Sept. 1, 1936. W. M. HAINES 2,052,566

FEED ROLL FOR TYPEWRITERS AND THE LIKE

Original Filed May 4, 1933

Fig. 1

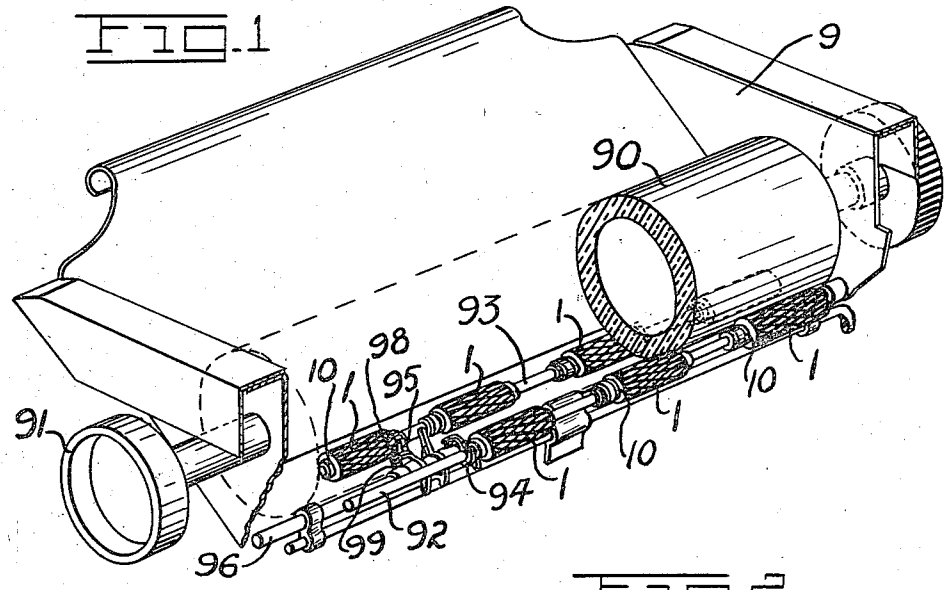


Fig. 2

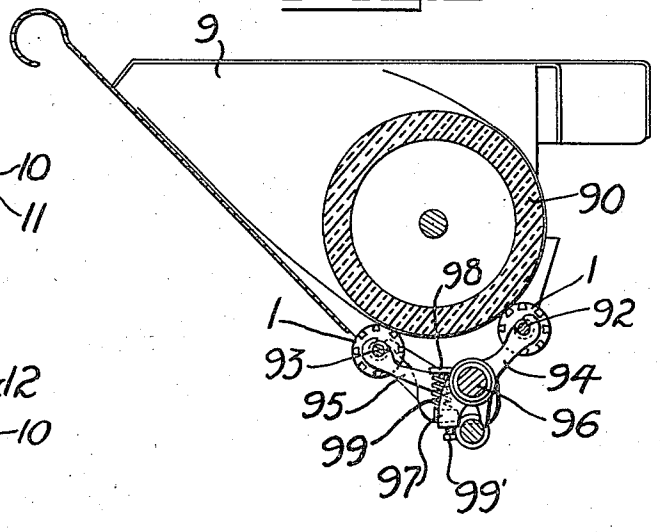


Fig. 3

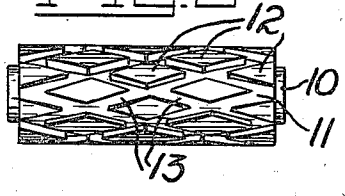


Fig. 4

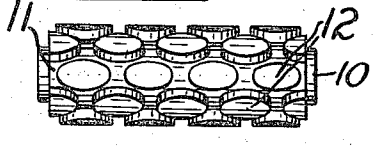
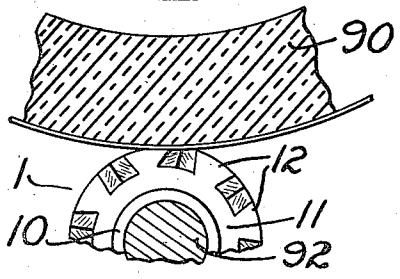


Fig. 5



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FEED ROLL FOR TYPEWRITERS AND THE LIKE

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Continuation of application Serial No. 669,402, May 4, 1933. This application November 21, 1933, Serial No. 698,993

8 Claims. (Cl. 197—138)

My invention relates to the paper feeding mechanism of office machines, such as typewriters, adding machines, mimeographs, multigraphs, accounting machines, envelope sealers, or other like devices.

This application is filed as a continuation of my application Serial No. 669,402, filed May 4, 1933.

There are numerous feed rolls of various sizes used on office machines such as those listed above, which rolls are cylindrical in shape and covered with rubber. This rubber, when new, provides a frictional contact with paper and like materials fed into the machine. With continued use, and because of the adhesive nature of the rubber in the rolls, minute particles of paper fibres, dust, erasure particles, ink, wax from stencils, and water or dermax from wet stencils become embedded in the surface of the rubber of the feed rolls, and the rolls in a comparatively short time become coated with these harmful particles until a thin, smooth layer of such embedded particles covers the entire surface of the feed roll, choking the life out of the rubber, causing it to swell and crack and deteriorate, and in a comparatively short time making the feed rolls impractical for the use of feeding paper accurately. Particularly is this harmful effect found when the rolls are used frequently in handling stencil material. The wax from the stencils or dermax from wet stencils is squeezed into the rubber, and the squeezing action is aggravated by the high tension employed in the tension springs, causing the rolls to press with considerable force against the surface of the platen. This pressure forces into the rubber particles which might otherwise fall off. The rolls soon swell to a size considerably greater than their normal original size, and this further aggravates the pressure and causes increasingly rapid deterioration of the rolls, in addition to which the surface thus produced loses the traction grip of live rubber on the paper or stencil, and errors in feeding and in alignment soon occur.

The surface of such rolls, carrying embedded particles of whatsoever nature, becomes smooth and loses its fresh traction grip, with the result that the rolls do not hold well on smooth materials, and it is not possible to feed the paper evenly, nor to roll back the platen and expect that, when returned to its original position after such rolling back, the type line will return exactly to its former position. This causes misalignment between the original and the carbon sheets, which latter are in contact with the considerably larger surface of the platen and therefore feed more evenly. Furthermore the smoothness of the rolls makes it impossible to handle cards, manila folders, and like stiff, comparatively smooth surfaced materials with any degree of accuracy. Moreover, with machines that employ stops (as in tabulating, or in machines with electric carriage returns) which bring the carriage to a sudden stop following a movement, and especially when very hard platens are used to obtain numerous carbon copies, the paper slips between the platen and the rolls, and misalignment of margins occurs, and in addition the lines tend to be inclined.

To such extent do these feed rolls affect the proper operation of the machine that it is necessary to change them frequently to obtain proper results, and because of the expense involved and the necessity of sending the machine to a repair shop, thereby losing the use of it for a period, this changing of the rolls is not done as often as good practice would indicate, and a great deal of dissatisfaction and lost motion is found in connection with the operation of machines wherein the feed rolls have become inefficient from causes enumerated above.

It is the general object of my invention, then, to provide feed rolls which by reason of their construction will eliminate the causes of deterioration, and will, for a considerably longer period, remain efficient, and which at all times will more effectively and accurately accomplish feed of all types of paper, whether several carbon sheets, cards, manila folders, or single sheets be employed.

More specifically it is an object to provide feed rolls especially constructed to the end of carrying off and eliminating the fibres, erasure particles, wax, dust, etc., to the end that they will not become embedded in the surface of the roll, thereby preserving the traction surface and the life of the rubber, and a roll which, if it swells under the influence of particles which are not thus eliminated, will in swelling be not increased in diameter.

It is a further object to provide a roll which by reason of its special construction will provide a live yet firm grip on the material which it is handling, to the end not only of providing accurate feeding at all times, but also to the end that pressure of the tension springs may be slackened, thereby eliminating the carbon smudges caused by pressure of the feed rolls in current practice, and making the machine more flexible and useful on various kinds of materials, without adjustment.

It is a further object to provide a roll of this character which is inexpensive and easily made

in quantities by various commercial processes, to the end that it may be supplied as a substitute for feed rollers now in use upon machines, or may, of course, be supplied as original equipment.

With these and other objects in mind, as will appear hereafter, my invention comprises the novel feed roll, and the novel combination of such a feed roll with the platen, carriage and associated parts of an office machine, all as shown in the accompanying drawing, described in this specification, and as will be more particularly defined by the claims which terminate the same.

In the accompanying drawing I have shown my invention embodied in a roller and assembled into a typewriter carriage, in forms such as are at present preferred by me.

Figure 1 is a perspective view of a typical typewriter carriage, having my feed rolls assembled therein, and with parts omitted and broken away to show the manner of assembly and use.

Figure 2 is a transverse section through such a carriage.

Figure 3 is an elevation of one form of roll, and Figure 4 is a similar elevation of an alternative form.

Figure 5 is a detail section through the surface of a platen and through the cooperating feed roll, showing the manner in which the traction effect is produced and facilitated by my invention.

A typical typewriter carriage, generally illustrated at 9 in Figures 1 and 2, embodies a rotatable platen 90 which is advanced by the line space lever (not shown) or by the platen knobs 91 at each end. Beneath the platen, and supported upon spindles 92 and 93, are a series of feed rolls 1. These spindles 92 and 93 are supported upon the respective arms 94 and 95, each of which is pivotally mounted upon a rod 96. Each carries an arm, as for instance the arm 97 forming part of the arm 94, between which arm and a fixed lug 98 is mounted a tension spring or springs 99. The tension on this spring determines the pressure with which the feed roll 1, mounted in the arm 92, bears against the platen 90, and this tension is regulated by such means as the adjusting screw 99'. Normally the tension on the springs and the consequent pressure of the feed rolls upon the platen is fairly high, the theory being thereby to insure as far as possible a good grip upon the paper or cards being handled, but with a considerable number of carbons this pressure becomes excessive and smudges develop, and with any pressure it is difficult to handle cards without card-feeding attachments or similar devices. Moreover, as the resilience of the feed rolls decreases from embedded particles and like causes, and as they swell from an accumulation of these particles, especially wax, the pressure increases and carbon smudges develop, and in fact the pressure may increase to such an extent, and the distortion will be so great, that the rolls do not roll evenly, and uneven feeding is the result.

According to my invention the feed roll is constructed in any suitable manner, as for instance, according to the present practice, by securing upon a metallic tubular core 10 a body 11 of live resilient rubber or like material. However, departing from prior practice, I provide upon the surface of the roll a plurality of sheer-walled buttons 12 of live resilient rubber upstanding from the body 11 forming the main part of the roll. These buttons may be, and usually would be, formed integral with the body 11, though it is not outside of the scope of my invention to provide them as separate elements attached to the body 11, and indeed if the depth of the buttons be sufficient, the body 11 may be of material other than rubber, and may be non-resilient. The shape of these buttons may vary considerably, and in Figure 3 they are shown as conventional diamonds or lozenges, and Figure 4 they are shown of elliptical shape. The diamond shape is preferable.

The positioning of these buttons relative to one another is important. They should be spaced from adjoining buttons, and should be disposed in such a way that there are no spaces or grooves between them which extend parallel to the axis of the roll. Preferably they are arranged in helical rows, and preferably the pitch of the helix is comparatively high, thus to leave diagonal grooves 13 extending in both directions about the roll. From this it will be clear that each of the diamond-shaped buttons of Figure 3 is disposed with an edge in alignment with a corresponding edge of each of four adjoining buttons, to provide the helical grooves 13 running in the two directions. The buttons are closely enough spaced or the grooves are sufficiently narrow that there is not provided any break extending axially from end to end of the roll; that is to say, there is always in contact with the paper or the platen a portion of several buttons.

The buttons may be molded in the rubber, or they may be cut or ground in the solid mass of rubber, as may be found most practical. I prefer that they be cut by a rotary grooving disk in a manner and by such a device as is disclosed in my copending application filed coincidentally with this application, for by such a process the edges of the buttons are undercut, as may be best seen in Figure 5, thus leaving a surface on each button which is of somewhat greater area than the base portion of the button, where it joins the mass 11. This gives each button individual resilience and yieldability, particularly circumferentially, and causes movement of one button relative to adjoining buttons. It is this movement which insures the frictional grip on the paper, and causes in effect a squeezing action, whereby particles of dust, erasures, paper fibres, wax and like deleterious substances are moved into and squeezed along the grooves to emerge at the ends of the rolls, where they will not do any harm, but because they are removed they do not affect the rubber of the rolls, especially their circumferential surfaces, in the manner indicated at the outset of this specification. This effect has been observed in practice, and the rolls, even when used with wax stencils, will accumulate stencil material, dust, and the like, at the ends of the grooves before causing any noticeable swelling of the material of the rolls themselves. Furthermore, as wax, dust, paper fibers, erasure particles and the like do accumulate in the surface of the buttons, and in time effect some swelling, the grooves provide space for expansion of the rubber, and the expansion occurs in this manner rather than radially to swell the size of the rolls.

Feed rolls of this type which were installed on a typewriter used for cutting stencils, and which had been in such service for nine months, showed the swelling of the rubber to have taken place in the grooves, rather than in the buttons themselves. The grooves were nearly closed in a period of nine months in such service, but the rolls were still cylindrical in shape, and fed the paper accurately.

The buttons being individually more resilient than a smooth cylindrical roll, they will accom-

modate more readily a bulkier mass, and will therefore accommodate a larger number of carbons, and will more readily accommodate such thick and stiff materials as cards, manila folders, and the like. Moreover, because of this resiliency, because of the longer life and frictional grip of the individual buttons, the tension on the springs 99 can be slackened, and this in itself lessens the likelihood of smudging and permits the rolls to accommodate themselves to the bulkier materials.

It is important that the grooves extend in both directions, and not only in one direction, for if they extended only in one direction, there would be a tendency to feed the paper in one direction, whereas this tendency is counteracted by the extension of the grooves in opposite directions upon the same roll, and the paper is thereby fed accurately and evenly. It may be rolled back by turning the platen knobs 91 and again fed forward to come into precise registry with its original position. Because of the better grip upon the paper there has been noticed no tendency for the paper to be moved longitudinally by its momentum in being brought to a sudden stop.

What I claim as my invention is:

1. A feed roll for typewriters and like paper feeding devices, comprising a cylinder of live, resilient material, the surface whereof is interrupted to provide two series of broad and deep grooves extending generally helically, said two series extending about the cylinder in opposite directions to mutually intersect.

2. A feed roll for typewriters and like paper feeding devices, comprising a resilient cylindrical live rubber body, the surface of which is defined by a plurality of sheer-walled, live rubber buttons having cylindrical-segmental tops and of a length a fractional part of the length of the cylinder, upstanding from and integral with the main body of the cylinder, said buttons being disposed in generally helical rows.

3. A feed roll for typewriters and like paper feeding devices, comprising a cylindrical resilient rubber body, and buttons of live rubber upstanding from said body and disposed in helical rows of large pitch and separated by broad and deep, oppositely-directed and intersecting helical grooves, the surfaces of said buttons lying in a common cylinder.

4. A feed roll for cooperating with the platen of typewriters and like paper feeding devices, comprising a cylindrical rubber body, and live rubber buttons of lozenge shape upstanding from said body to leave broad and deep grooves therebetween, and each disposed with its longer diagonal parallel to the axis of the roll for progressive displacement of each button edge as it rolls into a position adjacent to the platen to feed evenly paper held between the roll and platen.

5. A feed roll for cooperating with the platen of typewriters and like paper feeding devices, comprising a cylindrical body and spaced live rubber buttons of lozenge shape upstanding from said body and each disposed with its longer diagonal parallel to the axis of the roll and with each edge in alignment with an edge of four adjoining buttons to define broad and deep helical grooves therebetween for reception of foreign material, said button edges being progressively displaced as they roll into positions adjacent to the platen to progressively vary the width of said grooves thus to work such foreign material along the grooves to the end of the roll.

6. A feed roll for typewriters and like paper feeding devices, comprising a cylindrical body and spaced rubber buttons upstanding therefrom, the surface of all said buttons lying in a common cylinder, and the edges of said buttons being undercut to permit them to conform readily to the surface of the complemental platen as they roll thereover.

7. A feed roll for typewriters and the like paper feeding devices, comprising a cylindrical body of live rubber, and live rubber buttons of lozenge shape upstanding therefrom of a length a fractional part of the length of the cylinder and of a width sufficient that every element of the cylindrical body intersects several thereof, but spaced by grooves of a width and depth sufficient to receive foreign material which collects on the surface of the roll.

8. A feed roll for typewriters and like paper feeding devices, comprising a cylinder of live resilient material, and, upstanding therefrom, a plurality of spaced distortable buttons of live resilient material having sheer walls and generally flat tops meeting abruptly in angular edges and of a length a fractional part of the length of the cylinder.

WAYNE M. HAINES.