E. F. HULBERT.

SHEET FEEDING MACHINE.

APPLICATION FILED DEC. 27, 1917.

1,349,133.

Patented Aug. 10, 1920.

2 SHEETS-SHEET 1.

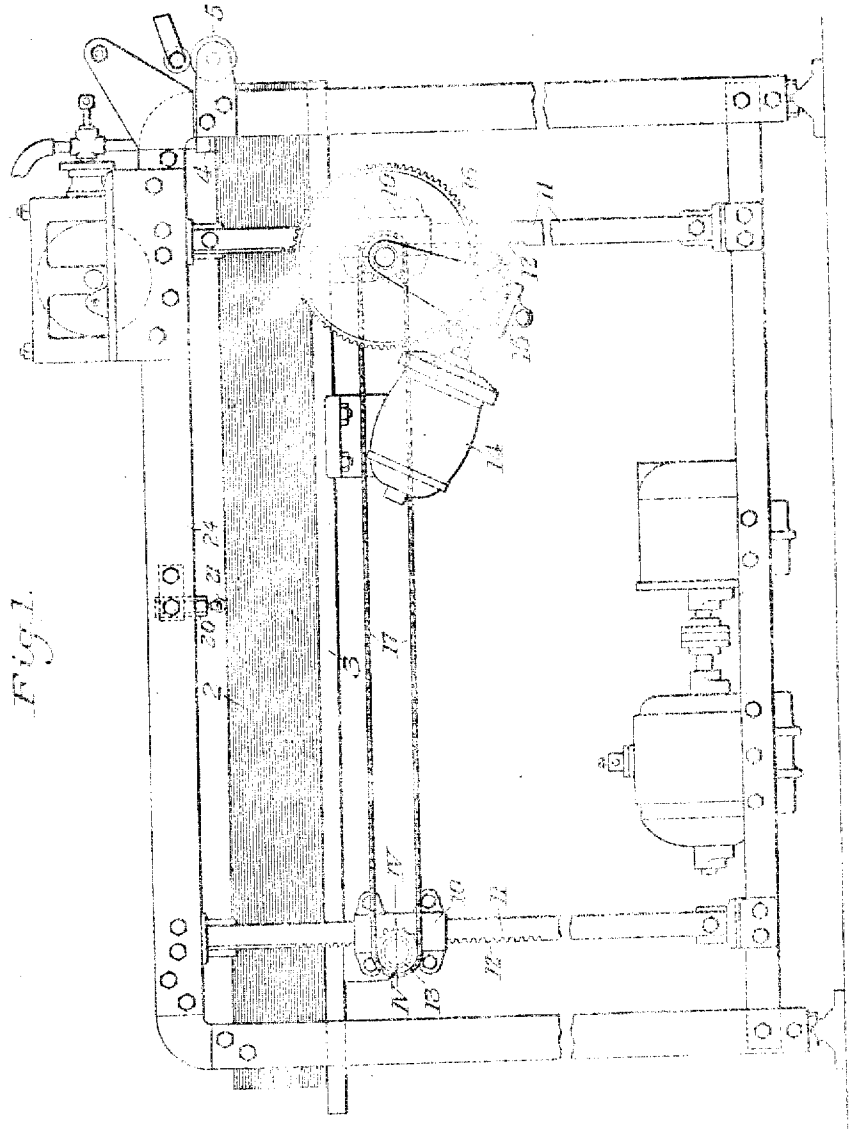


Fig. 1.

WITNESSES

R. A. Baldwin

F. W. Windridge

INVENTOR

E. F. Hulbert

by Richard, Byron, Rauber & Co.

Atty.

E. F. HULBERT.

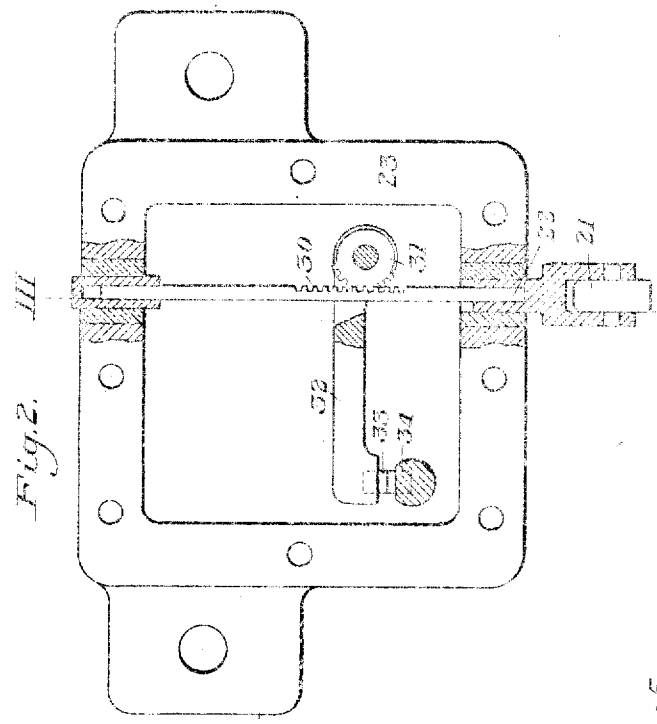
SHEET FEEDING MACHINE.

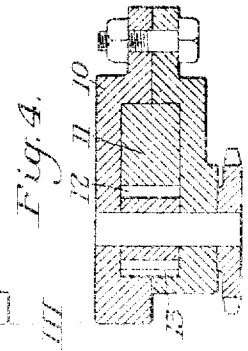
APPLICATION FILED DEC. 27, 1917.

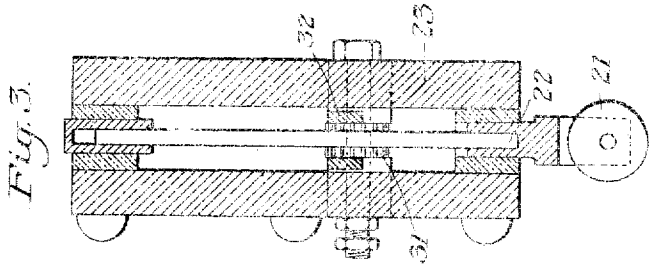
1,349,133.

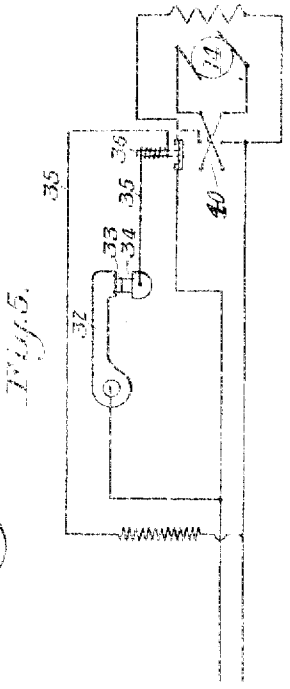
Patented Aug. 10, 1920.

2 SHEETS—SHEET 2.









WITNESSES

R. H. Balderson

F. W. Hindridge

INVENTOR

E. F. Hulbert

by Bakewell, Byrnes, Lemmon & Atty's.

UNITED STATES PATENT OFFICE.

EDWIN F. HULBERT, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO NATIONAL PAPER CAN COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF DELAWARE.

SHEET-FEEDING MACHINE.

1,349,133. Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed December 27, 1917. Serial No. 209,187.

To all whom it may concern:

Be it known that I, EDWIN F. HULBERT, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Sheet-Feeding Machines, of which the following is a full, clear, and exact description of same, reference being had to the accompanying drawings, forming part of this specification, in which:—

Figure 1 is a side elevation of the sheet feeding machine embodying the present invention.

Fig. 2 is a detailed view of the feeler and contact box.

Fig. 3 is a section on the line III—III of Fig. 2.

Fig. 4 is a horizontal section along the line IV—IV of Fig. 1, and

Fig. 5 is a diagram of the electric circuits.

The present invention relates to machines for feeding sheets of paper or the like and more particularly to machines for feeding sheets of paper singly from a pile or stack of sheets. In machines of this type the top sheet is separated from the pile by a suitable transferring mechanism and transferred to the feeding rolls of the machine which has to operate on the sheets. It is desirable to have the top of the pile of sheets maintained at a substantially constant level with relation to the mechanism which transfers the top sheet from the pile. The present invention relates particularly to a simple but accurate device for so maintaining the top of the piles of sheets at a substantially constant level.

Referring to the drawing, a pile of sheets of paper or the like 2 is carried on a vertically movable table 3. A vacuum foot or suction device 4 is arranged to be lowered against the top of the pile of sheets and to lift the top sheet and transfer it to feeder rolls, which carry the sheet to the machine to be fed. The construction and operation of the means for transferring the top sheet from the pile which includes the vacuum foot 4 and feed roll 5 is well known in this art and is not here described in detail. The vacuum lifting foot is preferably of the form shown in the patent of Carl Willard Krueger No. 1,250,902 of December 18, 1917 for sheet feeding machines.

The invention relates to the means for maintaining the top of the pile of sheets 2 at a substantially constant level with relation to the sheet transferring means, one embodiment of which is shown in the drawings and is described as follows: The table 3 is mounted in carriers 10 which are arranged to be moved up and down the legs 11. The legs 11 are provided with racks 12 engaged by pinions 13 on the carriers 10. The pinions 13 are driven by an electric motor 14 through speed reducing gearing including a worm 15 on the motor shaft engaging a worm gear wheel 16 carried on the shaft of one of the pinions 13. The pinions 13 are connected by means of a chain 17 carried by sprocket wheels on the pinion shafts. The motor 14 is supported on the underside of the table 3. The table is adapted to be raised gradually by the motor 14.

The motor is controlled by a feeler 20. The feeler 20 consists of an anti-friction roller 21 carried on the end of a pin 22 vertically movable in a contact box 23 and resting lightly by gravity against the top of the pile of sheets. The contact box 23 is carried by a fixed frame 24 over the top of the table. The side of the pin 22 is provided with a rack 30 which meshes with a pinion 31 formed on the hub of a movable contact arm 32. The free end of the arm 32 carries a movable contact 33 which is arranged to engage a fixed contact 34. The contacts 33 and 34 are connected by lead wires 35 to a relay 36 which controls the feed circuit of the motor 14.

The operation of the device is as follows: Suppose that the feeder is operating and the top sheet transfer means 4 and 5 is continually transferring sheets from the top of the pile. When the top sheet is removed the feeler 21 moves downwardly the thickness of the top sheet and rests on the sheet immediately below. The downward movement of the feeler roller 21 permits the contacts 33 and 34 to come together and through the relay 36 to switch on the current for operating the motor 14. The motor 14 thereupon raises the table with the pile of sheets until the feeler rises and separates the contacts 33 and 34 whereupon the motor stops and the table is stationary. If sheets of moderately thick material are being fed, the contact device will operate upon the removal of each

top sheet. If the sheets are of thin material the removal of several sheets may be necessary before the feeler drops sufficient to bring the contacts 33 and 34 into engagement to start the motor.

The device will operate without the change of adjustment for sheets of any thickness as the movement of the table is controlled solely by the feeler which engages the top of the pile. The machine may be adjusted to very accurately maintain the level of the top of the pile of sheets. For example, in one machine built, the top of the pile of sheets may be maintained within seven thousandths of an inch of a fixed level. In the illustrated embodiment of the invention the level of the sheet transferring means 4 and 5 is fixed while the sheet holding table 3 is moved. It is obvious that by mere reversal of parts the table 3 might be fixed and the sheet transferring mechanism 4 and 5 be moved downwardly and its position controlled by a feeler engaging the top of the pile of sheets on the table. The invention is not limited to the movement of the table alone but is intended to include the relative vertical movement between the table and sheet transferring means whereby the top of the pile and the sheet transferring means are maintained at a substantially constant level with relation to each other.

A hand reversing switch 40 is provided by means of which the motor 14 is driven in the reverse direction to lower the table when a fresh pile of sheets is to be placed on it.

While the preferred embodiment of the invention has been illustrated it is to be understood that the invention is not limited to its preferred embodiment but may be embodied in other constructions of sheet feeding apparatus within the scope of the following claims.

I claim:

1. In a machine for feeding sheets of paper or the like from a pile having means for transferring the top sheet from the pile, the combination of a frame having legs with racks formed thereon, a table having pinions engaging the racks and means for relatively raising the table with relation to the transferring means to maintain the top of the pile at a substantially constant level with relation to the transferring means, comprising an electric motor carried on the table and operatively connected to drive the pinions, and means for controlling the motor including a feeler adapted to rest against the top of the pile, and an electric contact moved by the feeler and operating to start the motor when the feeler moves downwardly upon the removal of the top sheet or sheets and operating to stop the motor when the top of the pile of sheets is raised to the desired predetermined level; substantially as described.

2. In a machine for feeding sheets of paper or the like from a pile having means for transferring the top sheet from the pile, the combination of a frame having a plurality of legs, a table having mechanism engaging the legs to raise the table with relation thereto, an electric motor carried by the table for driving the table raising mechanism and means for controlling the motor to maintain the top of the pile at a substantially constant level with relation to the transferring means, including a feeler adapted to rest against the top of the pile, and an electric contact moved by the feeler and operating to start the motor when the feeler moves downwardly upon the removal of the top sheet or sheets and operated to stop the motor when the top of the pile of sheets is raised to the desired predetermined level; substantially as described.

3. In a machine for feeding sheets of paper or the like from a pile having means for transferring the top sheet from the pile, the combination of a table for holding the pile of sheets, mechanism for relatively moving the table with relation to the transferring means, including an electric motor, and means for controlling the motor including a shaft having an electric contact arm carried thereby, a gear on the shaft, and a feeler adapted to rest against the top of the pile and having a rack meshing with the gear, said contact and feeler mechanism operating to start the motor when the feeler moves downwardly upon the removal of the top sheet, or sheets, and operating to stop the motor when the top of the pile of sheets is raised to the desired predetermined level; substantially as described.

4. In a machine for feeding sheets of paper or the like from a pile having means for transferring the top sheet from the pile, the combination of a table for holding the pile of sheets, mechanism for relatively raising the table with relation to the transferring means, including an electric motor carried on the table and irreversible speed reducing gearing driven thereby and engaging a stationary part of the machine, and means for controlling the motor, including a feeler adapted to rest against the top of the pile, and an electric contact and a motion increasing connection between the feeler and the contact, said feeler and contact operating to start the motor when the feeler moves downwardly upon the removal of the top sheet or sheets and operating to stop the motor when the top of the pile of sheets is raised to the desired predetermined level; substantially as described.

5. A machine for feeding sheets of paper or the like from a pile having means for transferring the top sheet from the pile, the combination of a table for holding the pile of sheets, mechanism for relatively raising

the table with relation to the transferring means, including a gear and an electric motor having a worm pinion engaging said gear to form an irreversible transmission holding the table against downward movement by gravity when the motor is stopped, and means for controlling the table raising mechanism including a feeler adapted to rest against the top of the pile, and an electric contact moved by the feeler and operating to start the motor when the feeler moves downwardly upon the removal of the top sheet or sheets, and operating to stop the motor when the top of the pile of sheets is raised to the desired predetermined level; substantially as described.

In testimony whereof, I have hereunto set my hand.

EDWIN F. HULBERT.