Dec. 19, 1944. C. E. WHITE 2,365,654

TRAVERSE MECHANISM FOR CARD STRIPPING APPARATUS

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Fig. 1

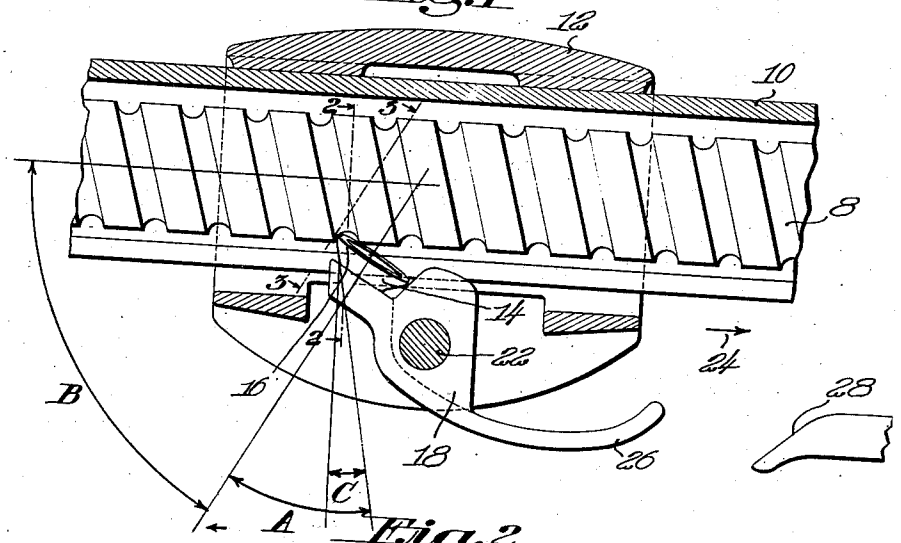


Fig. 2

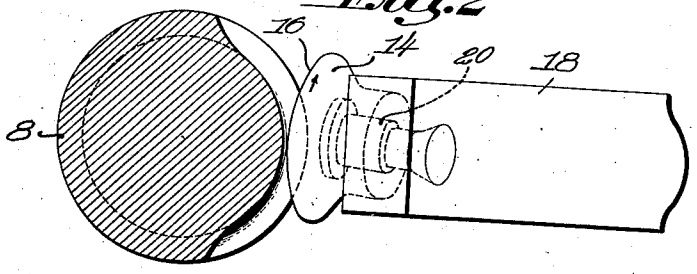
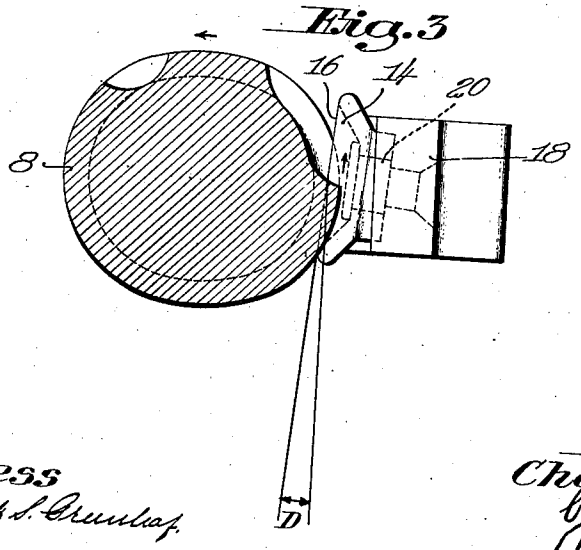


Fig. 3



Witness
Frederick S. Grunbaf.

Inventor
Charles E. White
by his attorneys
Churchill & Jenney

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TRAVERSE MECHANISM FOR CARD STRIPPING APPARATUS

Charles E. White, Abington, Mass., assignor to Abington Textile Machinery Works, Boston, Mass., a trust of Massachusetts

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6 Claims. (Cl. 19—109)

The present invention is concerned with improvements in the traverse mechanism of card stripping apparatus.

In pneumatic card stripping apparatus of the general type shown in the United States patent to Clark, No. 1,614,103, the suction nozzles are mounted on a nozzle carriage which is given a traversing movement by a rotating lead screw, the carriage during stripping being connected with the traverse screw by a pawl or dog, the nose of which runs in the thread of the screw. Because of the proximity of "fly" during the operation of the machine, it is not possible to use oil to lubricate the parts. The friction is therefore considerable and the wear of the parts relatively rapid.

Furthermore, at the end of each traverse, it is necessary to disengage the pawl from the screw, which is done automatically by an abutment into which the pawl runs to "knock-out" the latter from the screw. This forcible disengagement tends in time to chip the screw in the zone where disengagement takes place, so that frequently, in making repairs, it is necessary to replace the entire screw along with the pawl.

It is the object of the present invention to improve the driving connections between the traverse screw and nozzle carriage of pneumatic card stripping apparatus by providing rolling engagement in place of sliding contact between the parts. More specifically, the invention contemplates the provision of a roller pawl of novel design, which not only substantially reduces wear on the screw along its length, but also permits the disengagement of the parts at the end of the traverse to take place smoothly and without damage to the threads of the screw.

These objects have been attained by providing in accordance with the invention a pawl in the form of a roller, the periphery of which runs in the thread of the traverse screw. The roller is of cup-shaped contour to permit engagement with the screw at a substantial of roller axis to the axis of the screw, in order that the forces to which the bearing of the roller is subjected may be largely radial. This angular relationship of roller and screw axes is actually a compound angle, based as will hereafter appear on flare angles of the roller and on angles of inclination and tilt of the roller axis so that after the roller has been placed in engagement with the screw at the beginning of a traverse, the parts are automatically maintained in freely rolling engagement without the use of locking devices or other retaining means. At the end of the traverse, the pawl may readily be "rolled out" of engagement without injury to the screw.

In the drawing illustrating the invention, Fig. 1 is a view of a portion of the traverse screw of vacuum card stripping mechanism of the same general type as shown in the Clark patent above referred too, with a portion of the nozzle carriage shown in section and illustrating the roller pawl in operative engagement with the thread of the screw; Fig. 2 is a sectional view of the parts shown in Fig. 1, taken on the line 2—2 of said figure; and Fig. 3 is a sectional view, taken on the line 3—3 of Fig. 1.

The traverse screw, indicated at 8, is of conventional design for vacuum stripping mechanisms. A pitch angle of 9°–15′ is indicated, although the roller pawl to be described may be employed with traverse screws having a greater or lesser pitch angle as desired or required. The traverse screw runs within a traverse tube 10 fixed in the machine frame, the tube providing a support for the nozzle carriage, a portion of which is indicated at 12. The sleeve is slotted along its length to provide access for the pawl.

The roller pawl 14 is of cup-shaped contour, and is so mounted that the thread of the screw is engaged by the outer edge 16 of the flaring rim. The roller is pivotally mounted on a pawl lever 18 by means of a shouldered rivet 20. The pawl lever is pivotally connected to the nozzle carriage 12 by a pin 22 to enable the roller pawl to be moved into and out of engagement with the traverse screw.

In describing the various angular relationships of the parts by which the objects of the invention are achieved, it is convenient to define the several angles which are involved. The first of these angles is the flare of the roller, being the angle between the outer wall of the roller and the center line or axis. Let such angle be termed "A," as indicated on the drawing. A suitable value for this angle has been found to be in the vicinity of 45°.

The angle of inclination between the axis of the roller and the axis of the traverse screw, indicated in Fig. 1 as angle "B," is chosen in relation to the angle of flare of the roller so that the sum of the two angles is somewhat greater than 90°. Thus, with an angle of approximately 60° between axes of screw and roller, as indicated, a 15° difference results. This angle, represented by "C" in Fig. 1, insures that the engagement between screw and roller will take place between the rounded outer rim portion of the roller and the base of the screw thread.

Due to the relatively large (60°) angle between axes of screw and roller, a substantial proportion of the forces transmitted by the screw to the roller in driving the nozzle carriage is directed radially of the roller with a relatively small component of force in an axial direction at one point of the rim. Since this latter component tends to skew the roller on its pivot, it is desirable that this component be as small as practical in view of the rapid wear which results with bearings of limited length.

To insure, once the roller pawl has been placed in engagement with the screw, that the parts will automatically remain in driving engagement throughout the traverse without the use of locking devices, the roller is tilted at an angle which is hereinafter referred to as a run-in angle. This angle, indicated at "D" in Fig. 3, is the angle between the plane of rotation of the roller pawl and a tangent to the screw at the point of contact between the screw and roller. This angle need not be more than a few degrees, an angle of approximately 5° having been found satisfactory. The tilt of the roller must be in a direction toward that portion of the screw rotating toward the roller, to drive the nozzle carriage in the direction indicated by arrow **24**.

While this run-in angle insures that the roller will automatically remain in engagement with the screw once the traverse has been started, no difficulties are involved in disengaging the parts at the end of the stroke. As the limit of the traverse is approached, the handle **26** of the pawl lever engages the sloping face **28** of an abutment carried by the machine frame. Further advance of the carriage results in swinging the lever in a direction to disengage the roller, the latter being "rolled-out" of the screw smoothly and without subjecting the screw to increased wear in this zone.

While certain angles have been indicated for the flare of the roller pawl and the inclination of the axes of traverse screw and roller, these particular angles are not in themselves extremely critical. It is, however, important that the sum of the flare angle and the inclination angle be somewhat greater than 90°, in order that the engagement between screw and roller be with the outer rim of the roller. By making the angle between axes of roller and screw of the order of 60°, adequate clearance may be provided for the roller, yet the forces at its bearing are predominantly radial, so that undue wear on the bearing is avoided. These interrelated angles, together with the run-in angle, enable the pawl to engage the screw in rolling contact, with the result that operation for long periods of time is made possible without repair or replacement of the parts.

I claim as my invention:

1. A driving connection for the traverse motion of card stripping apparatus comprising, in combination with the nozzle carriage, a roller pawl pivotally mounted on the carriage for rolling engagement with the traverse screw, said pawl being cup-shaped to provide a flaring rim portion, the axis of the pawl being inclined to the axis of the screw to provide engagement between the thread of the screw and the outer rim portion of the pawl, said axis of the pawl also being tilted in non-intersecting relation to the axis of the screw to provide run-in between the pawl and the screw.

2. A driving connection for the traverse motion of card stripping apparatus comprising, in combination with the nozzle carriage, a roller pawl pivotally mounted on the carriage for rolling engagement with the traverse screw, said pawl being cup-shaped to provide a flaring rim portion, the axis of the roller pawl being inclined to the axis of the screw and the plane of rotation of the roller pawl being inclined relative to a tangent to the screw at the point of contact of screw and pawl.

3. A driving connection for the traverse motion of card stripping apparatus comprising, in combination with the nozzle carriage, a roller pawl pivotally mounted on the carriage for rolling engagement with the traverse screw, said pawl being cup-shaped to provide a rim portion flaring outwardly from the axis at an angle of approximately 40°, and the axis of the roller pawl being inclined to the axis of the screw at an angle of approximately 60°.

4. A driving connection for the traverse motion of card stripping apparatus comprising, in combination with the nozzle carriage, a roller pawl pivotally mounted on the carriage for rolling engagement with the traverse screw, said pawl being cup-shaped and having a rim portion flaring outwardly from the axis of the roller at an angle thereto, and the axis of the roller being disposed at an angle to the axis of the screw, the sum of said angles being greater than 90° to enable the outer portion of the rim of the pawl to engage the thread of the screw.

5. A driving connection for the traverse motion of card stripping apparatus comprising, in combination with the nozzle carriage, a roller pawl pivotally mounted on the carriage for rolling engagement with the traverse screw, said pawl having a rim portion flaring outwardly from the axis of the roller at an angle thereto, said axis of the roller being disposed at an angle to the axis of the screw, the sum of said angles being approximately 100°, and the plane of rotation of said roller being tilted with respect to a tangent to the screw at the point of contact between screw and roller, said angle of tilt being of the order of 5° and in a direction toward that portion of the screw rotating toward the roller to provide relative run-in between the parts and thereby automatically maintain the roller pawl in engagement with the screw.

6. Traverse mechanism for pneumatic stripping apparatus of cards, comprising in combination, a traverse screw, a nozzle carriage, a pawl lever, and a roller pawl carried by said lever, the pawl consisting of a cup-shaped member pivotally mounted on said lever and positioned to engage the screw with the axis of the pawl inclined at an angle of approximately 60° to the axis of the screw, said roller having an outwardly flaring rim portion inclined at an angle of approximately 40° to the axis of the roller, the plane of rotation of the roller being tilted at an angle of approximately 5° with respect to a tangent to the screw at the point of contact between roller and screw, the tilt being towards the screw relative to that portion thereof rotating towards the roller.

CHARLES E. WHITE.