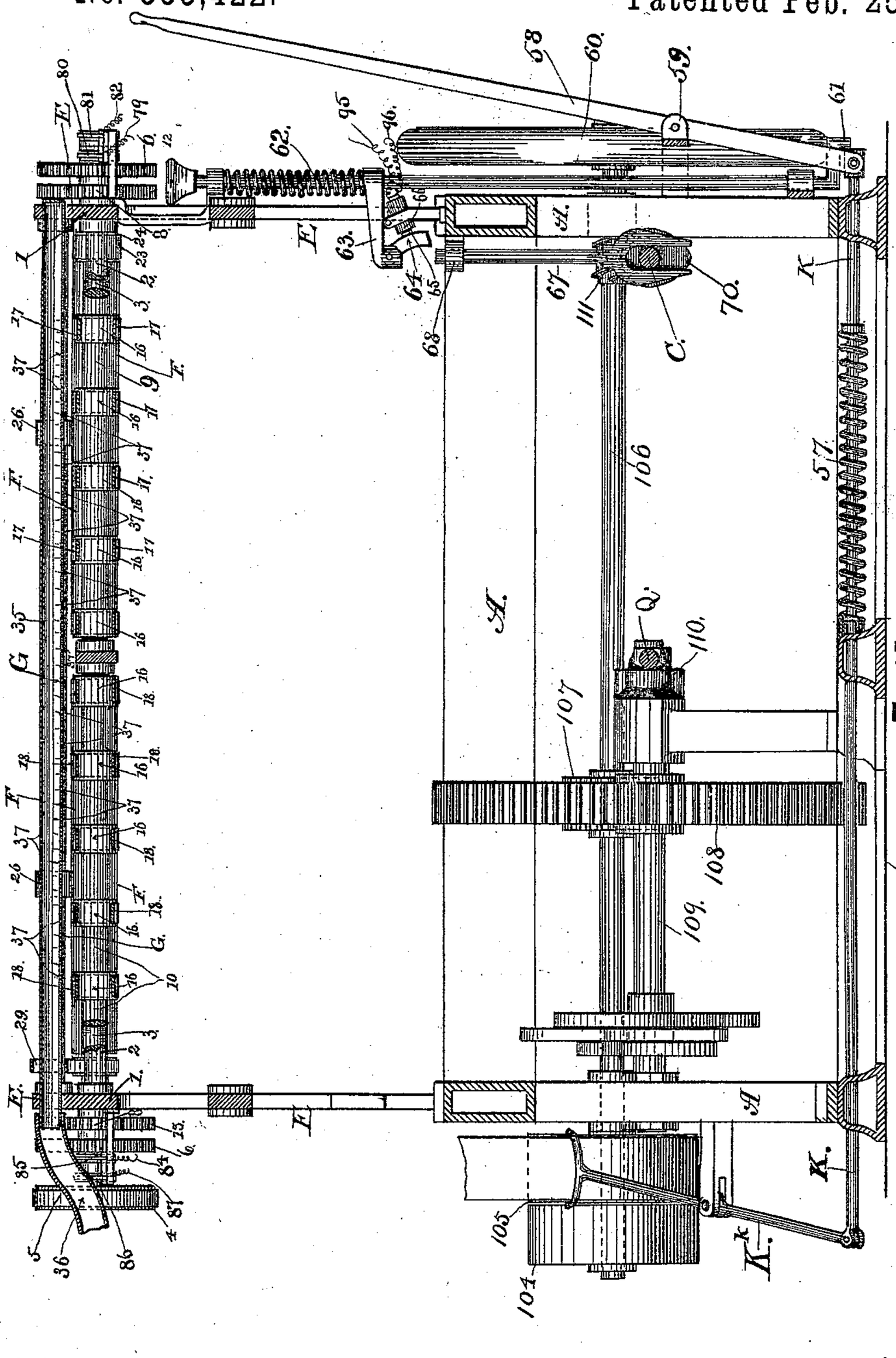

FIG. 15

WITNESSES:

S. B. Brenet.

E. L. Chafman Jr.

INVENTOR:

FRANK VAN BENTHUYSEN,

BY William H. Low.

Attorney.

UNITED STATES PATENT OFFICE.

FRANK VAN BENTHUYSEN, OF ALBANY, NEW YORK.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 555,422, dated February 25, 1896.

Application filed July 31, 1891. Serial No. 401,257. (No model.)

To all whom it may concern:

Be it known that I, FRANK VAN BENTHUYSEN, of the city and county of Albany, in the State of New York, have invented new and useful Improvements in Electrically-Controlled Paper-Feeding Mechanism for Printing-Presses, Folding-Machines, and other Similar Machinery, of which the following is a specification.

My invention consists of an automatic mechanism for conveying sheets of paper or other material from a feeding-table into a printing-press or other machine into contact with guides on such machines.

The objects of my invention are to effect the feeding of sheets, one at a time, against one or more guides of the machine; to provide means for automatically stopping the motion of the machine when a sheet is not brought into contact with said guides or guide in proper form or at a required time, thereby avoiding the printing of the sheet without proper registry, and also to effect an automatic stoppage of the machine whenever a supply of the sheets is exhausted or when said sheets are improperly fed to the machine.

In the accompanying drawings, which are herein referred to and form part of this specification, Figure 1 is a plan view of my paper-feeding mechanism as applied to a "stop-cylinder" printing-press, only a small portion of the latter being shown. Fig. 2 is a side elevation of the same. Fig. 3 is an end elevation of a part of my feeding mechanism, showing parts of the printing-press. Fig. 4 is a longitudinal section at the line X X on Fig. 1 of my feeding mechanism, the parts of the printing-press being omitted. Fig. 5 is an enlarged vertical section of part of my feeding mechanism, showing a rock-shaft of the printing-press provided with an electrically-controlled guide for the advancing end of a sheet of paper, the spring of said guide being in its normal position. Fig. 6 is a detached side elevation of said guide with its spring deflected. Figs. 7 and 8 are detached views of operating mechanism for a vacuum-pipe for moving sheets of paper laterally. Figs. 9 and 10 are respectively an enlarged vertical section of said vacuum-pipe and a side elevation of same, both of said views showing an electrically-controlled side guide for the sheets of paper. Fig. 11 is an enlarged side elevation of a pair of gear-wheels that form part of the tape-driving mechanism, the same showing an automatic clutch by which the driven wheel of said pair is automatically secured to its shaft. Fig. 12 is a skeleton plan view of the electrical circuits for controlling the several parts of my feeding mechanism. Fig. 13 is an enlarged side elevation of a pair of electromagnets and its movable armature employed in said electrical circuits in the manner hereinafter described. Fig. 14 is a side elevation of a portion of a stop-cylinder printing-press provided with my invention, and Fig. 15 is a transverse section of Fig. 14 at the line Y Y with certain parts omitted therefrom.

As represented in the drawings, A designates the frame of a printing-press of ordinary construction; B, the cylinder of said printing-press; C, the longitudinal cam-shaft of the same, and D the rock-shaft which carries the paper-guides for the inner end of the sheets of paper. Only portions of said parts are shown; but all are of an old and well-known construction, which form no part of my invention beyond their adaptation to my purpose.

E designates the framework for my paper-feeding mechanism, the same being composed of longitudinal frame-pieces 1, which are secured together by tie-bolts 2 or other suitable means. Said framework may be attached to the frame A in such manner that it will rest upon that part of the latter that is commonly used for supporting the "feed-board" of the press. A shaft 3 is journaled in the framework E and is provided with a pulley 4, to which motion is imparted by a belt 5, that moves in the direction indicated by an arrow in Fig. 1. Said belt may receive its motion from any suitable motor. At or near each end of the shaft 3 a gear-wheel 6 is loosely fixed on said shaft, and, in positions that correspond to the location of said gear-wheels, electrically-controlled friction-clutches 7 are secured to said shaft, one of said clutches being assigned to each of said gear-wheels and fitted to engage therewith, so as to temporarily secure said gear-wheels to the shaft 3. Said friction-clutches are so arranged that either one can be operated independently of the other, thereby allowing either one or both

of the gear-wheels to rotate with said shaft, or both of the gear-wheels may be freed from the shaft 3, so that the latter can be rotated without imparting motion to said shaft.

The electrically-controlled friction-clutch 7 forms no part of this invention, the same being fully shown and described in Letters Patent of the United States No. 457,446, granted to me August 11, 1891.

At opposite ends of the shaft 3, between the gear-wheels 6 and the outermost frame-pieces 1, there is a pinion 8 permanently secured to said shaft for a purpose hereinafter explained.

Two separate tape-driving shafts 9 and 10 are journaled in the framework E so as to range in line with each other, the center line of said shafts being parallel to that of the shaft 3, and to the outer end of each of said shafts a pinion 11 is secured. Said pinions are fitted to mesh into the gear-wheel 6 at the corresponding side of the machine for the purpose of imparting a maximum rate of speed to the shafts 9 and 10, but, it being understood that the gear-wheels 6 are only intermittently connected to the shaft 3, said speed is not uniformly maintained in both of said shafts, the speed of either of them being liable to be varied for a purpose hereinafter described. Gear-wheels 12 and 13 are loosely fitted on the shafts 9 and 10 between the pinions 11 and the corresponding frame-piece 1, and said gear-wheels are fitted to mesh into the pinions 8 on the shaft 3 for the purpose of imparting a minimum rate of speed to either of the shafts 9 and 10 when occasion requires it.

The gear-wheels 12 and 13 are loosely fitted on their respective shafts, so as to allow the latter to rotate freely in the eyes of said wheels while the shafts 9 and 10 are being rotated by means of the gear-wheels 6 and pinions 11, and for the purpose of permitting said shafts or either of them to revolve independently of the gear-wheels 12 and 13 both of the latter are provided with a series of openings 14 in their hubs, as shown in Fig. 11, said openings being formed with inclined sides at their outer sides, and in each opening is loosely placed a roller 15, which, while the shaft to which it pertains is being rotated at a greater number of revolutions than the corresponding gear-wheel, will be carried to the larger part of the opening and thereby leave the gear-wheel free from any positive connection with said shaft; but when the conditions are reversed, so that the gear-wheel is rotated a greater number of revolutions than the shaft to which it pertains, said rollers will be carried into the smaller part of the openings 14, and thereby the gear-wheel will be automatically clutched to the shaft whereon it is placed. Each of the shafts 9 and 10 is provided with a series of tape-pulleys 16 for driving two independent sets of endless tapes, the tapes of one set being designated as 17 and those of the other set being designated as 18. The tapes 17 pass around the pulleys of an independent shaft 19 and the tapes 18 pass around the pulleys of another independent shaft 20. The center lines of the shafts 19 and 20 range in exact line with each other and are parallel to the shafts 9 and 10.

F designates the paper-feeding drums by which the sheets of paper are fed into my feeding mechanism. This preliminary feeding of the sheets to said drums may be effected a sheet at a time either by hand or by any automatic mechanism that is suited to the purpose, and in feeding said sheets to the feeding-drums it is not necessary that they should be entered therein with absolute accuracy, for the reason that my feeding mechanism will automatically carry the sheets into their required place and position, as hereinafter explained. The feeding-drums F are secured to a continuous shaft 21, which is journaled in the framework E and is provided with a pulley 22, to which a belt 23 imparts motion derived from a pulley 24, which may be secured to the shaft 9, as shown in Fig. 1, or to the shaft 10, when preferable; but it is obvious that said drum-shaft may be driven by a pulley on a shaft that is disconnected from my feeding mechanism.

G designates a shaft that is loosely journaled in jaws 25 directly over the feeding-drums F. Said shaft is provided with collars or disks 26, which are adjustably secured thereto, so as to be fixed at any position where they may be required on said shaft, and said collars lrave a frictional contact with the feeding-drums F, so that they will bear upon each sheet of paper and by pressing the sheet upon the feeding-drums aid in the preliminary feeding of the sheets into the feeding mechanism.

H designates a transverse shaft that is journaled in the framework E, and is provided with a series of pulleys 27, by which a series of auxiliary feeding-tapes 28 are driven. Said shaft derives its motion through a belt 29 from a pulley on the shaft 3. A stationary shaft or rod 30, that is held by the framework E, is provided with a series of adjustable arms 31, each of which has a pulley 32 pivoted to its inner end for carrying the corresponding bight of the auxiliary feeding-tapes 28 to a point beyond the guides (hereinafter described) for the foremost edge of the sheets of paper, and said auxiliary feeding-tapes are adapted by reason of their bearing upon the sheets of paper at that point to prevent the foremost edge of the sheets of paper from being curled up by contact with said guides. The rod 30 also has secured thereto two arms 33, each having a metallic contact-arm 34, loosely pivoted thereto for a purpose hereinafter explained. The number of the endless tapes 28 and their positions should correspond to those of the endless tapes 17 and 18. A stationary blast-pipe 35 is fixed transversely over the inner portion of the endless tapes 17 and 18, and has one of its ends closed, the

opposite end being open and connected by a flexible tube 36 to an air-forcing pump or fan. (Not shown in the drawings.) The lower side of the pipe 35 has a series of openings 37 formed therein so as to discharge the air therefrom directly downward upon a sheet of paper lying on the upper portion of the endless tapes 17 and 18, and thereby the frictional contact of the paper with said tapes will be augmented.

I designates a transverse sliding pipe located adjacently to the inner bight of the endless tapes 17 and 18, and so that its upper side will lie on the same plane with the upper line of said tapes. One end of said pipe is closed and is provided with a valve 38, that is electrically controlled, as hereinafter explained. The opposite end of the pipe I is connected by a flexible tube 39 to an air-exhausting pump or fan (not shown in the drawings,) for the purpose of producing a vacuum in said pipe when all of its apertures are closed, and the upper side of the pipe I is provided with a series of openings 40, for the purpose of affording means, when said openings are covered by a sheet of paper that is being fed through by the tapes 17 and 18, of attaching the sheet to said pipe by atmospheric pressure during the operation of moving said sheet toward the side guide of the apparatus. A pendent lug 41 is attached to the pipe I, and a connecting-rod 42 connects said lug to the upper end of a lever 43, that is pivoted, as at 44, to a bracket 45, projecting from the side of the framework A. The lower portion of the lever 43 engages with a cam 46 secured to the cam-shaft C, said cam being fitted to produce the required oscillations of said lever to effect the reciprocations of the pipe I for moving an attached sheet of paper against the side guide of the apparatus.

An inclined table J is attached to the framework E, so as to extend from side to side of the apparatus slightly in advance of pipe I and over the cylinder B of the printing-press, said table having an inclination that corresponds to that of the lower stretch of the endless feeding-tapes 28, which sweep closely to the top of said table. In the upper face of the latter, at each end and extending nearly to the middle of said table, metallic strips 47, which should be good conductors of electricity, are inserted to receive contact from the arms 34. The auxilliary feeding-tapes 28 are arranged to coact with the surface of the table J for the purpose of completing the feeding of the sheets of paper to the nippers of the impression-cylinder B, after said sheets have passed off from the feeding-tapes 17 and 18. Adjustable fingers 48 project from the inner edge of the table J for the purpose of affording support for heads 49 for the paper-guides located directly over the cylinder B. Each of said heads, which are made of wood or other material that is a proper non-conductor of electricity, is provided with a delicate pendent spring 50 made of metal having suitable conductivity for electricity, said spring being capable of being deflected by the pressure of a sheet of paper when the latter is pushed edgewise against its face. Each of the heads 49 is provided with a contact-point 51, against which the spring 50 will bear when said spring is deflected, as shown in Fig. 6, and each of said heads is also provided with a stop 52 to prevent the said spring from springing outwardly beyond its normal position. The heads 49 are attached to the outer end of slides 53, which are adjustably secured to arms 54, the latter being adjustably attached to the rock-shaft D, and the latter is oscillated in the usual and well-known manner by means of a rod 55, which bears upon a cam 56 secured to the shaft C. The rock-shaft D is arranged to lift the paper-guides from the path of the sheet of paper immediately before the moment when the sheet of paper—now in the grasp of the nippers of the cylinder B, (not shown in the drawings)—commences to be carried toward the forms for obtaining the impression by said cylinder.

K *k* designate a belt-shipper of a common and well-known form, the same consisting of a lever fulcrumed to the side of the press-frame and jointed to a sliding rod K, fitted to slide through openings formed in the bed-piece of said frame. The opposite end of said sliding rod is jointed to a hand-lever 58 fulcrumed to a bracket 59 attached to said frame. Said lever is provided for the purpose of moveing said belt-shipper in one direction against the resistance of a compressible spring 57, interposed between a collar on the sliding rod K and an adjacent part of said bed-piece. By means of said lever the belt-shipper is moved to carry the driving-belt of the machine onto a tight pulley 105, whereon said belt is retained by reason of the sliding rod K being held in a fixed position by a detent 61, which is formed on the lower end of a vertical sliding rod 60 for the purpose of engaging with the corresponding end of the sliding rod K. The sliding bar 60 is forced downwardly by a spring 62 to carry the detent 61 into position to engage with the sliding rod K, but when the latter is released from the hold of said detent the spring 57 will force said rod to move in a direction that will cause said belt-shipper to carry the driving-belt onto a loose pulley 104, and thereby the operation of the printing-press will be terminated temporarily. The sliding rod 60 is provided with an arm 63, having at its inner end a loosely-pivoted drop-piece 64, provided with an armature 65, which coacts with an electromagnet 66 for the purpose of drawing said drop-piece into the position shown in Fig. 15, which shows the position maintained by said drop-piece while the printing-press is performing its operations. A vertically-reciprocating rod 67, fitted to slide in a guide 68 on the frame A, is provided with a friction-roller 69, which bears upon a cam 70, secured to the cam-shaft C, the lower end of

said rod being bifurcated to span said shaft. When the electrical circuit through the electromagnet is broken to release the drop-piece 64, the latter will drop into the position shown in full lines in Fig. 3, and thereby the rod 67 on its next upward stroke will engage with the lower end of said drop-piece and effect an upward movement of the rod 60 that will dislodge the detent 61 from its engagement with the sliding rod K. When this is accomplished, the spring 57 will forcibly move said sliding rod in such manner as to cause the belt-shipper K *k* to shift the driving-belt onto the loose pulley 104 of the printing-press and cause the latter to terminate its operations. The valve 38, attached to the pipe I, is connected to the free end of a lever 71, which is pressed upwardly by a spring 72 for the purpose of holding said valve normally in a position where it is slightly raised from its seat. An electromagnet 73 is arranged in respect to the lever 71 in such manner that when said magnet is electrically excited it will draw said lever downward to effect the closing movement of the valve 38.

L designates a side guide for the sheets of paper. Said guide is adjustably attached to the table J, and is located adjacent to the pipe I, its purpose being to govern the lateral position of the sheets of paper passing through the feeding mechanism. Said side guide consists of a head 74, of wood or other material that is a non-conductor of electricity, to which a delicate spring 75, of metal possessed of conductive power for electricity, is pendently attached. A contact-point 76 is fixed in the face of said head, so that the spring 75 will come in contact therewith when said spring is deflected, as shown in Fig. 7, and a stop 77 prevents said spring from springing too far from the face of said head.

For the purpose of simplifying the description of the electrical circuits for my feeding mechanism I have shown four generators of electricity, which are designated as M, N, O, and P; but it should be understood that a single generator is sufficient for the purposes of my apparatus.

In the drawings the generator M supplies the electricity for the circuit that operates the friction-clutch 7 on one side of my apparatus, the current from said generator through a conducting-wire 78, thence through the strip 47, contact-arm 34, conducting-wire 79, and brush 80 into the electromagnets of said friction-clutch. From said electromagnets the current passes through the brush 81 and conducting-wire 82 back to the generator M, thereby completing the electric circuit. Said circuit becomes automatically broken when a sheet of paper passes between the end of the contact-arm 34 and the strip 47, and by the breaking of said circuit the friction-clutch 7 on the corresponding side of the apparatus is retracted from the gear-wheel 6 on said side, and simultaneously therewith the gear-wheel 12 is automatically clutched to the shaft 9 to drive the tapes 17 at a reduced rate of travel. The tapes 18 may coincidently be traveling at their maximum rate of speed to carry the sheet of paper squarely toward the cylinder B.

The current of electricity from the generator N operates the friction-clutch 7 at the opposite side of the apparatus, in the manner just described, by passing through a conducting-wire 83, strip 47 on the same side of the apparatus, corresponding contact-arm 34, conducting-wire 84, and brush 85 into the electromagnets of the last-named friction-clutch. From said electromagnets the current passes through the brush 86 and conducting-wire 87 back to the generator N. The breaking of the circuit through the last-named generator is effected by a sheet of paper in the manner just described in respect to the current from the generator M, and the manner of clutching the gear-wheel 13 to the shaft 10 is precisely the same as described for clutching the gear-wheel 12 to the shaft 9, and thereby the tapes 18 have their speed reduced in the manner described in respect to the tapes 17, and with the same results upon a sheet of paper resting thereon.

The generator O supplies the electricity for the circuit which is connected with the paper-guides for the end of the sheet for the purpose of effecting the closing of the valve 38 when a vacuum is required in the pipe I, and it should be understood that this circuit remains normally in an open condition. From the generator O the current passes through a conducting-wire 88 to the spring 50 which is farthest from said generator. From the contact-point 51 for said spring a conducting-wire 89 conveys the current, when the circuit is closed by deflecting said spring against said contact-point, to the spring 50 that is nearest the generator O, and from the contact-point 51 for the last-named spring a conducting-wire 90 conveys the current to one pole of a movable armature 91, and from the opposite pole of said armature a conducting-wire 92 connects with one side of the electromagnet 73 for closing the valve 38, and from the opposite side of said electromagnet a conducting-wire 93 conveys the current back to the generator O, thereby completing that circuit. To the conducting-wire 90 a branch conducting-wire 94 is connected to the contact-point 76, attached to the side guide L and to the spring 75 of said side guide. A conducting-wire 95 is connected to convey the current to the electromagnet 66 by which the drop-piece 64 is drawn back to prevent the reciprocating rod 67 from releasing the sliding rod K to move the belt-shipper attached thereto. From the electromagnet 66 a conducting-wire 96 is connected to the conducting-wire 93, which connects with the generator O, and thereby this auxiliary circuit is completed.

The generator P is an adjunctive one for producing an electrical circuit that will cut out the circuit which passes through the armature 91, whereby the valve 38 will be re-

leased from the control of the magnet 73 so as to be opened by the spring 72, and the vacuum in the pipe I will be destroyed to free the sheet of paper from said pipe. To effect that purpose a conducting-wire 97 is connected to the contact-point 76 from one pole of the generator P. The opposite pole of said generator is connected to one side of the electromagnets 98 by a conducting-wire 99, and the opposite side of said electromagnets is connected by a conducting-wire 100 to the wire 95 so as to complete the circuit through said generator to magnetize the electromagnets 98. When the magnetization of the electromagnets 98 is effected the armature 91 will be instantly attracted to said magnets, and the current which passes through said armature from the wire 90 to the wire 92 is broken, and the current from the generator O will continue to pass, through the wires 94 and 95, electromagnet 66, and wires 96 and 93, back to said generator. The armature 91 is normally held by a spring 101 against a pair of contact-points 102, which, being insulated in a bracket 103 for the electromagnet 98, form the terminals for the wires 90 and 92.

As hereinbefore set forth, the printing-press partially illustrated in the drawings is one of a class commonly known as a "stop-cylinder;" but said press forms no part of my invention, which can be readily applied to any form of printing-press in which a cylinder is employed for carrying sheets to receive impressions from forms carried on a press-bed.

As shown in Figs. 14 and 15, 106 designates the driving-shaft of the press, to which the tight pulley 105 is secured and the loose pulley 104 is fitted to rotate thereon without imparting motion thereto. A pinion 107 is also secured to said shaft and is fitted to mesh into a spur-wheel 108, secured to a shaft 109, which carries a crank 110 on its inner end. The driving-shaft 106 is provided with a worm 111, which meshes into a worm-wheel 112, secured to the cam-shaft C for the purpose of imparting a rotary motion to said cam-shaft. A connecting-rod Q engages on the wrist-pin of the crank 110 and to a center shaft 113, which is journaled in a hanger 114, secured to the lower face of the press-bed R. Said center shaft has a gear-wheel 115 secured to it, and one end of the connecting-rod Q is bifurcated to span said gear-wheel and form a jointed connection to the center shaft. The gear-wheel 115 is fitted to mesh into a stationary rack 116, secured to the base of the press, and said gear-wheel also meshes into a rack 117, secured to the lower face of the press-bed R. By means of the crank 110 and connecting-rod Q a rotary motion is imparted to the gear-wheel 115 by impelling said wheel on the rack 116, and thereby a reciprocating movement is imparted to the press-bed R, which movement will be twice the linear travel of the gear-wheel 115 in the rack 116.

The upper face of the press-bed R is provided with a rack 118 at one of its edges. Said rack is shorter than the movement of the press-bed, so as to leave a blank space, as at 119, and it is adapted to take in a gear-wheel 120 on the cylinder B. While the rack 118 is engaged in said gear-wheel a rotary motion will thereby be imparted to the cylinder B; but when the blank space 119 is brought into position directly beneath said gear-wheel the engagement of the gear-wheel 120 with the rack 118 will terminate. A double cam S, preferably composed of plates 121 and 122, is secured to the shaft 109, and the outer edges of said plates are provided with successive projections and depressions, which are adapted to effect the required endwise movements of a connecting-link 123, fitted to span the shaft 109 between the plates 121 and 122. A friction-roller 124 is pivoted on said link and arranged to bear upon the periphery of the plate 121, for the purpose of moving the link in a direction toward that end of the press where the driving-shaft 106 is located, and a like roller 125 is also pivoted to said link and arranged to bear upon the periphery of the plate 122, for the purpose of moving said link in the opposite direction, and it should be understood that the projections on either of said plates have corresponding depressions on the other one, so that the rollers 124 and 125 will have a fair bearing on the periphery of the plates to which they are respectively assigned. One end of the link 123 is jointed, as at 126, to the swinging end of a rocker-arm 127, fitted to vibrate in a vertical plane longitudinally of the press-frame, and the upper end of said rocker-arm is provided with a jaw 128, that is fitted to engage with a tooth 129, attached to one end of the cylinder B, and the engagement of said jaw and tooth is practically simultaneous with the disengagement of the rack 118 from the gear-wheel 120, said rocker-arm being arranged to move the cylinder B into position (shown in Fig. 14) before the cylinder is brought to a state of rest. The cylinder B will then remain stationary while the peripheries of the plates 121 and 122 have the parts which are concentric to the shaft 109 in contact with the rollers 124 and 125, and it is during this stationary condition of the cylinder B that a sheet fed by my feeding mechanism reaches the nipping-fingers of said cylinder in condition to be engaged on the latter and carried in to receive an impression of a form fixed on the press-bed R. As shown in Fig. 14, the cylinder B is at its stationary position and the roller 124 is just started on a projection of the plate 121, whereby an impulse will be given to the rocker-arm 127 to start the cylinder B, by means of the jaw 128 and tooth 129, so that the teeth of the rack 118 will mesh into the teeth of the gear-wheel 120. When the latter is accomplished the jaw 128 will be disengaged from the tooth 129, and, by means of the rack 118, the cylinder B will have a complete revolution imparted to it and will

return to its state of rest, as hereinbefore described.

By reference to Fig. 14 it will be seen that the gear-wheel 120 has a portion of its periphery unprovided with teeth, so as to leave a blank space 130, which corresponds in position with the tooth 129, whereby clearance is obtained to allow the teeth of the rack 118 to pass under said gear-wheel while the press-bed R is making its reciprocation toward the opposite end of the press from the one where the cylinder is located. From the foregoing description of said stop-cylinder press it will be seen that the cylinder B is revolved while the press-bed R is being moved toward the end of the press at which the driving-shaft 106 is located, and said cylinder remains stationary while the press-bed is being moved in the opposite direction.

My invention operates in the following manner: The motion of the press being stopped, a sheet of paper is laid on the tapes of the feeding mechanism and is arranged to bear against the guides 50 and L, and the press is then started by shifting the driving-belt from the loose to the tight pulley by means of the lever 58. If the rod 60 is at this time held in its raised position by the cam 70, said lever must be held until the cam has been moved to release the rod 60, and the latter then falls and its detent 61 will engage the sliding rod K, and thereby the belt-shipper K *k* will be held in position to retain the driving-belt on the tight pulley 105 and keep the press in motion. The sheets of paper are then fed to the apparatus by inserting them, a sheet at a time, between the feeding-drums F and the disks 26, and said insertion may be effected either by hand or automatically by mechanical means. Said feeding-drums deliver the sheets upon the upper stretch of the endless tapes 17 and 18 while the latter are being moved at their maximum speed, and preferably each sheet should be delivered upon said tapes in such manner that an equal portion will rest upon the two series of said tapes, and by the latter the sheet is fed to the table J and under the feeding-tapes 28, by which it is passed between the contact-arms 34 and metallic strips 47, thereby breaking the electrical circuits that control the friction-clutches 7 at the opposite sides of the apparatus. If a sheet of paper has its advancing edge presented in an angular direction in respect to said contact-arms, so that one of said circuits will be broken before the other is affected, the tapes on the side of the unbroken circuit will continue to move at their maximum speed and the tapes of the other series will move at a reduced speed, and thereby the sheet will be brought into its correct position automatically. When the leading edge of sheet of paper strikes both of the springs 50 to deflect said springs against their corresponding contact-points 51, the circuit through the wires 90 and 93 will be closed to excite the electromagnet 73, whereby the valve 38 will be closed and the sheet of paper, adhering to the pipe I, will be carried laterally against the spring 75 of the side guide L and, by the deflection of said spring against the contact-point 76, the circuit through the electromagnets 98 will be closed to break the circuit through the electromagnet 73 so as to release the valve 38 from the control of said magnet. When this is accomplished the sheet of paper is free and in position for being grasped by the nippers of the cylinder B.

In the operation of my feeding mechanism, in case a sheet does not reach all of the guides shortly before the grippers of the press-cylinder close upon the sheet, the drop-piece 64 will not be drawn back by the magnet 66, the circuit through said magnet will remain open, and the rod 67, moved by the cam 70, will engage with the pendent drop-piece and effect the disengagement of the detent 61 from the sliding rod K, and by the operation of the belt-shipper K *k*, thereby released, the motion of the press will be automatically stopped.

When it is desirable to stop the printing-press independently of the electrically-controlled mechanism, the rod 60 can be raised by hand to release the belt-shipper K *k* from the control of the detent 61. Then said belt-shipper will operate in the manner hereinbefore described. The driving-belt can be shifted to the fast pulley to start the printing-press at any moment without turning said press by hand in the ordinary manner of starting printing-presses.

While I have shown my feeding mechanism applied to a stop-cylinder printing-press, it should be understood that it is adapted to use on any form of printing-press which prints separate sheets of paper.

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

1. In a paper-feeding mechanism, the combination of two independent series or sets of feeding-tapes; each set having an independent driving mechanism for producing differential speeds and so arranged that one set of said tapes may be moved at its maximum while the other set is moving at its minimum speed, clutch mechanism for temporarily fastening the gearing of said driving mechanisms to their respective shafts, and electrical circuits connected to said clutch mechanisms in such manner that either train of gearing—for effecting the maximum speed of the feeding-tapes—may be thrown out of action; each of said electrical circuits being provided with contact-points that are automatically separable by means of a sheet of paper, substantially as and for the purpose herein specified.

2. In a paper-feeding mechanism, the combination of an electrical circuit, a guide or guides for the foremost end of the sheets of paper connected with said circuit and provided with means for automatically closing the circuit, a lateral feeding mechanism provided with means—controlled by said elec-

trical circuit—for temporarily attaching the sheets of paper thereto, a side guide electrically connected to said circuit and provided with means for automatically closing the circuit by the contact of a sheet of paper therewith, and a stop-motion controlled by said circuit; whereby the stoppage of the press will be effected automatically, substantially as and for the purpose herein specified.

3. In a paper-feeding mechanism, the combination of a belt-shipper, a spring-actuated rod provided with a detent for retaining said belt-shipper at one extremity of its movement; said rod being provided with an arm having a drop-piece loosely pivoted thereto, a vertically-reciprocating rod fitted to take against the lower end of said drop-piece when the latter is in a vertically-pendent position, an electromagnet adjacently located to said drop-piece and arranged to deflect the latter from the path of said reciprocating rod, and an electrical circuit connected with said magnet; said circuit being automatically closed by the side guide of the paper-feeding mechanism, substantially as specified.

4. In a paper-feeding mechanism, the combination of one or more guides for the foremost end of the sheets of paper; said guides being fitted to automatically close an open electrical circuit which connects said guides with an electromagnet for closing the valve of a vacuum-pipe; said vacuum-pipe being perforated and fitted to reciprocate endwise laterally of the paper-feeding mechanism, a side guide for the sheets of paper located adjacent to said vacuum-pipe, and a branch electrical circuit from the first-named circuit and arranged to demagnetize the electromagnet which controls the closing of the valve of said vacuum-pipe, as and for the purpose herein specified.

5. In a paper-feeding mechanism, the combination of preliminary feeding-tapes, a table located intermediately between said tapes and the impression-cylinder of a press to which said feeding mechanism is applied, and auxiliary feeding-tapes arranged to bear upon the upper surface of said table and extending over said cylinder to a point beyond the guides for the foremost edge of the sheets of paper; whereby said auxiliary feeding-tapes will cooperate with said table to complete the feeding of the sheets of paper from the preliminary feeding-tapes to the impression-cylinder, and the curling up of said sheets—by contact with said guides—will be prevented by said tapes, substantially as specified.

6. In a paper-feeding mechanism, the combination with one or more electrical circuits, a sheet-feeding mechanism consisting of two independently-operating series of feeding-tapes; the driving mechanism of each series of tapes being provided with an electrically-controlled friction-clutch, and means—substantially as described—for breaking the electrical circuit to either of said clutches, of a lateral feeding mechanism consisting of a perforated vacuum-pipe fitted to reciprocate in a transverse direction in respect to the line of movement of said feeding-tapes; said vacuum-pipe being provided with an electrically-controlled valve—whereby the vacuum can be destroyed, and means—substantially as described—for effecting the opening and closing movements of said valve, as and for the purpose herein specified.

7. In a paper-feeding mechanism, the combination of an electrical circuit, two independently-operating series of feeding-tapes for feeding the paper toward the impression-cylinder of a printing-press; the driving mechanism of each series of said tapes being provided with an electrically-controlled friction-clutch as herein set forth, a table provided with two independent contact-plates which are separately electrically connected with one pole of said circuit, and a pair of loosely-pivoted contact-arms which are electrically connected with the other pole of said circuit and arranged to normally remain in electrical contact with the corresponding contact-plate of said table—said contact being broken by passing a sheet of paper between either of said arms and its corresponding contact-plate; whereby either of the series of feeding-tapes can be automatically retarded to bring a sheet of paper into perfect register before its delivery to the impression-cylinder, as and for the purpose specified.

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