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SHEET FEEDING APPARATUS

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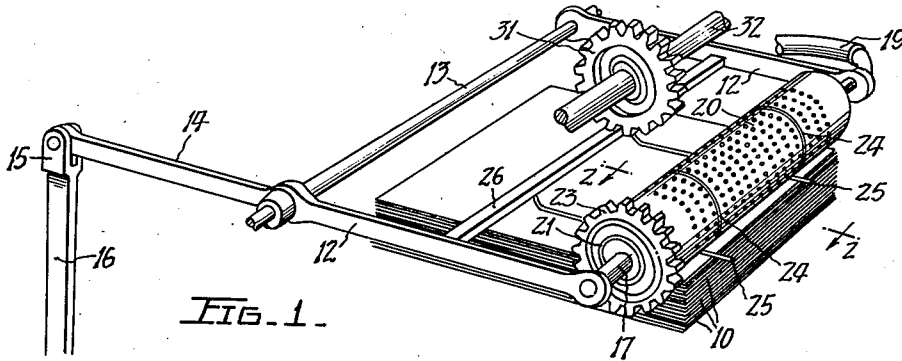


FIG. 1.

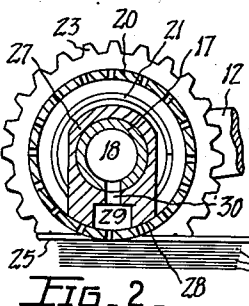


FIG. 2.

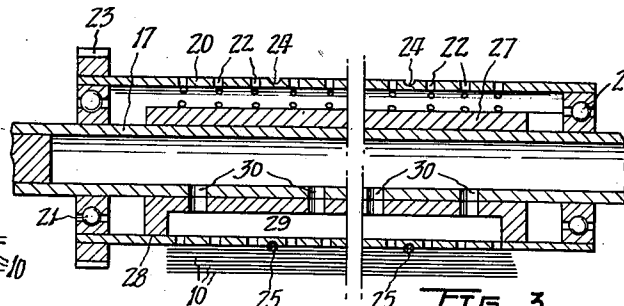


FIG. 3.

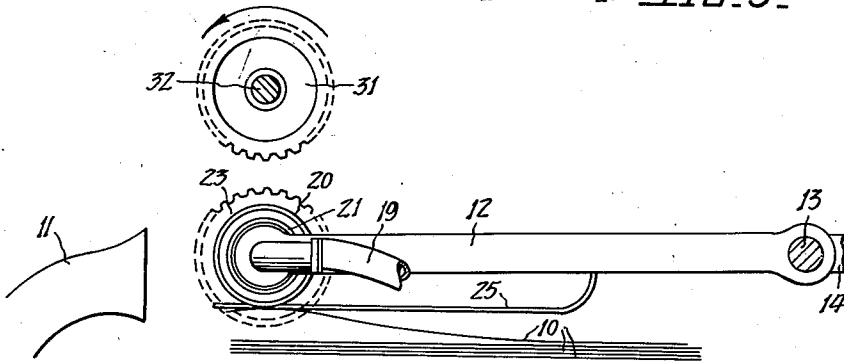


FIG. 4.

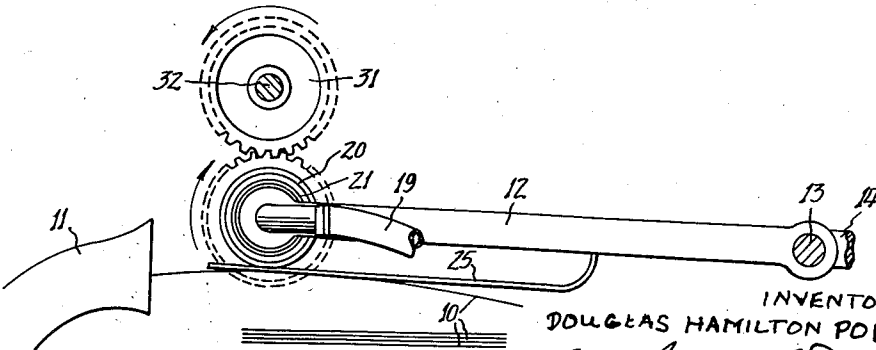


FIG. 5.

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SHEET FEEDING APPARATUS

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3 Claims. (Cl. 271-27)

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This invention relates to an apparatus for sequentially feeding individual sheets of paper or the like.

In many machines, such as machines for wrapping individual copies of newspapers, periodicals and the like, or printing machines, it is required to provide means for feeding forward sheets of paper one at a time from a stack, in correct synchronization with the operation of other parts of the machine.

The principal object of my invention is to provide a sheet feeding apparatus for association with a machine of the character stated, the feeding apparatus being of the type employing a perforated suction roller, and being of a novel and particularly simple character in that suction is exerted continuously by the roller, so that no valvular means are required to cut off the suction at intervals, the roller being adapted to be brought whilst not rotating into contact with the uppermost sheet of a stack of sheets, and to be rotated by simple yet positive means only after having been raised to separate the said uppermost sheet suctionally from the stack, so as to feed the said separated sheet forwardly.

A further object of the invention is to provide simple and economical means whereby the operation of the feeding apparatus is synchronized with the operation of the machine with which the apparatus is associated.

With these aims in view, I have provided a sheet feeding apparatus for sequentially feeding individual sheets of paper, for example, from a stack of sheets, including a perforated suction roller rotatably mounted on a tubular shaft which is adapted to be alternately raised and lowered in synchronization with the machine to which the sheets are to be fed so that the roller is alternately brought near to or into contact with the uppermost sheet of a stack, and raised above the stack. Suction is applied continuously to the tubular shaft and thence, through a shoe secured to the shaft within the roller, to those perforations in the roller which are at the time at the bottom of the roller. When the roller is in lowered position, it is inactive; that is to say, it is not caused to rotate. When the roller is brought to raised position, it is brought into engagement with a drive wheel, rotated continuously in synchronization with the machine to which the sheets are to be fed, so that the roller is then caused to rotate so as to throw forwardly the sheet suctionally adhering to the bottom portion thereof.

In order that my invention may be more readily

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understood and put into practical effect, I now refer to the accompanying drawings, wherein:

Figure 1 is a diagrammatic representation, in perspective, of the principal parts of an apparatus according to the invention, the suction roller thereof being in fully lowered position;

Figure 2 is a sectional view, to enlarged scale, of the suction roller, taken along line 2-2 in Figure 1;

Figure 3 is a partly broken-away longitudinal sectional view, to enlarged scale, of the suction roller of the apparatus shown in Figure 1;

Figure 4 is a side elevational view of parts of the apparatus, with the suction roller in partly raised position; and

Figure 5 is a side elevational view of parts of the apparatus, with the suction roller in fully raised position.

The apparatus, shown schematically in these drawings, is devised to feed in sequence at predetermined intervals of time, sheets of paper, designated 10, from a stack, ordinarily arranged within an open-topped container (not shown) into a chute 11 (see Figures 4 and 5) whereby the said sheets 10 are conveyed gravitationally or otherwise to a newspaper rolling and wrapping machine, for example (not shown).

The apparatus includes a pair of rocker arms 12 secured to and extending forwardly of a shaft 13, which is rotatably mounted in any suitable bearings (not shown). One of the rocker arms 12 is formed with an integral rearwardly extending arm 14, the rear end of which is pivotally connected in a fork 15 at the upper end of an actuating arm 16, and a cam, crank or other suitable mechanism (not shown) is associated with the said actuating arm whereby it may be moved reciprocally in synchronization with the parts of the newspaper rolling and wrapping, or other, machine in such manner as to cause the front ends of the rocker arms 12 to be alternately raised and lowered.

Fixedly secured to the front ends of the rocker arms 12 is a tubular axle 17, one end of which is closed by a plug 18, the other end being open and connected by means of a flexible conduit 19 to a vacuum-pump (not shown).

A suction roller 20 is mounted co-axially about the axle 17, the said roller consisting of a hollow metal cylinder, the ends of which are mounted on ballbearing races 21 associated with the axle 17. A multiplicity of fairly small perforations 22 are formed through the suction roller. On one end of the suction roller 20 there is mounted a gear wheel 23. Two peripheral grooves 24 are

formed about the suction roller, in the under portion of each of which there is engaged a guide wire 25. Each guide wire is secured at its rear end to a cross-member 26 secured between the rocker arms 12, and the front end of each of the guide wires extends somewhat to the front of the suction roller 20.

A shoe 27 is fixedly mounted on the axle 17 within the suction roller 20. The said shoe consists of a metal block bored longitudinally to receive closely the axle 17, the lower face 28 of the shoe being arcuately curved in cross section and so disposed as to bear closely against the inner surface of the suction roller 20, the remainder of the shoe being cleared by the suction roller. A groove 29 is formed from the said lower curved face 28 of the shoe 27, the said groove extending from a position near to one end of the shoe to a position near to the other end thereof so that, as the suction roller 20 rotates, all the perforations 22 thereof will be brought into communication with the groove 29. A number of holes 30 are formed radially inwards from the groove 29 through the shoe 27 and the axle 17 into the bore of the said axle.

It will be seen, then, that when the vacuum-pump is operated to effect suction through the flexible conduit 19 and the bore of the axle 17, the suctional effect will be transmitted by way of holes 30 and the groove 29 to those perforations 22 of the suction roller 20 which are in communication with the said groove 29; that is to say, to those perforations 22 which at the time are at the lower part of the said suction roller 20.

When the rocker arms 12 have been so moved that the suction roller 20 is in lowermost position, as shown in Figure 1, and is resting upon the uppermost sheet 10 of the stack of sheets, the said roller is not caused to be rotated; but when the rocker arms move to raise the said roller to full extent, as shown in Figure 5, the gear wheel 23 associated with the suction roller is brought into mesh with an upper gear wheel 31 secured on a shaft 32 and which is caused to rotate continuously by any suitable means; preferably by the source of power which operates the paper rolling and wrapping, or other, machine with which the feeding apparatus is associated. When the suction roller 20 is again lowered and so brought out of mesh with the upper gear wheel 31, it comes to rest.

In operation, the mechanism of the rolling and wrapping, or other, mechanism acts to reciprocate the actuating arm 16 and to rotate the upper gear wheel 31 in synchronization with the other parts of the said mechanism; and at the same time the vacuum-pump operates to exert a continuous suctional force through the flexible conduit 19, the axle 17, the holes 27, the groove 26 of the shoe 24, and the perforations 22 which are, at the time, at the bottom of the suction roller 20. Assuming that initially the suction roller 20 is in lowermost position as shown in Figure 1, bearing on the front part of the uppermost sheet 10 of the stack of sheets, and at rest, then as the actuating arm 16 is moved to cause the rocker arms 12 to carry the suction roller 20 upwardly to an intermediate position, as shown in Figure 4, the suction exerted through the lowermost perforations 22 causes the front portion of the said uppermost sheet 10 to be raised with the suction roller 20. When the suction roller 20 is raised further, towards uppermost position as shown in Figure 5, the gear wheel 23

associated with the suction roller is brought into mesh with the continuously rotating upper gear wheel 31, so that the suction roller is rotated in such manner as to cause the adhering sheet 10 to be impelled forwardly. The front portions of the guide wires 25 act to overcome any tendency of the said sheet 10 to curl about the rotating suction roller and to direct it forwardly into the mouth of the chute 11. The suction roller 20 is then lowered so that its gear wheel 23 is brought out of engagement with the upper gear wheel 31, and consequently ceases rotation, normally before it is returned to contact with the front portion of the next succeeding sheet 10; and so on.

The stack of sheets 10 is raised by well-known means, either continuously or at intervals, so that the level of the uppermost sheet 10 of the stack remains substantially constant.

It will be appreciated that, as the suction roller 20 engages suctionally with corresponding parts of the succeeding sheets 10, and as the moment when the said roller commences rotation is mechanically determined, the feeding of the sheets 10 may be very accurately synchronized with the operation of the newspaper rolling and wrapping or other mechanism with which the feeding apparatus is associated.

What I claim is:

1. A sheet feeding apparatus comprising a perforated suction roller rotatably mounted on a tubular axle adapted to be connected to a continuously operating suction pump; a shoe mounted on the axle within the roller and bearing on the lowermost part of the inner face of the roller; a way between the interior of the axle and the bearing face of the shoe whereby suction is adapted to be applied to the perforations of the roller which at the time are lowermost; a reciprocatory mounting for the roller axle adapted to move the roller alternatively downwardly towards the uppermost sheet of a stack, and upwardly from the said stack; a wheel secured coaxially to the roller; and a drive wheel, adapted to be rotated continuously, above the roller; the roller wheel being adapted, when the roller is in raised position, to be engaged with and, together with the roller, to be rotated by the drive wheel.

2. A sheet feeding apparatus comprising a perforated suction roller rotatably mounted on a tubular axle adapted to be connected to a continuously operating suction pump; a shoe mounted on the axle within the roller and bearing on the lowermost part of the inner face of the roller; a way between the interior of the axle and the bearing face of the shoe whereby suction is adapted to be applied to the perforations of the roller which at the time are lowermost; a reciprocatory mounting for the roller axle adapted to move the roller alternatively downwardly towards the uppermost sheet of a stack, and upwardly from the said stack; a toothed wheel secured coaxially to the roller; and a toothed drive wheel, adapted to be rotated continuously, above the roller; the toothed roller wheel being adapted, when the roller approaches the end of its upward movement, to mesh with the toothed drive wheel and, together with the roller, to be rotated thereby until, during the downward movement of the roller, the toothed roller wheel is carried out of mesh with the toothed driven wheel.

3. A sheet feeding apparatus comprising a pair of rocker arms; a tubular axle adapted to be connected to a continuously operating suction pump being carried between the rocker arms; a perfo-

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rated suction roller rotatably mounted on the said axle; the rocker arms being adapted to be oscillated to bring the roller alternatively downwardly towards the uppermost sheet of a stack, and upwardly from the said stack; a shoe 5 mounted on the axle within the roller and bearing on the lowermost part of the inner face of the roller; a longitudinal recess in the bearing face of the shoe; passages between the interior of the axle and the said longitudinal recess in the 10 bearing face of the shoe whereby suction is adapted to be applied to the perforations of the roller which at the time are lowermost; circumferential grooves about the roller; guide wires connected to the rocker arms, each guide wire 15

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extending under and forwardly of the roller and engaged in a circumferential groove; a toothed wheel secured coaxially to the roller; and a toothed drive wheel, adapted to be rotated continuously, above the roller; the toothed roller wheel being adapted, when the roller approaches the end of its upward movement, to mesh with the toothed drive wheel and, together with the roller, to be rotated thereby until, during the 10 downward movement of the roller, the toothed roller wheel is carried out of mesh with the toothed drive wheel.

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No references cited.