No. 888,028. PATENTED MAY 19, 1908.

L. E. MORRISON.

SHEET FEEDING MECHANISM.

APPLICATION FILED JULY 5, 1906.

3 SHEETS—SHEET 1.

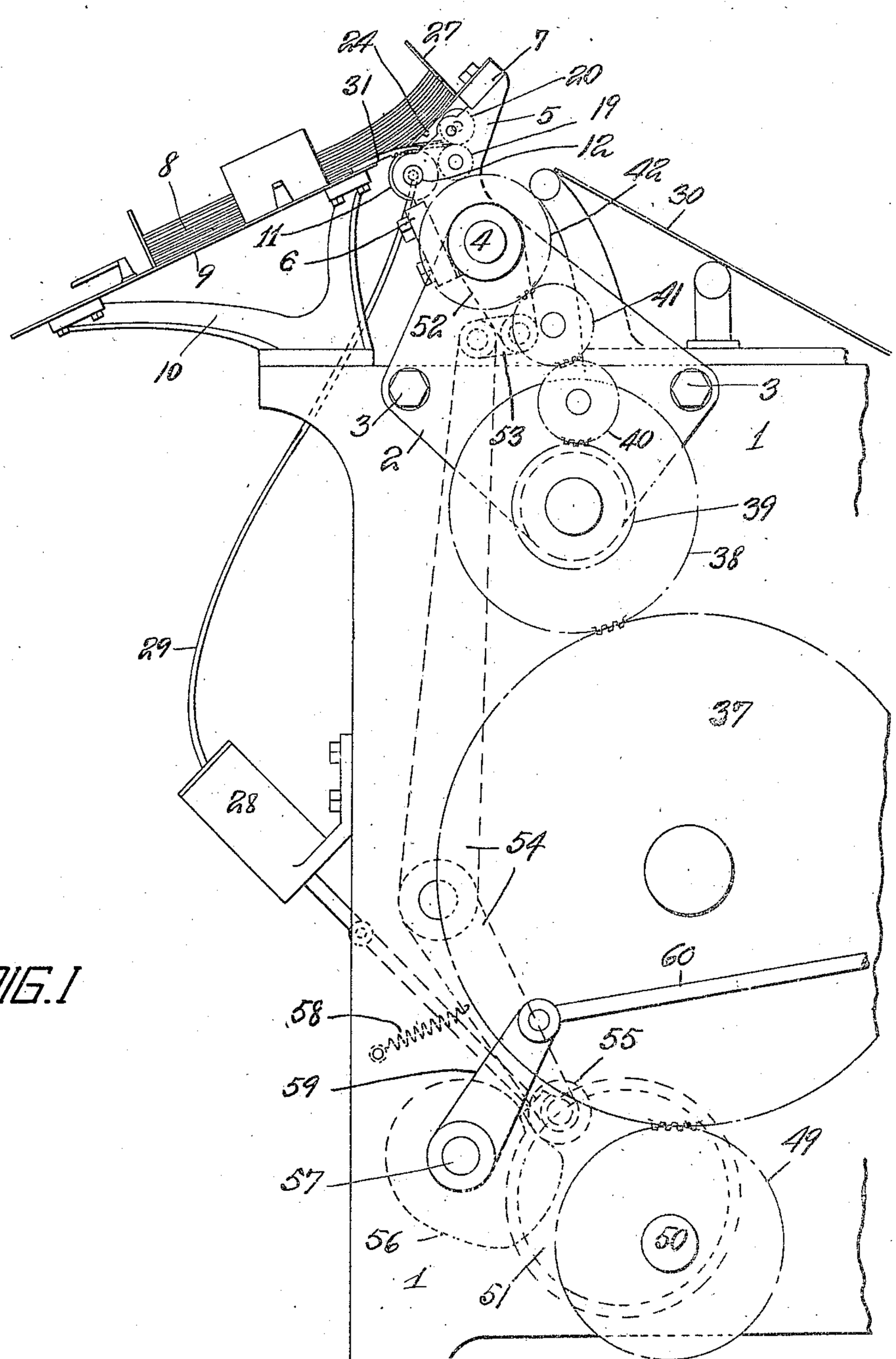

FIG. 1

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3 SHEETS—SHEET 2.

FIG. 2

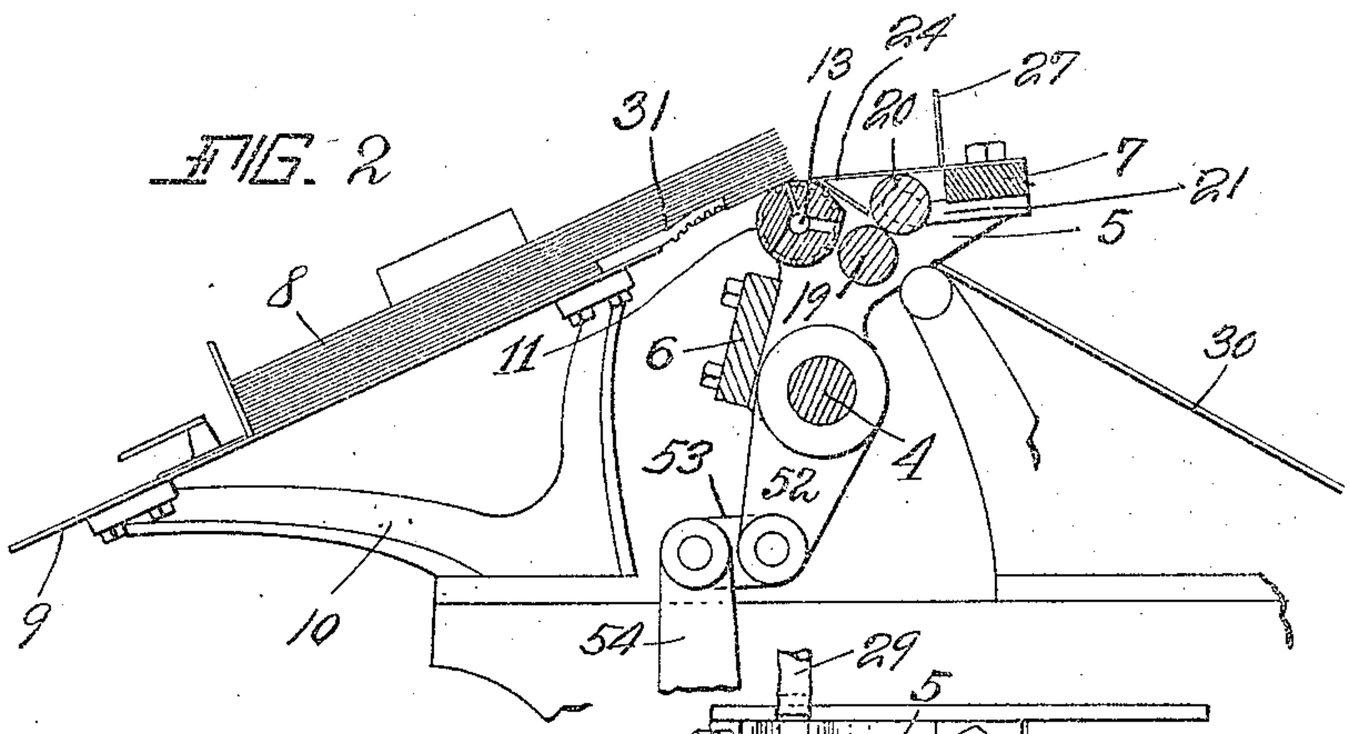
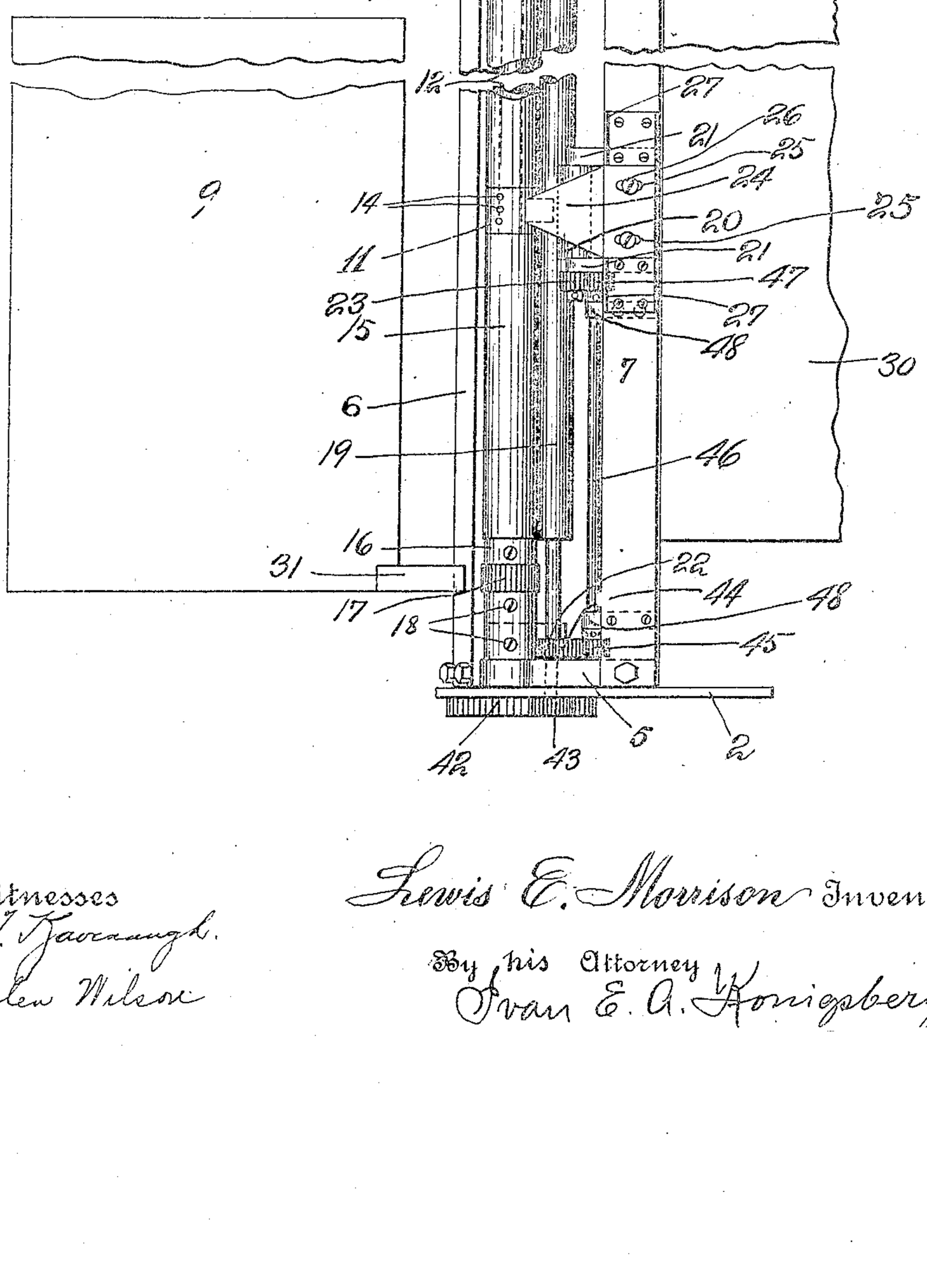


FIG. 3



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3 SHEETS—SHEET 3.

FIG. 4

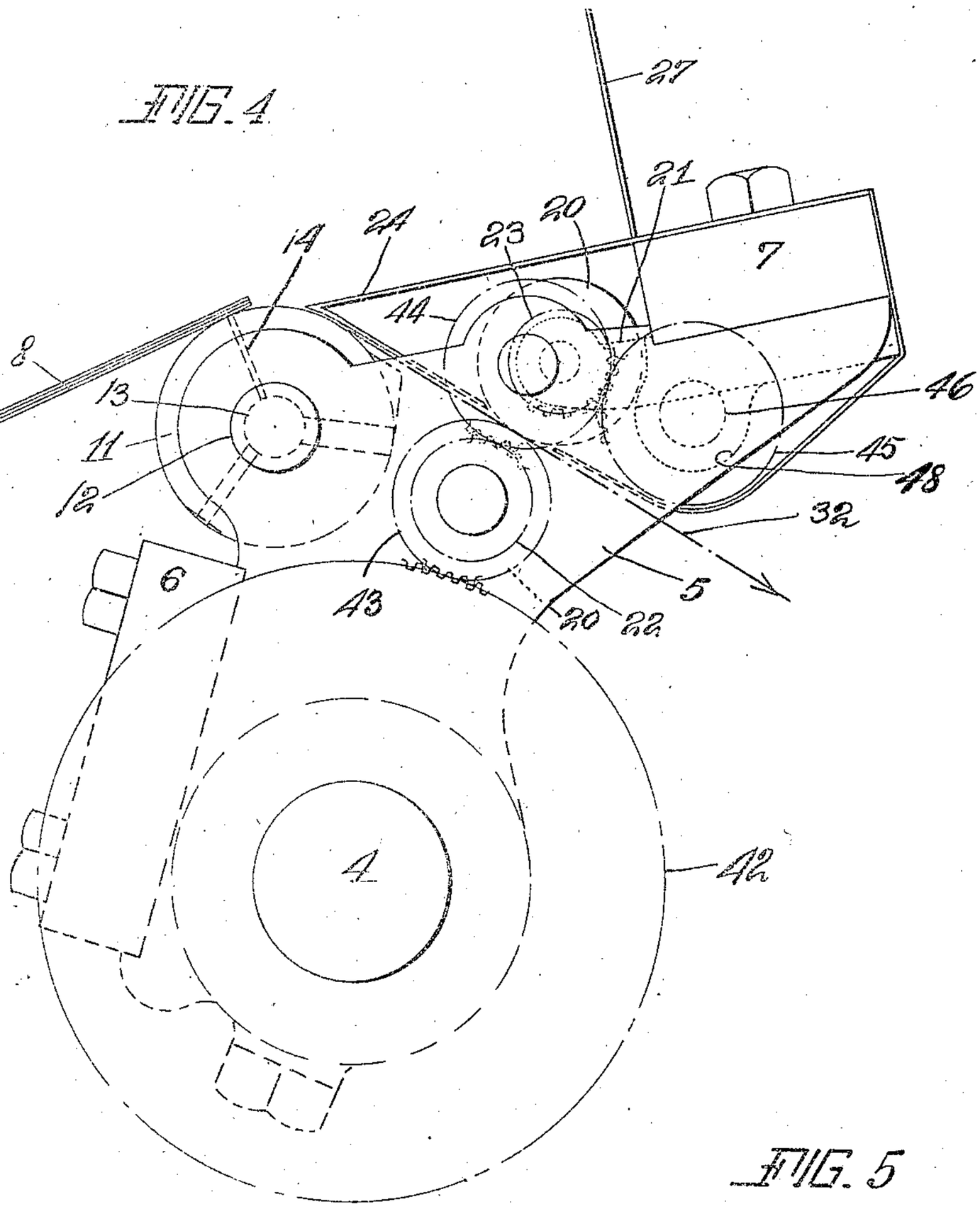
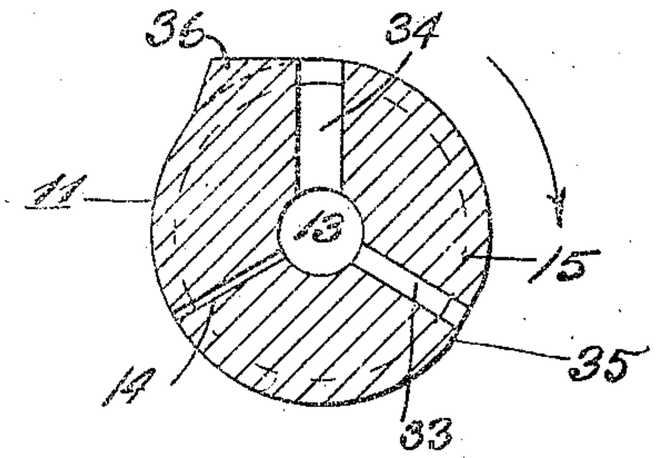


FIG. 5



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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING MECHANISM.

No. 888,023. Specification of Letters Patent. Patented May 19, 1908.

Application filed July 5, 1906. Serial No. 324,751.

To all whom it may concern:

Be it known that I, LEWIS E. MORRISON, a citizen of the United States of America, and a resident of the city of Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Sheet-Feeding Mechanisms, of which the following is a specification.

The present invention relates to sheet feeding mechanisms for feeding sheets of paper to printing or other machines, and its object is to provide an automatic feeding mechanism of improved and simple construction and operation and easily adapted to be attached to different types of machines without causing great changes to be made in their construction.

Broadly speaking my invention comprises a stationary table adapted to receive the sheets and a separating mechanism including a suction roller for separating and feeding the sheet to the particular machine to which the feed is attached, and means for the operation of the mechanism.

Hence the invention comprises such elements of construction and arrangement of parts as will be set forth in the following description and pointed out in the claims, while referring to the accompanying drawings.

I desire it to be understood, however, that I consider myself entitled to such changes within the limit and scope of the claims as will readily suggest themselves to those skilled in the art.

In the said drawings Figure 1 is a side view showing my invention attached to a machine, of which only so much is shown as is necessary to the understanding of the operation of my invention. Fig. 2 is a sectional view of the feeding mechanism. Fig. 3 is a plan view of Fig. 2. Fig. 4 is an enlarged detail view of the gearing and Fig. 5 is a detail view of my improved suction roller.

Referring more particularly to Fig. 1, the numeral 1 indicates the framework of a machine to which my improved feeding mechanism is attached. In the present instance this machine is assumed to be an automatic platen printing machine, but as will be readily understood later, my feeding mechanism is adapted to be attached to any kind of a machine, which requires an efficient and automatic feed. On either side of the machine I mount a bracket 2 fastened by bolts 3. The said bracket carries a train of gears, which will be described later, and the main rock-shaft 4, which carries the separating and feeding mechanism proper. Upon the said shaft 4 is mounted two brackets 5, one at either end which are joined by the girts or bars 6 and 7, and thus forms a framework for the separating and feeding elements.

8 indicates a pile of sheets to be separated and fed, and 9 is the inclined stationary table or support for the said sheets. This table is provided with the usual guides and is fastened to the machine by any suitable and convenient means such as brackets 10.

In the rear of and adjacent to the table and journaled in the brackets 5 is mounted the suction roller 11. This suction roller comprises a central shaft 12 provided with a longitudinal air passage 13, which extends from the one end and to the enlarged middle portion of the roller, where other radial air passages 14 lead to the surface of the roller. Two sleeves 15 envelop the shaft 12 on either side of the enlarged portion, and the surfaces of the said sleeves are flush with the surfaces of the central portion. The longitudinal air passage is connected to an air pump 28 by means of the tube 29. For this and the following see Fig. 3. The sleeves are free to rotate on the shaft and are held in place by means of collars 16. A gear 17 is carried fast on the shaft 12 by means of set screws 18 and coacting with the rack 31 on the table 9.

19 and 20 indicate respectively two guide or feed rollers. 19 is journaled in the brackets 5, while 20 which for practical purposes is a much shorter roller is journaled in two bearings 21 carried by the bar 7. Gears as 22 and 23 are carried by the shafts of these two rollers 19 and 20 respectively. The bar 7 is further provided with the separating lip or shield 24, adjustably mounted by means of slots 25 and screws 26, and on either side of 24 is mounted at an angle thereto two stops 27. 30 indicates a table or support on the machine to which the sheets are fed, to be gripped by any suitable mechanism. In the present instance 30 would indicate the registering table on the press.

As already stated the above described elements form the separating and feeding mechanism proper, and I will now describe their functions and operation, and later point out the mechanical actuating devices.

The normal position of the above parts is shown in Figs. 2, 3 and 4, from which it will

be seen that the leading edges of the sheets rest on the suction roller 11 and cover the radial air passages.

As the machine commences its operation, the air in the suction roller is exhausted with the result that the leading edge of the lowermost sheet adheres firmly to the said roller; at the same time the rockshaft 4 is rocked forwardly, the gear 17 engages the rack 31 and the lowermost sheet is turned in a rearward and downward direction and fed to the guide rolls 19 and 20, the air being again forced into the suction roller. During the forward movement of the rockshaft the lip 24 enters the pile of sheets above the lowermost one and the said sheets ride up on the said lip, and abut against the stops 27, thus entirely separating the lowermost sheet from the rest. This is illustrated clearly in Fig. 1. The guide rolls having gripped the sheet, the rockshaft 4 is rocked rearwardly and the sheet is fed between the said rolls and onto whatever mechanism is provided on the machine for the gripping or further handling of the sheet.

The line 32, Fig. 4 indicates the direction of travel of the sheet. This oscillating motion of the separating members is very rapid, and the guide rolls 19 and 20 rotate continuously as will be described later.

It will be understood that the loose sleeves on the suction roller act as independent guide or feed rolls during the passage of the sheet over them.

After the above described operation the sheets again settle on the suction roller and the operation is repeated.

It will be seen that by reason of the stationary table 9, the bottom sheet is always in the same position, consequently my feeding mechanism will hardly ever "miss" a sheet. I am also able to build this table much lighter and at less cost than an oscillating table, which is subject to much jar and strain.

In order to allow for different air pressure on the bottom sheet, I provide my suction roller with a plurality of radial openings of different sizes as seen in Fig. 5, in which is illustrated a suction roller having graded radial air passages 14, 33 and 34. The openings 34 are generally cut in the form of a slot.

In order to get a good "grip" on the paper, the surface of the roller is flattened as at 35, while for heavier paper or thin cardboard I find it advantageous to provide a projection or cam 36 extending in a direction opposite to the direction of rotation of the suction roller and the surface of which is substantially tangent to the roller at the end of the adjacent air passage or passages 34. It will be seen from Fig. 5 that the surface of this cam 36 forms a ledge upon which the front portion of the sheet rests; thus, when the suction is applied and the roller commences to rotate, the sheet will be bent at a point at or beyond the rear edge of said cam, or in other words, the bending of the sheet takes place further back, than when the cam is not provided. And when a thick sheet is handled it is important and practical to have as much surface of the sheet as possible to rest directly on the roller, in order to prevent slipping or missing, while a thin sheet naturally curves around the roller. To sum up, the bending of the paper takes place further back from the points at which the suction is applied, thus making it possible to feed a much heavier paper with the same power of suction than would be possible if the cam was not provided. When one set of openings are used, the others are plugged by any suitable means, and the circumferential adjustment of the openings is done by simply loosening the set screws 18 which fasten the gear 17 to the roller, then the particular openings wanted are turned upward and the screws again tightened.

The means of actuating my feeding mechanism may be any suitable and well known mechanical elements, and will of course depend entirely upon the kind of machine to which my feed is attached. In the present instance, as already stated, I mount two brackets 2 one on either side of the machine, and one of the said brackets carries a train of gears through which power is transmitted from the main driving gear 37 to the different rollers. The train of gears embrace in the present instance (see Fig. 1) the gears 38, 39, 40, 41 and 42, the latter of which happens to be concentric with the rockshaft 4, but is not connected thereto.

Referring now to Figs. 3 and 4 it will be seen that outside of the bracket 5 is provided a gear 43 on the shaft of the guide roll 19, said gear meshing with gear 42, thus driving the roll 19; on the same shaft, but inside the bracket is the above mentioned gear 22 which meshes with the idler gear 44 which meshes with gear 45 on one end of the auxillary shaft 46 which carries at its other inner end a gear 47, which meshes with the aforesaid gear 23 thus driving the guide roll 20. The auxiliary shaft is carried by brackets 48 mounted on bar 7.

Meshing with the driving gear 37 is a gear 49, upon whose shaft 50 is mounted the eccentric 51 by means of which the pump 28 is operated.

The means for oscillating the shaft 4 comprises the arm 52, fast on said shaft, link 53 connecting it to bell crank 54 carrying the cam roll 55 coacting with the cam 56 on rockshaft 57. The spring 58 keeps the roll on the cam. The shaft 57 may be rocked by any suitable means, such as arm 59 and rod 60 which in the present instance is thought to be connected to the rocking arm of the press

which carries the form and the inking device. This part is not shown, as it is well known in the art, and it is obvious that shaft 57 may be rocked by any other well know mechanical means and the present illustration is only an example of how this may be done.

It is of course hardly necessary to state that my feeding mechanism oscillates once to every revolution (operation) of the machine to which it is attached.

It is thought that the above clearly describes and illustrates my invention in its preferred form. As stated, the actuating means are merely shown as an example, and might with another type of machine be entirely different, but such changes will readily suggest themselves to any skilled mechanic. I claim, however, all such changes and variations within the spirit of the invention to which the scope of the claims entitle me.

What I claim is:

1. In an automatic sheet separating device a rotatable suction roller having radial air passages of different sizes, a projection on the surface of said roller adjacent the largest size radial air passage, said projection extending in a direction opposite to the direction of rotation of the said roller.

2. In an automatic sheet separating device a rotatable suction roller having radial air passages of different sizes, a projection adapted to aid in separating the lowermost sheet, the surface of said projection being tangent to the roller at the end of the axis of the adjacent air passage and extending in a direction opposite to the direction of rotation of said roller.

3. In an automatic sheet feeding device the combination with a stationary table adapted to receive a pile of sheets, a separating and feeding mechanism comprising a suction roller adapted to separate the lowermost sheet from the other sheets, radial air passages of different sizes in the said roller, a plurality of loose sleeves on the shaft of the said roller, a plurality of guide or feed rollers, means for rotating the said feed rollers constantly in one direction, the said feed rollers being adapted to receive the sheet from the said suction roller, a sheet lifting device adapted to separate the said pile of sheets from the lowermost one, stops adapted to abut the leading edges of the thus separated sheets, means for oscillating the said separating mechanism and means carried by the said table for oscillating the said suction roller independently from the said mechanism.

4. In an automatic sheet separating device a rotatable suction roller, having radial air passages of different sizes in said roller, a cam on said roller, said cam being for the purpose as set forth and located adjacent the largest size passage, the surface of said cam extending in a direction opposite to the direction of rotation of said roller and substantially tangent to the roller at the end of the radial axis of the adjacent passage.

5. In an automatic sheet separating device a rotatable suction roller, having radial air passages of different sizes in said roller, a cam on the surface of said roller adjacent the largest size radial air passage, said cam extending in a direction opposite to the direction of rotation of said roller, and means whereby any of the air passages may be brought into working position.

6. In an automatic sheet separating and feeding device the combination with a stationary table adapted to receive a pile of sheets, an oscillating separating and feeding mechanism comprising a suction roller, having radial air passages of different sizes in said roller, a cam carried by said roller, guide or feed rollers adapted to receive the sheet from said suction roller, a sheet lifting device, means for oscillating said mechanism and means for oscillating the said suction roller independently from the said mechanism.

Signed at New York this 2d day of July 1906.

LEWIS E. MORRISON.

Witnesses:
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