(No Model.) 6 Sheets—Sheet 1.

R. S. ODER.

PAPER FEEDING MACHINE.

No. 567,995. Patented Sept. 22, 1896.

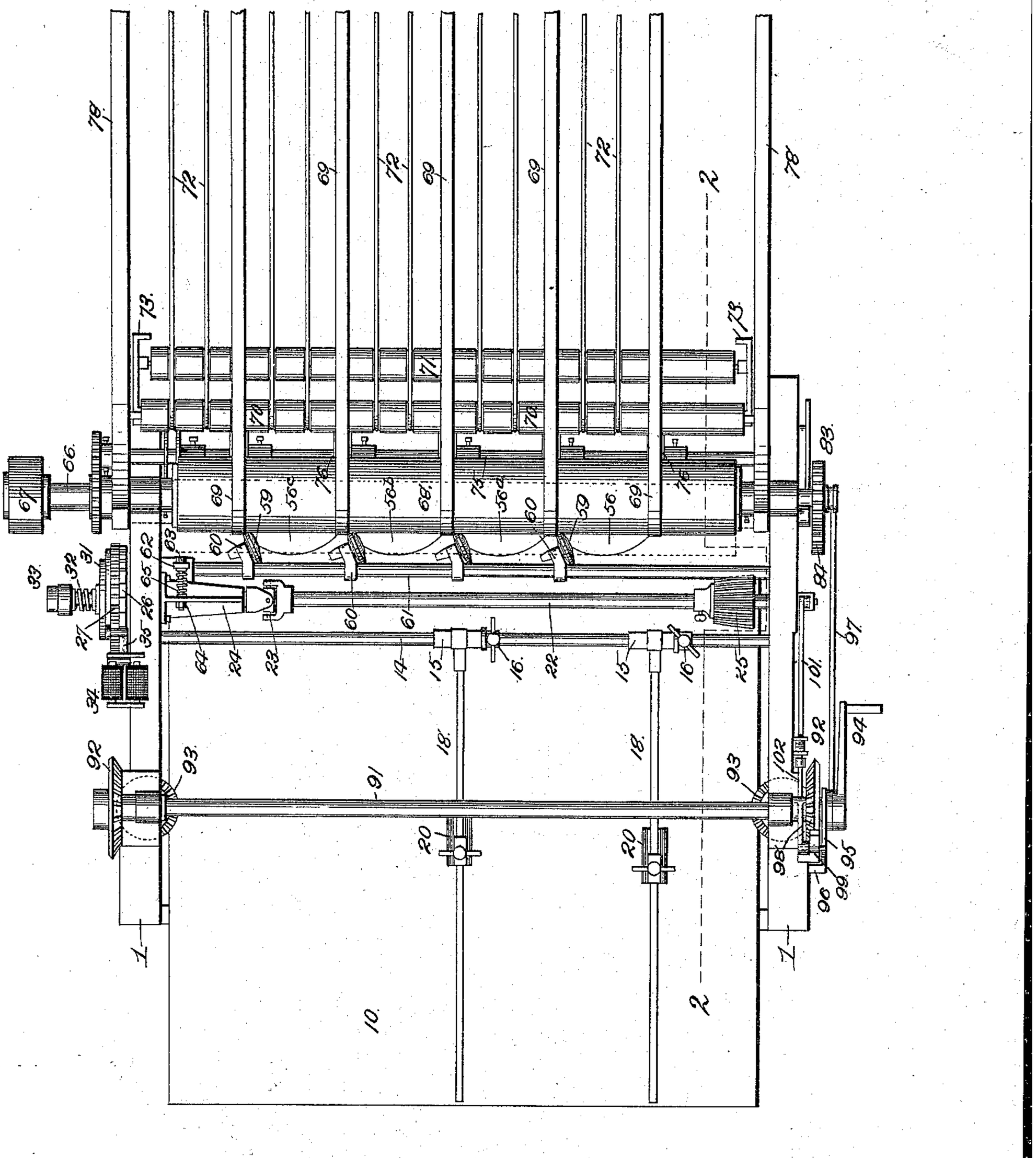

Fig. 1.

Witnesses.

F. G. Fischer

A. W. Parkins.

Inventor:

Robert D Oder

(No Model.) 6 Sheets—Sheet 2.

R. S. ODER.

PAPER FEEDING MACHINE.

No. 567,995. Patented Sept. 22, 1896.

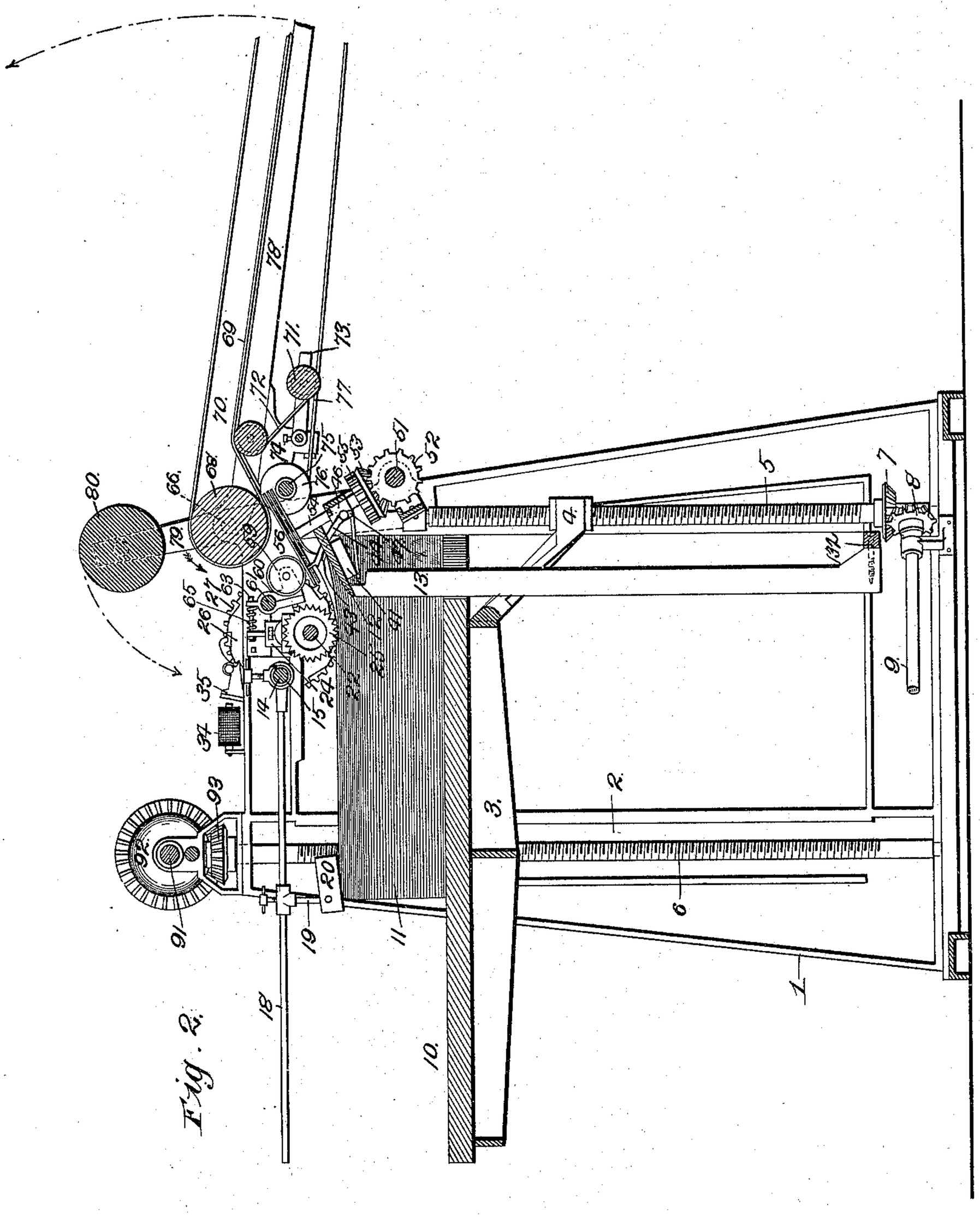

Fig. 2.

Witnesses:

F. G. Fischer

A. M. Parkins.

Inventor:

Robert S. Oder

(No Model.) 6 Sheets—Sheet 3.

R. S. ODER.

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Fig. 1.

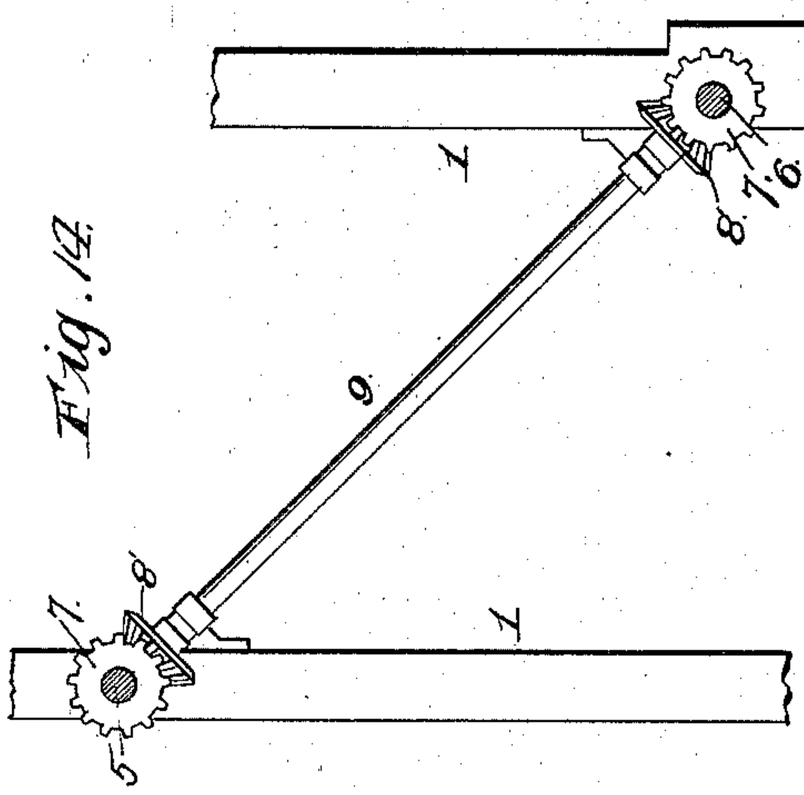


Fig. 6.

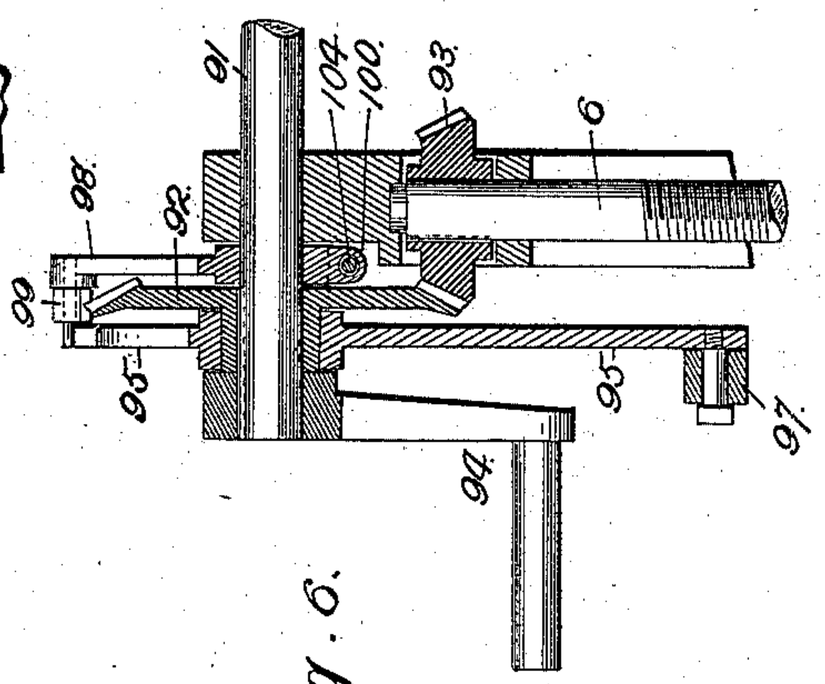
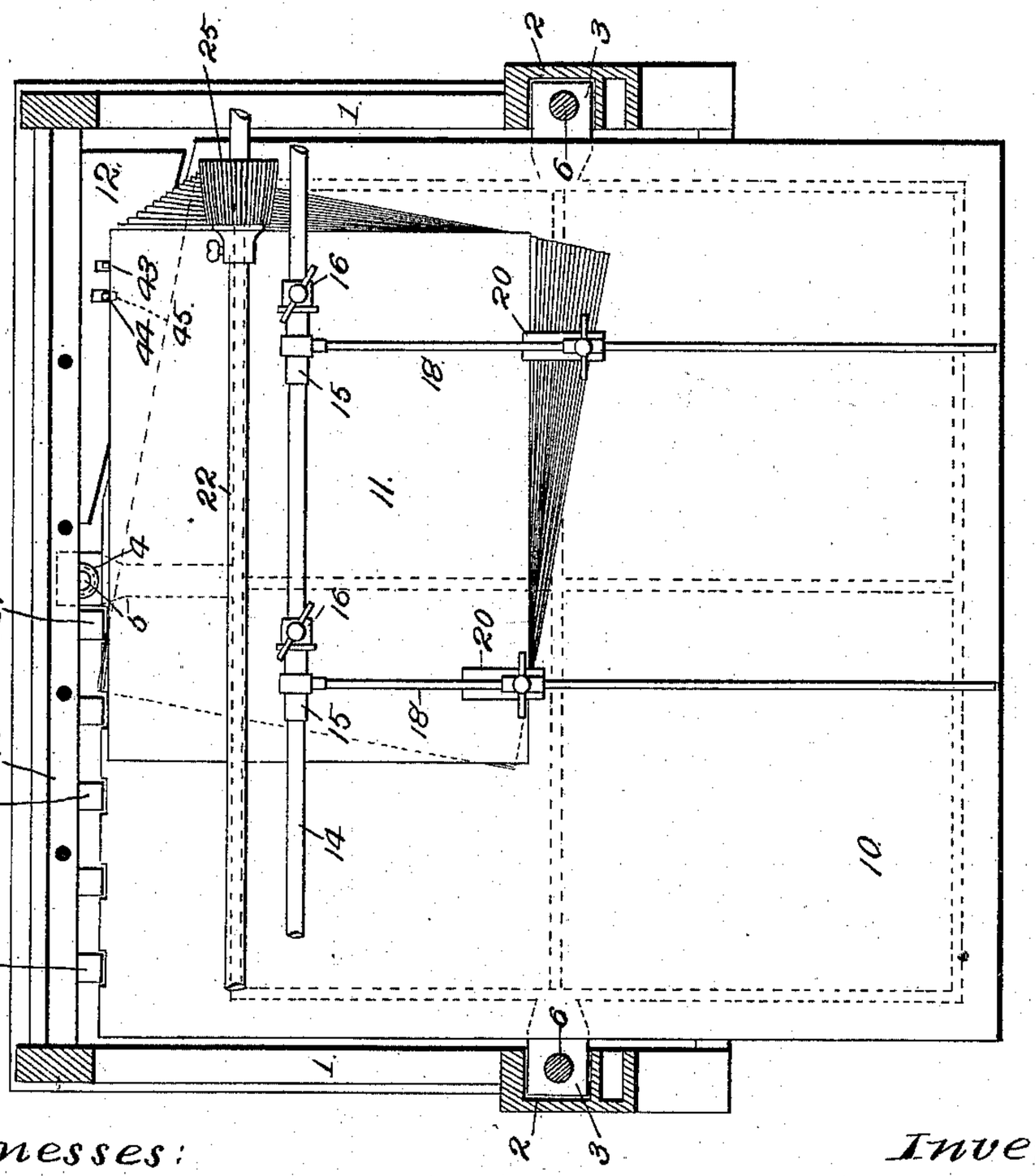


Fig. 3.



Witnesses:

F. G. Fischer

A. M. Parkins.

Inventor

Robert D. Oder.

(No Model.)

6 Sheets—Sheet 4.

R. S. ODER.

PAPER FEEDING MACHINE.

No. 567,995. Patented Sept. 22, 1896.

Fig. 4.

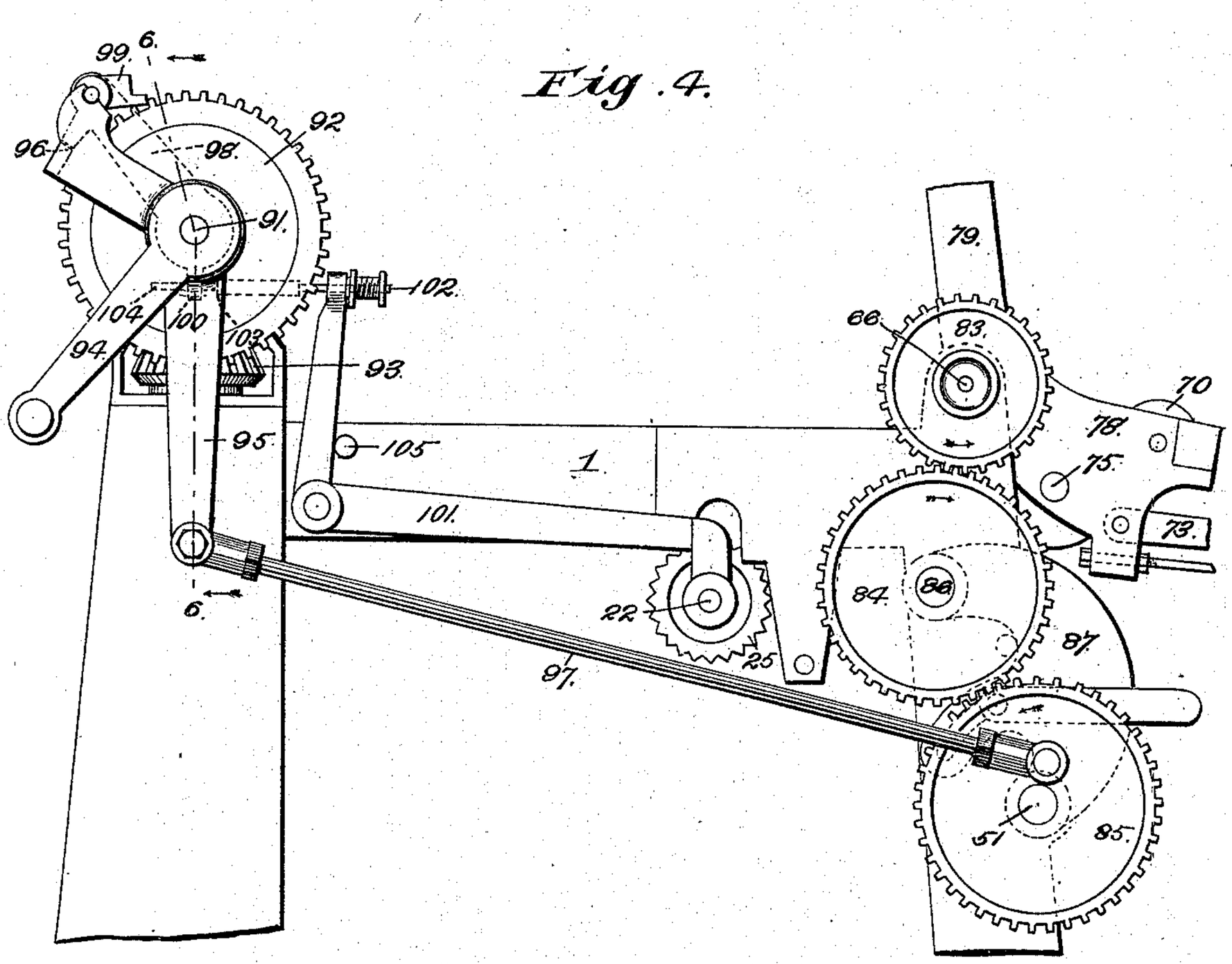
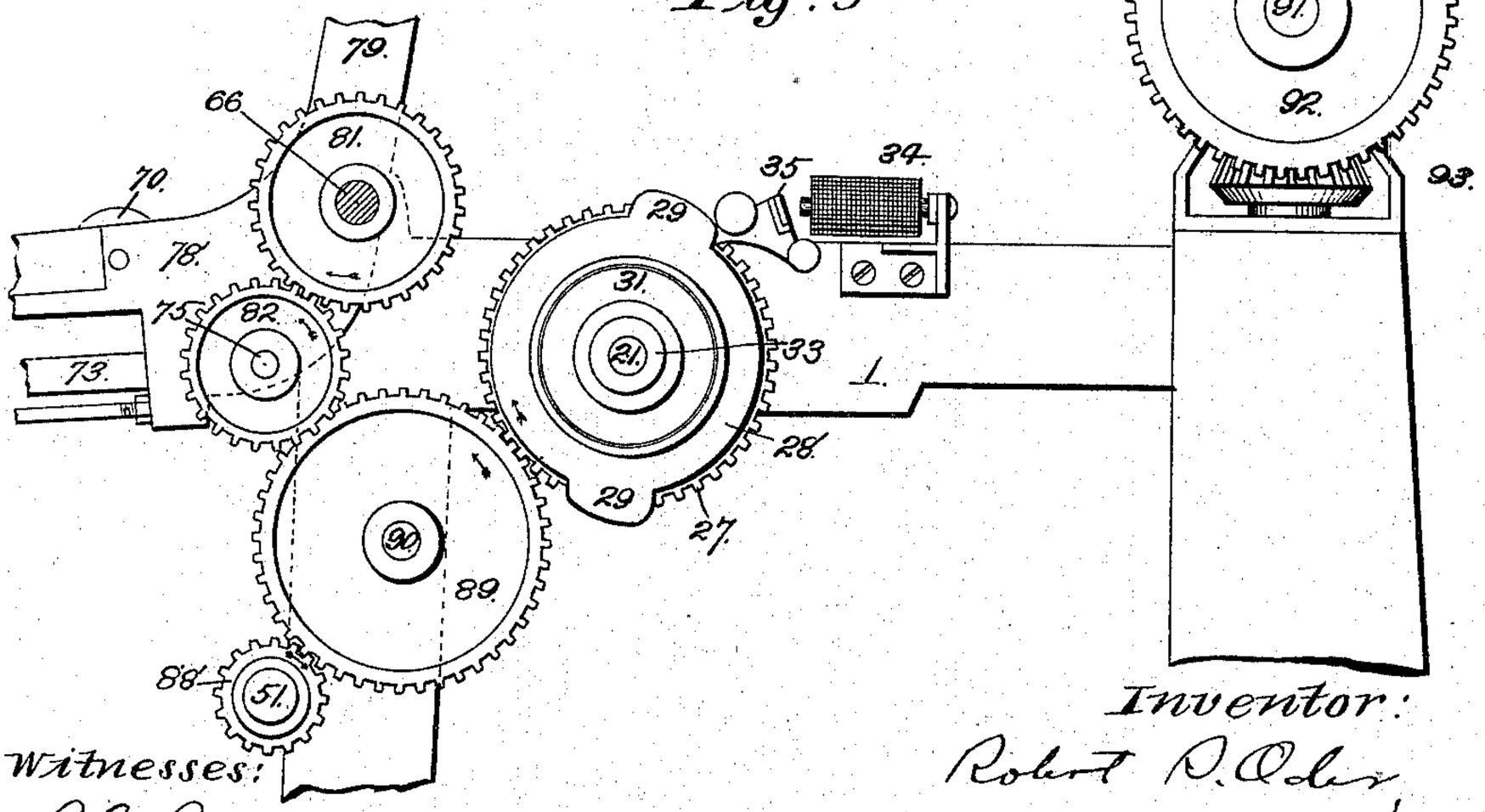


Fig. 5



Witnesses:
F. G. Fischer
A. M. Parkins.

Inventor:
Robert S. Oder

(No Model.) 6 Sheets—Sheet 5.

R. S. ODER.

PAPER FEEDING MACHINE.

No. 567,995. Patented Sept. 22, 1896.

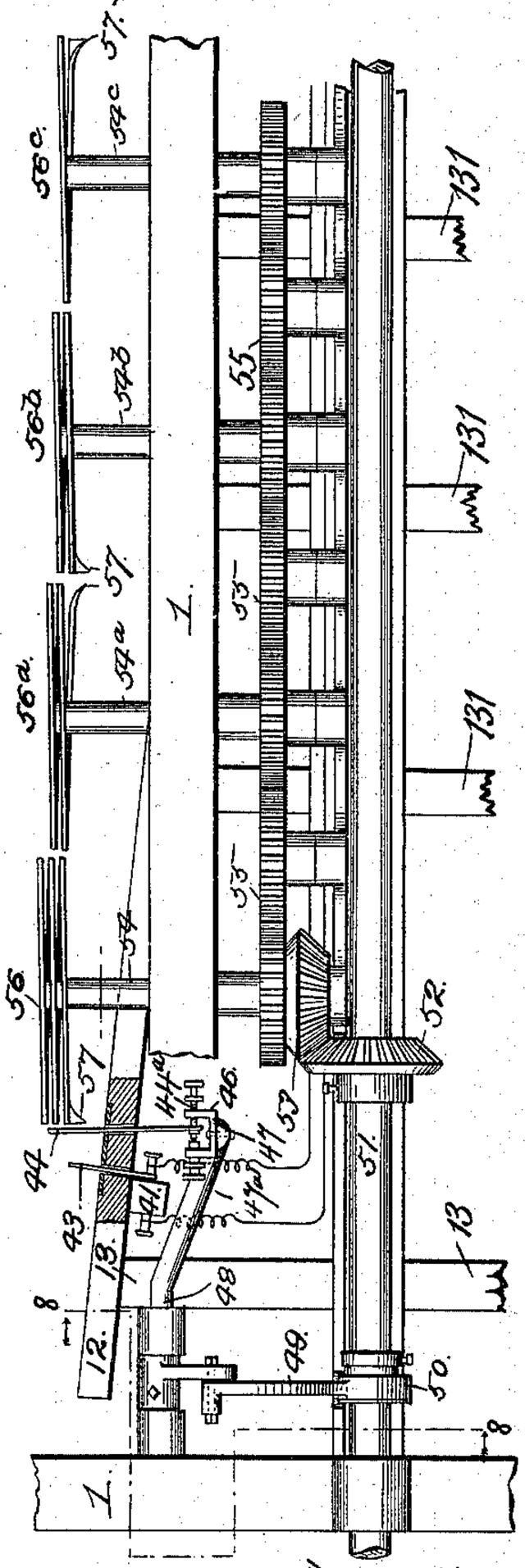


Fig. 7.

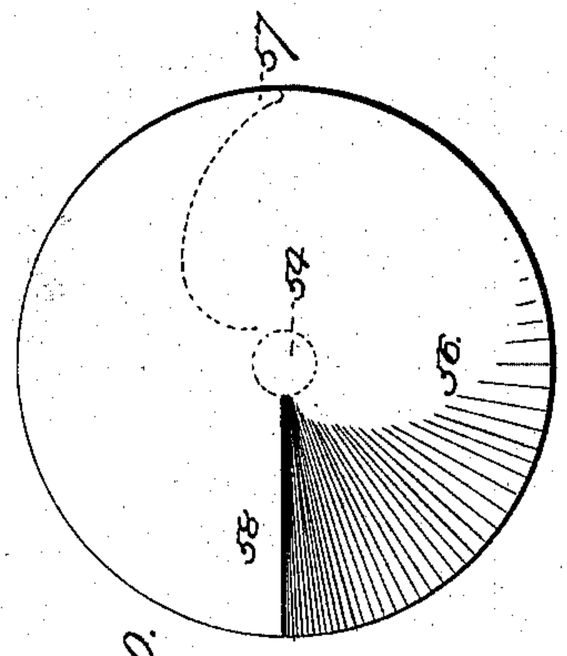
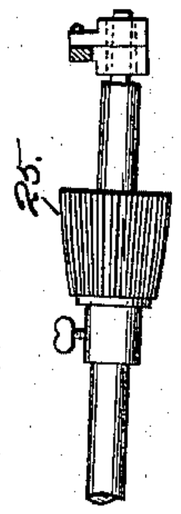


Fig. 10.



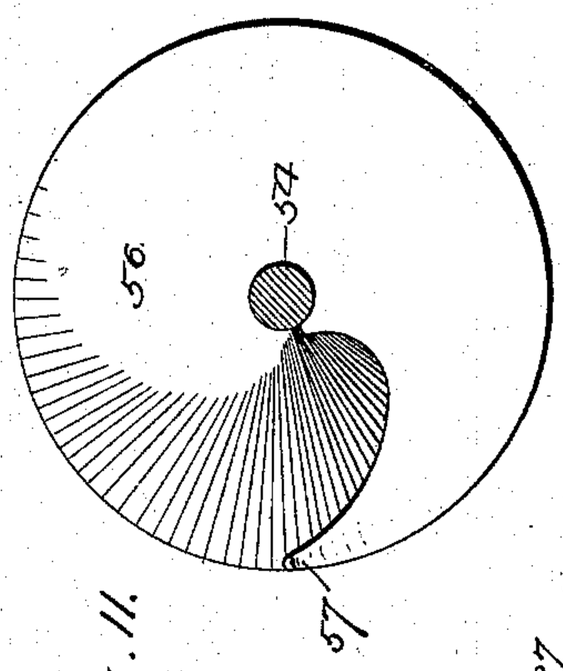


Fig. 11.

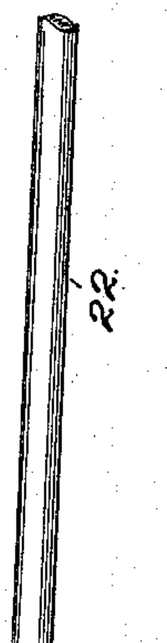


Fig. 12.

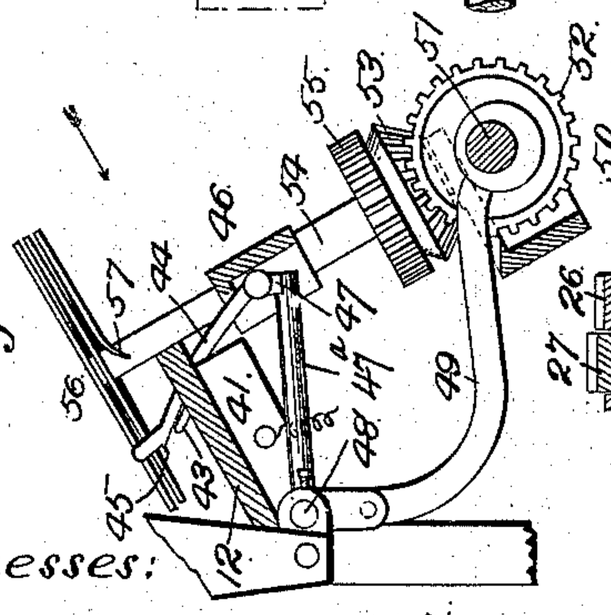


Fig. 8.

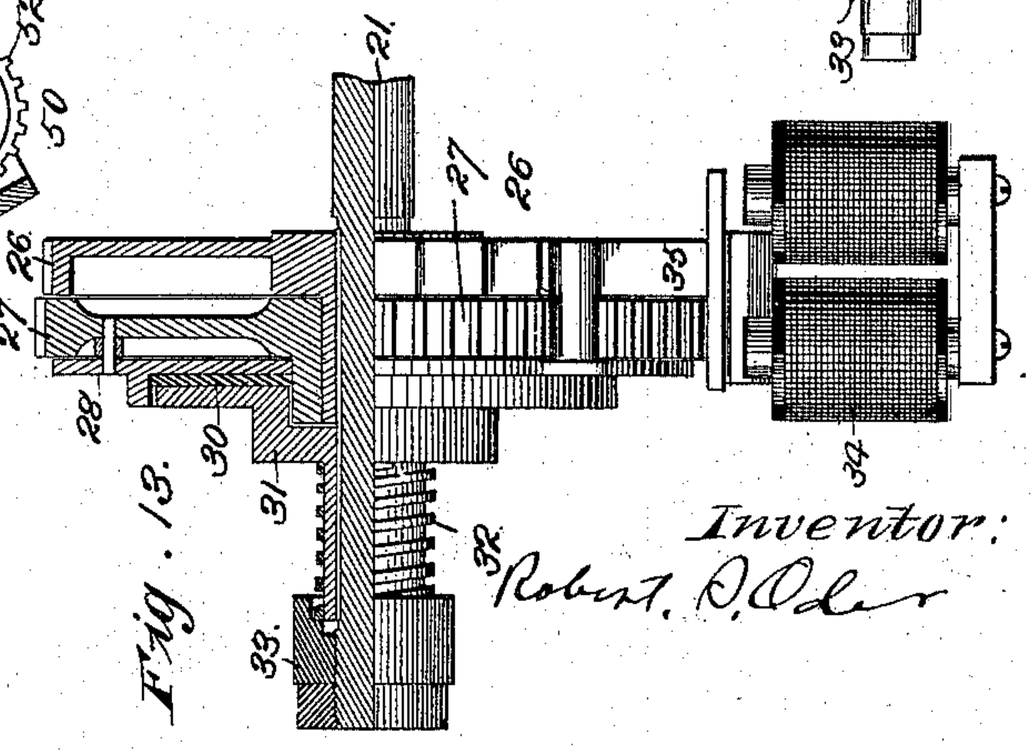


Fig. 13.

Witnesses:

F. G. Fischer

A. W. Parkins

Inventor:

Robert. D. Oder

(No Model.)

6 Sheets—Sheet 6.

R. S. ODER.

PAPER FEEDING MACHINE.

No. 567,995. Patented Sept. 22, 1896.

Fig. 9.

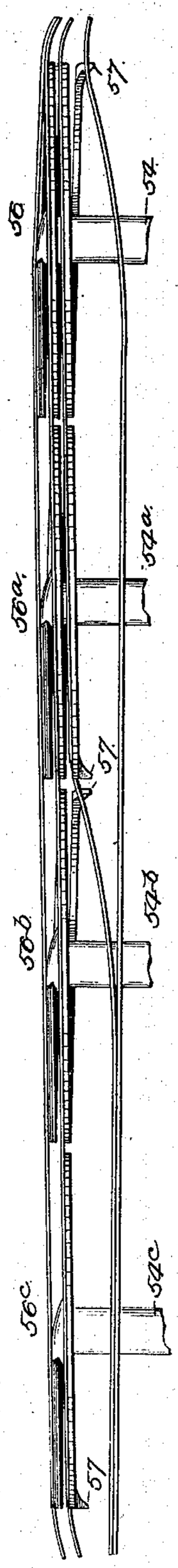


Fig. 15.

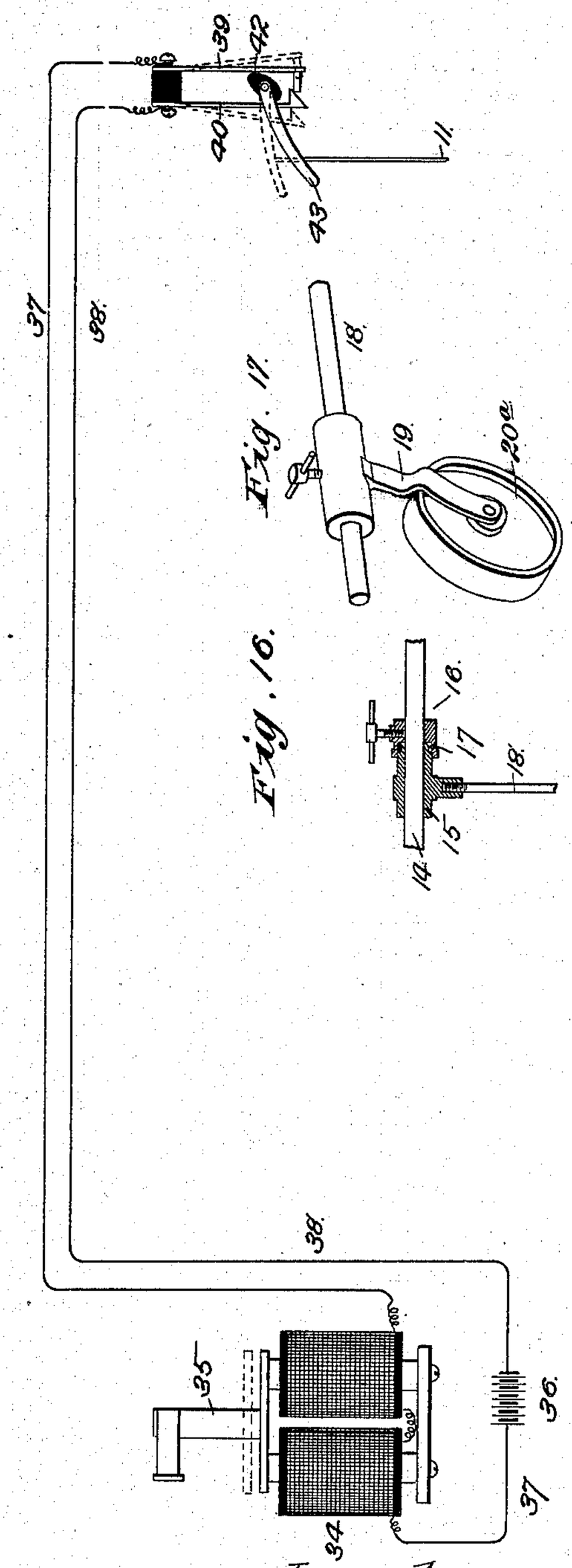


Fig. 17.

Fig. 16.

Witnesses:
F. G. Fischer,
A. M. Parkins.

Inventor:
Robert S. Oder.

UNITED STATES PATENT OFFICE.

ROBERT S. ODER, OF KANSAS CITY, MISSOURI.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 567,995, dated September 22, 1896.

Application filed July 12, 1895. Serial No. 555,744. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. ODER, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Paper-Feeding Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to paper-feeding machines, and my object is to produce a machine of this character which is entirely automatic and at the same time is under perfect control of the attendant, is positive and reliable in feeding or delivering to the customary tapes or conveyers only one sheet at a time, and which automatically adjusts itself to paper of varying thickness or ply.

Other objects of the invention will appear in the following description, and the novel features of construction and arrangement will be pointed out in appended claims.

Referring now to the drawings which accompany this specification and illustrate the invention, Figure 1 is a top plan view of a paper-feeding machine embodying my invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a horizontal section of a part of the machine to illustrate the posture of the papers tacked upon the table. Fig. 4 is a side elevation, enlarged, of a part of the framework to show the gearing at one side. Fig. 5 is a similar view showing the gearing at the opposite side. Fig. 6 is a section on the line 6 6, Fig. 4. Fig. 7 is a rear elevation of the upper part of the machine. Fig. 8 is a section on the line 8 8, Fig. 7. Fig. 9 is a view illustrating the mode of elevating the sheets singly and successively from the stack. Fig. 10 is a top plan view of one of the paper-elevating disks. Fig. 11 is an inverted view of the same. Fig. 12 is a view in section of the framework and in elevation of the knuckle-jointed shaft which carries the paper adjusting and feed wheel and other mechanism. Fig. 13 is a view in plan of an electromagnet and in plan and section of mechanism upon the knuckle-jointed shaft and shows the relation established between them by the armature of said magnet. Fig. 14 is a view showing the connecting mechanism for imparting motion from one screw to another. Fig. 15 is a diagrammatic view of the electrical circuit. Fig. 16 is a sectional view of one of the adjustable sleeves which carry the gravity-block arms. Fig. 17 is a detail perspective view of a modified form of paper holding or staying device.

Referring now to the drawings, 1 designates a supporting-framework of any suitable form which embodies a pair of vertical guideways 2 for the opposite ends of the cross-head. Said cross-head is preferably of skeleton rectangular configuration, as at 3, and has a rearwardly-projecting arm 4. Said arm is provided with a thread-aperture engaged by the vertical screw 5, journaled at its opposite ends in the framework. Vertical screws 6 also engage threaded apertures in the ends of the cross-head, which project into the guideways and are also journaled in the framework. The screw 5 and the screw 6 at the left side of the machine are left-hand screws, and said screw 5 is connected to the right-hand screw 6 by gearing comprising the beveled cog-wheels 7 7, mounted rigidly on said screws, and the engaging cog-wheels 8 upon opposite ends of the oblique shaft 9, journaled in bearings of the framework.

Mounted upon the cross-head is the table 10, upon which is stacked in the requisite quantity the sheets of paper 11. The table at its rear margin for suitable distance is inclined and extends parallel with the hypotenuse of the triangular-shaped deflecting-board 12, secured to incline downwardly and forwardly upon the vertical guide and standard 13 of the framework. A series of uprights 131 are arranged in rear of the upright 13, supported at their upper ends by the cross-piece 46 and at their lower ends by a cross-piece 132, Fig. 2. These uprights serve as guides for the paper when sheets of larger size are stacked on the table.

Devices for staying the paper properly upon the table are as follows: 14 designates a transverse rod secured in the framework, and 15 sliding sleeves thereon, which are embraced by collars 16, secured at required points by set-screws which impinge upon the said rod. The sleeves 15 are rotatably mounted upon the shaft and within the collar by pins which project from the collars and engage annular grooves 17 in said sleeves. Projecting for-

wardly from said sleeves are the rods 18, and depending from sleeves adjustable thereon by set-screws are rods 19, which pivotally carry at their lower ends the gravity-blocks 20. The pivoted blocks may be replaced, if desired, by the rollers 20ª, rotatably carried at the lower ends of the rods 19.

The paper, when first stacked, has its rear margin arranged parallel with and near the rear inclined margin of the table, and it is held with a yielding pressure in this position by the said gravity-blocks, which thus serve as guides for this purpose.

The mechanism for rearranging the paper automatically will now be described.

A transverse shaft comprises the sections 21 and 22, knuckle-jointed together at 23. The section 21 is journaled in one side of the frame and in a bracket 24, projecting inwardly therefrom. The section 22 rotates with the section 21 and also swings in a vertical plane, and adjustably mounted upon its unsupported end is the beveled paper-adjusting and feed-wheel or scraper 25. Upon the outer end of the section 21 is keyed the ratchet-wheel 26, and mounted rotatably upon the hub of the same is the cog-wheel 27, which carries rigidly the disk 28, having at diametrically opposite points cams or shoulders 29, which project beyond the periphery of the cog-wheel for a purpose which will be hereinafter explained. A washer 30 is held into frictional contact with the disk 28 by a friction-clutch consisting of a sliding sleeve 31, keyed upon the shaft, and the spring 32, which bears at its opposite ends against said sliding sleeve and the rigid collar 33, screwed upon the shaft. Mounted also upon the frame is the electromagnet 34 and its armature 35, which is approximately T-shaped, having its head opposed to the poles of the magnet and its stem overhanging the ratchet-wheel 26. Said armature is pivoted in such manner that its gravitational tendency is away from the magnet and toward the ratchet-wheel, which it engages twice in each revolution of the shaft, as hereinafter more particularly referred to. Said magnet is in circuit with a battery 36, located at any convenient point, and the conductors 37 and 38, leading, respectively, from and to the positive and negative poles of said battery, connect with spring contact-plates 39 and 40, mounted upon a dielectric in a box or casing 41, secured to the under side of the deflecting-board. Interposed rotatably between said spring contact-plates in an elliptical wedge 42, of insulating material, and projecting from the same up through an elongated opening or slot of the deflecting-board is an arm 43.

The spring-plates 39 and 40 are so weak that they yield to the slight pressure of a sheet of paper against the arm of the wedge, and move readily out of contact to break the circuit, for a purpose which will hereinafter appear. Contiguous to the arm 43, and also projecting through a slot in said deflecting-board, is a lever 44, pivotally supported upon an adjustable shaft 44ª, supported within a yoke 47, secured to the end of an arm 47ª, extending from a rock-shaft 48, journaled in bearings of the framework and moving with said arm to raise and lower the lever 44. Above the board 12 the lever 44 is formed with a notch or shoulder 45 to engage the sheets of paper, as will be further explained. Said shaft is also provided with a second arm which is pivotally connected by the link 49 with the eccentric 50 upon the shaft 51, which imparts motion through the medium of the bevel-gears 52 and 53 to a shaft 54, and from said shaft through a train of gearing 55 to a series of similar shafts 54ª, 54ᵇ, and 54ᶜ. Said shafts are parallel and project at right angles to but higher than the plane represented by the inclined deflecting-board, and mounted upon their upper ends are the spiral elevating-disks 56 of two and one-half threads or convolutions 56ª of two threads, 56ᵇ, of one and a half threads, and 56ᶜ of one thread, and the lowest or base threads of said disks are in the same horizontal plane and terminate in downwardly-inclined pointed tongues 57. The disks are so disposed that once in each rotation the tongues of each adjacent pair come opposite to each other, one to deliver and the other to receive the sheet of paper in process of elevation, as will be more minutely referred to in the description of operation of the machine. The upper terminals of said disks on their discharge ends are preferably straight, as at 58, and extend radially of the disks' axes. The disks are of such diameter that their peripheries are nearly in contact, and are disposed so that the tongue of disk 56 shall pass close to and lower than the shoulder 45 of lever 44 to receive once in each revolution a sheet of paper elevated by said lever.

In order to feed the paper positively and reliably from the upper sides of the spiral disks to the conveyers, to be presently described, I provide a force-feed mechanism, consisting of friction-disks 59, corresponding in number and disposed tangentially, or substantially so, with orbits described by said disks. Said disks are mounted rotatably in bearings 60, secured on a rock-shaft 61, journaled at its opposite ends in the framework. At one end said shaft has an arm 62, and connecting the same with the bracket 24 is the bolt 63, which is adjusted by the nut 64. A spring 65 spirally encircles said bolt, and bearing at its opposite ends against said bracket and said arm holds the friction-rollers with a yielding pressure against said disks, said pressure being determined and regulated by the proper adjustment of the bolt 63. Extending transversely of and journaled in the framework, above the said spiral disks, is the shaft 66, which derives motion in the direction indicated by arrow, Fig. 2, from the pulley 67, driven by a belt. (Not shown.) Said shaft also is provided with a

roller 68, around which extend the endless tapes or conveyers 69. Rearward of and parallel with said roller is a grooved roller 70, which, together with the similar roller 71, forms guides for the conveyer-cords 72, which may be properly tensioned by pivotally operating the arms 73 and then securing them at the required point by the set-screws 74. Also journaled in the framework parallel with the shaft 66 and at the opposite or lower side of the disks, so that a straight line connecting it with the axis of the shaft 66 would extend at right angles to the inclined plane of the disks, is the shaft 75, and mounted upon the same are the rollers 76, corresponding in number and located in the same vertical plane as the tapes 69. The peripheries of said rollers are slightly above said disks and in close proximity to the roller 68, and extending around the same are the lower tapes or conveyers 77, which also, preferably, are guided by the roller 70 to cause the opposing portions of the conveyers to come snugly together, and are guided upon the roller 71 to be readily and easily tensioned when required. The relative position of the tapes and cords are shown clearly in Fig. 1.

The carrying-tapes 72 are merely auxiliary to the tapes 69 and 77 and serve to give the sheets support at more frequent intervals than would be the case if they were omitted. The tapes 72 are duplicates of the tapes 77, except that the former lead from a roll 71 to the roll 70, while the tapes 77 lead from the roll 71 to the pulleys 76 and thence over the roll 70. The tapes 72 are not carried through the same course as the tapes 77, for the reason that the grooved pulleys 76 occur only between the spiral disks 56^a, 56^b, and 56^c, and it might occur that the tapes 77 would be too far apart to alone give the sheet proper support.

The frame 78, which carries the conveyer mechanism, is pivotally mounted on the shaft 66, so that it may be thrown up out of the way, if required, and to hold it in such position I provide the frame with an arm 79, having a weight 80 at its free end. Shaft 75 is driven from shaft 66 by the intermeshing gears 81 and 82, (see Fig. 5,) and shaft 51 is driven from the same source by the intermeshing gear-wheels 83, 84, and 85 at the opposite side of the machine. Gear-wheel 84 is mounted rotatably on a stud 86 at the free end of an arm 87, pivotally mounted upon the shaft 51. This construction is provided in case a larger or smaller gear should be found desirable in order to change the speed for any purpose. Upon the opposite end of shaft 51 is a gear-pinion 88, which, through the medium of the gear-wheel 89 upon stub-shaft 90, drives continuously the gear-wheel 27 of knuckle-jointed shaft hereinbefore described. Extending transversely of and journaled in the framework is the shaft 91, and mounted rigidly thereon are two gear-wheels 92, meshing with the gear-wheels 93 upon the upper ends of the screws 6. Said shaft at one end is provided with a crank-handle 94, and mounted loosely upon said shaft between said crank and the contiguous wheel 92 is an angle-lever 95, comprising a pendent arm and an upwardly-projecting arm. The upwardly-projecting arm is provided with a shoulder 96, and the pendent arm is pivotally connected to a wrist-pin of the gear-wheel 85 by the pitman 97. Loosely mounted on the shaft 91 at the opposite side of said gear-wheel is an arm 98, and pivotally carried by the same is a gravity-pawl 99, the pivot of said pawl nominally resting in a cavity in the face of the upwardly-projecting arm of the angle-lever 95. At the opposite side of its pivot said arm is provided with a depending apertured lug 100.

A bell-crank lever 101 is pivotally mounted upon the framework and has one arm pivotally connected to the unsupported end of the knuckle-jointed shaft, and has a rod 102 adjustably mounted in the upper end of the other arm. Said rod is provided with a shoulder 103 and with a reduced stem 104, which projects loosely through the apertured lug of the arm 98.

The downward movement of the feed-wheel 25 is limited by a pin 105, projecting from the framework into the path of the bell-crank lever.

Motion is imparted to the different parts of the machine as follows: The rotating belt-pulley 67 imparts motion to the endless tapes or conveyers through the medium of the roller 68 and to the screws 5 and 6 and wheels 83 84 85, pitman 97, angle-lever 95, pawl 99, and gear-wheels 92 and 93, because each time the pitman advances it pivotally operates the angle-lever, which in turn exerts pressure against the pawl 99 and rotates the contiguous gear-wheel 92, and one of said wheels, by way of one of the gear-wheels 93 and its screw 6, imparts motion to the gear-wheels 7 and 8 and the shaft 9. The pawl-carrying lever 98 is moved back by gravity after actuating the bevel-gear 92. The rotation of the pulley in the direction indicated by arrow, Fig. 2, causes the screw-rods to continuously but almost imperceptibly elevate the cross-head and the table. Simultaneously with the operation of the conveyers and the elevation of the table the spiral disks are rotated through the medium of the shaft 51, (upon which the gear-wheel 85 is mounted,) bevel-gears 52 and 53, and the train of gearing 55, and the rock-shaft 48, through the medium of the cam 50 and link 49, raises and lowers the lever 44. The rotation of the disks, of course, through friction causes the operation of the rollers 59 of rock-shaft 61, and motion is imparted to the rollers 70 71 and conveyers 77 through the medium of gear-wheel 82, which meshes with the gear-wheel 81. The knuckle-jointed shaft carrying the feed-wheel 25 is not continuously operated, but is intermittently operated through the

medium of the gear-wheels 88, 89, and 27 and the friction-clutch mechanism hereinafter described, together with the cams or shoulders 29, coöperating with the armature of the electromagnet and the ratchet-wheel 26.

The general operation is as follows: Supposing the paper-sheets are stacked upon the table and the table to be too low for the engagement with the paper of the feed-wheel or scraper 25, the operator, if time is a consideration, grasps and turns the crank-handle in the proper direction to elevate the paper and the feed-wheel or scraper 25 until the shoulder 103 is nearly in contact with the depending lug 100 of the lever 98; or, if time is not a consideration, the table will automatically rise until the said position of the various parts is reached, no paper in the meantime being fed to the conveyers, as will be understood. The automatic operation or rise of the table is very slow, (almost imperceptible,) owing to the fine pitch of the threads of the rotating screws. Immediately the paper has reached the required elevation and is engaged by the gravity-blocks and the rotating bevel feed-wheel said wheel, by friction, causes the stack to assume the position shown in Fig. 3, or in such position, assisted by the stays or holders 20, that the rear edge of each sheet overhangs the corresponding edge of the sheet next below and the topmost sheet is forced edgewise against the lever 43 in parallel relation with the receiving-disks, (being guided by the inclined board 12,) which yields (see dotted lines, Fig. 15) and breaks the electrical circuit. Immediately this takes place the armature, by gravity, engages the ratchet-wheel 26 and stops instantly the rotation of the knuckle-jointed shaft, and consequently the feed-wheel. Simultaneously with the operation of the lever 43 the paper engages the shoulder of the upwardly-moving lever 44 and is raised thereby, and at the same time the tongue 57 of the spiral disk 56 engages under said paper. By the time said disk has described half a revolution the paper is engaged by the tongue of the next disk 56^a. When one revolution of said disk 56 and a half-revolution of the disk 56^a has been completed, the tongue of the third disk 56^b engages under the paper, and when one and a half revolutions of disk 56, one revolution of disk 56^a, and one half-revolution of disk 56^b have been completed the tongue of the fourth and last disk 56^c engages the paper, so that it will be clearly apparent that the disks successively take up each sheet of paper.

With each half-revolution of the disks the circuit is made and broken, broken each time a sheet of paper is forced against the lever 43 and made as said sheet is elevated by the lever 44, said completion of the circuit being instantaneous by reason of the recontact of the springs 39 and 40, which, acting upon the block 42, forces it to its original position to permit said contact to take place, and as said circuit is completed one of the cams or shoulders 29 throws the armature-pawl out of the path of the ratchet-wheel and into the field of the electromagnet, which, being energized, holds it until the circuit is again broken, and thereby permits the spring-actuated clutch, which bears against the disk 28, to transmit motion to the knuckle-jointed shaft. Immediately the circuit is broken by the action of the sheet of paper fed by the rotating shaft the armature-pawl, by gravity, reëngages the ratchet-wheel and stops the rotation of said shaft. Thus it will be understood that as the knuckle-jointed shaft rotates only when the circuit is complete said shaft ceases to operate as the paper is forced by the rotating feed-wheel against lever 43 and resumes its operation immediately the recontact of the plates 39 40 is accomplished, which takes place when the paper is elevated by the lever 44, as heretofore explained.

As each sheet of paper is fed from the stack the table, by the action of the screws 5 and 6 and the other mechanism described, rises automatically a distance corresponding about to the thickness of the sheet, so that the plane of the upper surface of the stack is constantly maintained. The distance could be determined with mathematical accuracy if paper of one thickness were always employed or a different set of screws could be employed with each size of paper. To employ a single set of screws with paper of varying thickness or ply, I employ a regulator mechanism embodying the pawl-carrying arm 98, the bell-crank lever 101, the rod 102, and the feed-wheel 25, governed by the plane of the top of stack. This regulator mechanism accommodates the movement of the table to the pitch of the threads of the screws, or, in other words, prevents the operation of the screws when the top of the stack gets too high, as I will now proceed to explain.

Supposing thin paper is employed with screws having threads comparatively coarse, it is obvious that if the screws were continuously operated the plane of the top of the stack would soon get too high for the paper to feed, because the pawl, actuated by the angle-lever 95, would move the wheel 92 a certain distance with each operation. This is prevented, however, because as the stack rises above the predetermined plane the bell-crank lever is operated and the shoulder 103 strikes the lug 100 and throws the pawl forward, incidentally operating the wheel 92. The pawl-carrying arm when thus operated does not immediately gravitate back to its original position to be again moved forward by the angle-lever 95, constantly rocked by the pitman 97, but remains elevated as long as the top of the stack is too high by the pressure of the shoulder 103 against lug 100, or, in other words, remains inoperative until the surplus leaves above the said plane have been disposed of by the regular action of the feed-wheel 25.

Returning now to the spiral disks it will

be understood that as they continuously rotate the front end of the paper finally emerges from their discharge ends 58 simultaneously, and is grasped frictionally by the rollers 59 and fed conjointly by said rollers and the disks to the conveyers or endless tapes in the usual manner. If it be desired to employ sheets of greater area, the sleeve 15, to the left, is moved farther from the companion sleeve and secured at the required point by the set-screw. Access may be had to the spiral disks and the contiguous mechanism by elevating the pivoted frame 78. Said frame is held in such position, if required, by the weight 80.

While I have described and illustrated a particular form of the machine, it is to be of course understood that changes in the form, proportion, or detail construction of the parts may be made without departing from the essential spirit and scope or sacrificing any of the advantages of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A paper-feeding machine comprising a vertically-movable paper-support, a feed-shaft, means controlled by said shaft for automatically raising said support, and electrical devices for arresting the movement of said shaft, said electrical devices being controlled by the contact therewith of the sheet of paper being fed; substantially as described.

2. In a paper-feeding machine, the combination with a support for the paper, of a feed-shaft, means controlled by said shaft for automatically elevating said support, and electrical devices comprising an electromagnet, an armature, an electric circuit, and a circuit-closer adapted to be operated by the sheet of paper being fed, to intermittently actuate said feed-shaft; substantially as described.

3. In a paper-feeding machine, the combination with a paper-support, and means for elevating the same, of a feed-shaft rotatably secured at one end, and carrying a feed-wheel at its opposite end, and means for controlling the upward movement of the paper-support with relation to the height of the stack of paper thereon, comprising a lever operated by the vertical movement of the feed-shaft; substantially as described.

4. In a paper-feeding machine, the combination with a paper-support and means for elevating the same, of a feed-shaft having both a rotary and a vertical movement, electrical devices for controlling the rotary movement of said shaft, and mechanism operated by the vertical movement of said shaft for interrupting the upward movement of the paper-support; substantially as described.

5. In a paper-feeding machine, the combination with a paper-support, and means for elevating the same, of a jointed feed-shaft rotatably secured at one end, and provided at its opposite end with a feed-wheel, and a connection between the feed-shaft and elevating mechanism whereby the latter is rendered inoperative by the vertical movement of the feed-shaft; substantially as described.

6. A paper-feeding machine comprising a table, screws operatively carrying the same, gear-wheels upon said screws, a shaft having gear-wheels meshing with the gear-wheels on the screws, a pawl-carrying arm, a lever for rocking said arm to elevate the table, a rotary feed-shaft adapted to be moved vertically and mechanism independent of said rocking lever and controlled by said feed-shaft for raising the pawl out of operative position; substantially as set forth.

7. A paper-feeding machine, comprising a table, screws operatively carrying the same, gear-wheels upon said screws, a shaft, gear-wheels thereon which mesh with the first-named gear-wheels, a pawl-carrying arm, a lever, means for rocking said lever and thereby said pawl-carrying arm, a paper-feeding shaft having vertical motion, and connections between said shaft and said pawl-carrying arm whereby upward movement of the former imparts movement to the latter; substantially as and for the purpose set forth.

8. A paper-feeding machine, comprising a table, screws operatively carrying the same, gear-wheels upon said screws, a shaft, gear-wheels thereon, which mesh with the first-named gear-wheels, a pawl-carrying arm, having an apertured lug, a lever, means for rocking the same and thereby the pawl-carrying arm, a shaft having vertical motion, a lever connected thereto, and a rod carried by said lever, having a shoulder and projecting through said apertured lug; substantially as set forth.

9. In a paper-feeding machine, the combination with a shaft, and a feed-wheel thereon, of a gear-wheel rotating around the shaft, a clutch thereon engaging the said gear-wheel, an electrical circuit, and means whereby when the electrical circuit is broken, the rotation of the shaft ceases; substantially as set forth.

10. In a paper-feeding machine, the combination with a shaft, and a paper-feeding wheel, a ratchet-wheel and a clutch mounted thereon, of a rotating gear-wheel mounted loosely upon the hub of the ratchet-wheel and in engagement with said clutch, a pawl in engagement with said ratchet-wheel, an electrical circuit, and means to make and break the circuit; substantially as and for the purpose set forth.

11. In a paper-feeding machine, the combination with a shaft and a feed-wheel, a ratchet-wheel and a clutch thereon, of a rotating gear-wheel mounted loosely upon the hub of the ratchet-wheel, an electrical circuit including an electromagnet, and a pivoted armature, and means to break said circuit to permit the armature to engage the ratchet-wheel; substantially as set forth.

12. In a paper-feeding machine, the combination with a shaft, and a feeding-wheel, a ratchet-wheel and a clutch thereon, of a ro-

tating gear-wheel loosely mounted upon the hub of the ratchet-wheel, an electrical circuit, including a pair of spring contact-terminals, an electromagnet, and a pivoted armature, and means to force said spring-terminals apart and thereby break the circuit and interrupt the rotation of the shaft; substantially as set forth.

13. In a paper-feeding machine, the combination with a shaft, and a feed-wheel, a ratchet-wheel and a clutch thereon, of a gear-wheel rotating upon the hub of the ratchet-wheel, an electrical circuit, including a pair of spring contact-terminals, an electromagnet, and a pivoted armature, and an arm having an elliptical wedge of insulating material, which is operated in one direction by each sheet of paper to force the terminals apart and break the circuit, and in the opposite direction by said terminals to complete the circuit; substantially as set forth.

14. In a paper-feeding machine, the combination with a shaft, a feed-wheel, and ratchet-wheel, mounted rigidly thereon, and a spring-actuated clutch mounted slidingly thereon and rotating therewith, of a rotating gear-wheel, mounted loosely upon the hub of the ratchet-wheel, and an electrically-controlled armature-pawl, which, when the circuit is broken, engages the ratchet-wheel and stops the rotation of the shaft and is moved out of the path of the ratchet-wheel when the circuit is completed; substantially as set forth.

15. In a paper-feeding machine, the combination of a rotating feed-wheel, a lift-lever, and a spiral disk; substantially as set forth.

16. In a paper-feeding machine, the combination with a feed-wheel, a spiral disk and a lift-lever, of means for interrupting the operation of the feed-wheel as the lift-lever rises; substantially as set forth.

17. In a paper-feeding machine, the combination with an intermittingly-operating feed-wheel, of a lift-lever, and a rotating spiral disk; substantially as set forth.

18. In a paper-feeding machine, the combination with a rotating feed-wheel, of a lift-lever, and a rotating spiral disk; substantially as set forth.

19. In a paper-feeding machine, the combination, with an intermittently-operating feed-wheel, of a lift-lever, and a rotating spiral disk, provided with a tongue; all arranged substantially as shown and described.

20. In a paper-feeding machine, the combination with an intermittently-operating feed-wheel, and a rotating spiral disk having a tongue, of a lift-lever, and a rock-shaft for elevating the same at predetermined intervals of time; substantially as set forth.

21. In a paper-feeding machine, the combination with a rotating feed-wheel, and a rotating spiral disk having a tongue, of a rotating shaft geared to and driving said spiral disk, an eccentric thereon, a rock-shaft operatingly linked to said eccentric, and a lift-lever rising at intervals by the action of said rock-shaft; substantially as set forth.

22. In a paper-feeding machine, a series of rotating spiral disks having depending tongues, the first disk having one-half more revolutions than the second; the second having one-half more revolutions than the third, and so on, through the entire series; substantially as and for the purpose set forth.

23. In a paper-feeding machine, the combination with a rotating feed-wheel, and a series of rotating spiral disks having downwardly-curved tongues, each preceding disk having one-half more revolutions than the succeeding one, of a lift-lever, for elevating each sheet of paper successively into the path of the first or contiguous disk; substantially as set forth.

24. In a paper-feeding machine, the combination, with a rotating feed-wheel, a series of rotating spiral disks, and a lift-lever, of friction-wheels operating in conjunction with the said disks; substantially as and for the purpose set forth.

25. In a paper-feeding machine the combination with an upwardly-moving table for paper, a feed-wheel having vertical and intermittent rotatable movement, and a series of paper-elevating disks, of a lift-lever for placing the paper sheets successively into the path of the contiguous spiral disk, and friction-wheels held yieldingly in engagement with the spiral disk; substantially as set forth.

26. In a paper-feeding machine, the combination with an upwardly-moving table for paper, a feed-wheel having vertical and intermittent rotatable movement, and a series of paper-elevating disks, of a lift-lever, friction-wheels held with a yielding pressure against the disks, and endless conveyers arranged to receive the paper as it is fed from said disks and friction-wheels; substantially as set forth.

27. In a paper-feeding machine, the combination with a series of rotating disks, of a rock-shaft, friction-wheels corresponding in number to and engaging with said disks, and supported by said rock-shaft independently of each other, a spring exerting its pressure against said shaft to hold the friction-wheels yieldingly upon the disks, and means to tension said spring; substantially as set forth.

28. In a paper-feeding machine, the combination with a table, to support the paper, of gravity-blocks resting upon said paper, a series of disks for successively engaging said sheets, and means for moving the sheets into position to be engaged by the disks; substantially as set forth.

29. In a paper-feeding machine, the combination with a shaft a feed-wheel, a ratchet-wheel and a clutch thereon, a gear-wheel rotating around said shaft and engaged by said clutch, and a cam or shoulder rotating with the gear-wheel, of a pawl engaging the

ratchet-wheel and at intervals moved out of engagement with the same by the said cam or shoulder, substantially as and for the purpose set forth.

30. In a paper-feeding machine, the combination with a shaft, a feed-wheel, a ratchet-wheel, and a clutch thereon, a gear-wheel rotating around the shaft and cams or shoulders rotatable with said gear-wheel, of an electrical circuit, including an electromagnet, and its armature, which, when the circuit is broken, stops the rotation of the ratchet-wheel and consequently of the shaft, and which, as the circuit is completed is forced out of engagement with the ratchet-wheel by one of said cams or shoulders into the field of the magnet; substantially as set forth.

31. In a paper-feeding machine, the combination with a vertically-adjustable table to support the paper, and a feed-wheel for rearranging and removing the paper, of rotatable and laterally-adjustable sleeves above the paper, rods carried by said sleeves, gravity-blocks supported from said rods and resting upon said paper, and means for adjusting said blocks to maintain the paper in proper relation to the receiving mechanism; substantially as set forth.

32. In a paper-sheet-feeding machine, the combination of a table to hold the pile of sheets, said table having guides to position the pile diagonally with respect to the delivery edge of the table, and a feed-wheel or scraper located and arranged to act on the upper side of said pile at one edge only of the sheets; substantially as set forth.

33. In a paper-sheet-feeding machine, the combination of a table to hold a pile of sheets, a sheet-receiving mechanism to take the sheets from the table, guides on the table to position the pile diagonally with respect to the line of the receiving mechanism, and a feed-wheel or scraper located and arranged to act on the upper side of the pile and at one edge only of the sheets, whereby the upper sheets of the pile are forwarded to and turned into position parallel with the receiving mechanism; substantially as set forth.

34. In a paper-sheet-feeding machine, the combination of a support to hold the pile of sheets, a spiral disk located at the delivery edge of said support and arranged to revolve on an axis inclined to the surface of the support, and mechanism for feeding the sheets forward to the disk; substantially as set forth.

35. In a paper-sheet-feeding machine, the combination of a support to hold a pile of sheets, a series of spiral disks located at the delivery edge of the support, and adapted to successively engage the sheet being fed, mechanism for feeding the sheets from the support to the disks, and mechanism for rotating the disks so as to elevate said sheets; substantially as described.

36. In a paper-sheet-feeding machine, the combination of a support to hold a pile of sheets, a sheet-delivering mechanism, a series of spiral disks located between the delivery edge of the support and the delivering mechanism, said disks being arranged to revolve so as to successively engage and take the sheets from the support and forward them to the delivering mechanism, and means for feeding the sheets from the support to the disks; substantially as described.

37. In a paper-sheet-feeding machine, the combination of a support to hold a pile of sheets, and a series of spiral disks located at the delivery edge of said support, said disks being rotated to elevate the top sheets of the pile, and being constructed and adapted to act in succession upon said sheets, whereby the sheets are first lifted at one end and subsequently raised at points along their length to the opposite end; substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT S. ODER.

Witnesses:
J. A. GOLDSBOROUGH,
H. M. STERLING.