Feb. 23, 1943. R. McC. JOHNSTONE 2,312,173

SLITTER UNIT ASSEMBLY

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Fig. 1.

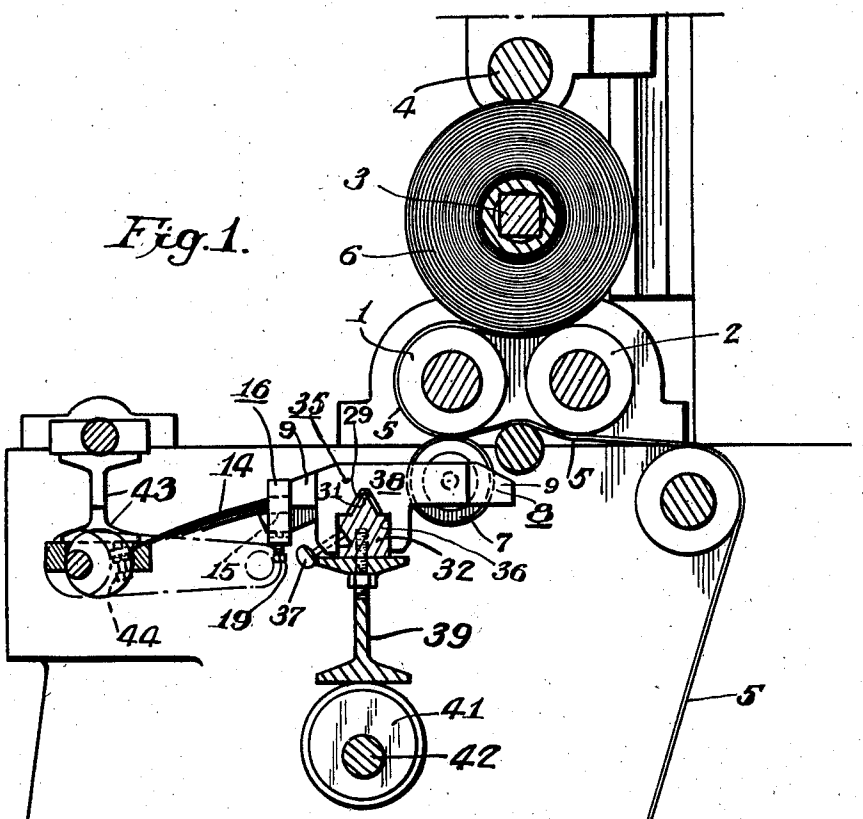


Fig. 4.

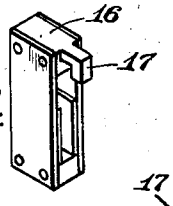
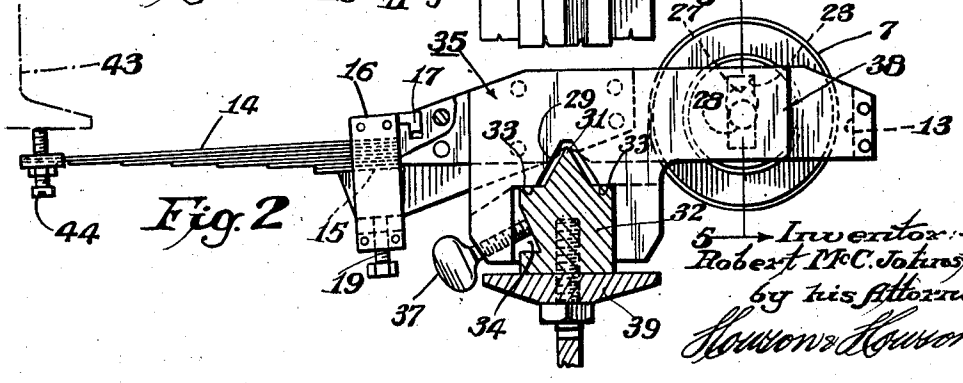


Fig. 3.

Fig. 2



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Fig. 8

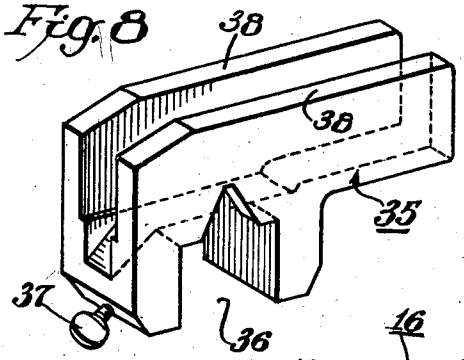
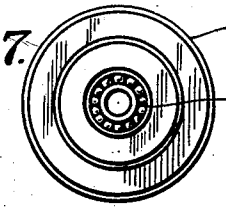


Fig. 7.



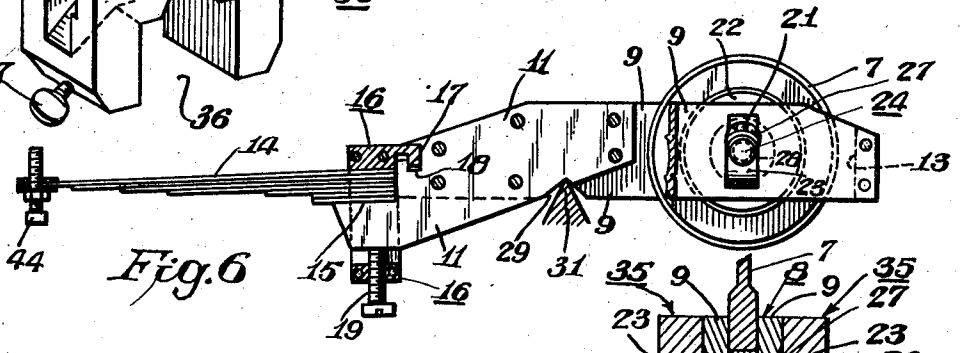


Fig. 6

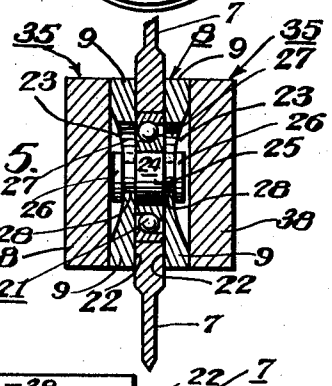


Fig. 5.

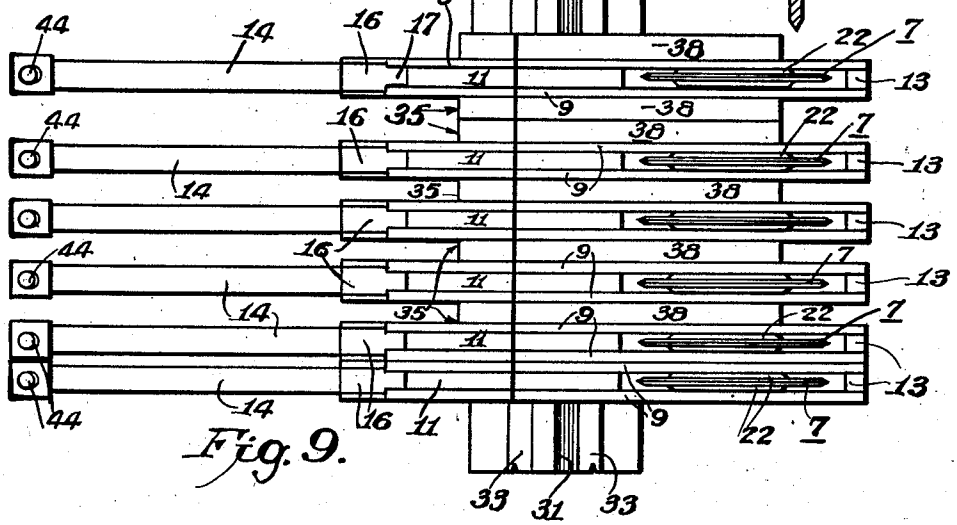


Fig. 9.

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UNITED STATES PATENT OFFICE

2,312,173

SLITTER UNIT ASSEMBLY

Robert McC. Johnstone, Bondsville, Pa.

Application January 31, 1942, Serial No. 429,087

6 Claims. (Cl. 164—65)

This invention relates to slitting machines, and a principal object of the invention is to provide a generally improved form of slitter unit.

More specifically, one object of the invention is to provide an improved means for mounting the slitter disk in its supporting lever, said means affording a substantially sealed bearing for the disk.

Another specific object is to provide an improved means for attaching to a slitter lever the tensioning spring which constitutes an element of the slitter unit assembly.

Still another object of the invention is to provide a slitter bar assembly wherein the tensioning spring is positioned with respect to the other elements of the lever assembly so as to afford the lever a relatively high degree of stability in the machine assembly.

The invention further affords a novel fulcruming and spacing device for the levers, as hereinafter set forth.

In the attached drawings:

Figure 1 is a diagrammatic sectional view showing parts of a slitting and rewinding machine incorporating my invention;

Fig. 2 is an enlarged sectional view showing the slitter unit and its mounting;

Fig. 3 is a top plan view of the slitter unit assembly shown in Fig. 2;

Fig. 4 is a detached view in perspective of one of the structural elements of the slitter bar assembly;

Fig. 5 is a section on the line 5—5, Fig. 2;

Fig. 6 is a longitudinal sectional view illustrating details of the slitter bar assembly;

Fig. 7 is a detached view in elevation of a slitter element;

Fig. 8 is a view in perspective of one of the spacer elements, and

Fig. 9 is a top plan view illustrating a plurality of the slitter bars in a typical gang assembly in the machine.

Referring to Fig. 1 of the drawings, the web-slitting machine therein illustrated comprises front and rear winding drums 1 and 2, a winding shaft 3 and a top pressure roll 4. The web 5, which constitutes the work material, is guided under the drums 1 and 2 and upwardly around the former to the shaft 3, on which it is wound in well known manner to produce a roll 6. Operatively associated with the front drum 1 is one or more slitter elements each in the form, in the present instance, of a disk 7, this element functioning to slit the web against the drum 1 prior to its passage to the roll 6.

The disk 7 is mounted in one end of a lever 8. This lever is composed, in the present instance, of two side plates 9, 9, secured against opposite sides of a plate 11. The plate 11 is not coextensive with the side plates 9, so that a space 12 is provided between the side plates for reception of the disk 7. The outer end of the space 12 is closed by a spacer element 13, which is secured between the extremities of the side plates 9.

To the opposite end of the plate 11 is secured a leaf spring 14, the function of which will be hereinafter described. This spring is clamped solidly upon a shoulder 15 of the plate 11 by means of a clamp 16. This clamp, as shown in perspective in Fig. 4, consists of a hollow rectangular body member the sides of which in assembly embrace and fit snugly against the opposite sides of the spring 14, and also against the opposite sides of the plate 11, it being noted, by reference to Fig. 4, that the opening in the clamp 16 is relatively narrow in the lower part which engages the opposite sides of the said plate. Projecting from the upper end of the clamp is a hook element 17 which, in assembly, fits into a recess 18 in the top of the plate 11 and between the side plates 9. Threaded into the bottom of the clamp 16 is a screw 19 which, in assembly, is tightened against the under side of the plate 11 to thereby draw the top of the clamp solidly down upon the base of the spring 14, and to thereby clamp the spring to the plate 11, the hook 17 providing a positive interlock between the clamp and the plate 11.

The disk 7, see Fig. 5, is provided with an anti-friction bearing 21, and this bearing and the hub portion 22 of the disk are formed to fit neatly between the side plates 9, 9 of the lever 8. The outer face of each of the plates 9 is provided with a slot-like recess 23 and an aperture in the bottom of said recess for reception of a pin 24 which provides a pintle support for the disk 7. The pin 24 is formed, as shown in Fig. 5, with a central portion 25 and end portions 26 formed in the present instance by turning circumferential grooves in the pin body. The central portion 25 receives the inner race of the bearing 21, and the end portions 26 function as heads to retain the pin against axial displacement in the side plates. The apertures in these plates which receive the pin are in the nature of bayonet joints, as indicated in broken lines in Fig. 3, with end portions 27 of diameter sufficiently large to permit passage therethrough of the portions 25 and 26 of the pin of relatively great diameter. The portions 27 of the apertures communicate with por-

tions 28 of smaller size neatly fitting the portions of the pin of relatively small diameter which lie intermediate the end portions 26 and the central portion 25. With the pin established in the smaller ends 28 of the apertures, it is apparent that axial displacement of the pin is precluded, and that withdrawal of the pin may be effected only after the pin is moved bodily upwardly into the larger ends 27 of the apertures. It will be noted that in operation, the reaction forces between the disk 7 and the drum 1 are in a direction to retain the disk in the smaller ends of the said apertures.

On the under side of the lever 8 is an angular notch 29 which is inset both in the side plates 9 and the spacer plate 11. In the machine assembly, this notch 29 receives the knife edge 31 of a fulcrum member 32, this member being in the form, in the present instance, of a bar which is coextensive with the drum 1. As shown in Figs. 2 and 3, the fulcrum bar 32 is substantially rectangular in form with the knife edge formation 31 projecting from the upper flat top so as to afford at each longitudinal side thereof a laterally projecting shoulder 33. In the forward side of the bar 32 is a longitudinal notch or recess 34, the function of which will be hereinafter described.

In conjunction with the aforedescribed slitter lever assembly, I provide a spacer member 35 shown in perspective in Fig. 8. This member has in the base thereof a transverse recess 36 which is shaped to receive the fulcrum bar 32, as best shown in Fig. 2. It will be noted that the spacer engages the bar 32 only at the sides thereof and on the shoulders 33, there being no contact between the spacer and the knife edge 31. In the forward wall of the recess 36 the spacer member 35 carries a set screw 37 which in assembly is threaded inwardly against the inclined face of the recess 34, the resulting reaction being such as to clamp the spacer element solidly against one side and the shoulders 33 of the fulcrum bar 32, as shown in Fig. 2. The spacer element further comprises two cheeks 38, 38 which occupy positions at opposite sides of the side plates 9 of the lever, and which form therebetween a slotted opening in which the said lever is neatly fitted, as shown in Fig. 5. The spacer element is formed so that normal contact between the element and the lever occurs only on the outer side faces of the side plates 9 and the inner surfaces of the cheeks 38, it being noted that the knife edge 31 of the bar 32 in assembly extends upwardly into the space between the said cheeks for fulcruming engagement with the lever. Thus while the spacer element functions to positively locate and retain the lever in adjusted position longitudinally of the fulcrum bar, it offers no interference with the free pivotal movement of the lever on the fulcrum.

In the machine assembly, the fulcrum bar 32 is mounted upon a beam 39 which may be elevated and lowered through the medium of an eccentric 41 on a shaft 42. When the fulcrum bar is thus elevated to bring the disk 7 into engagement with the platen roll 1, the outer free end of the spring 14 engages the under side of a transverse beam 43, the parts being so related that the spring 14 is placed under tension, as illustrated in Fig. 1. The outer end of the spring 14 carries a screw 44 which may be adjusted in the spring so as to regulate the tension. It is to be noted that the spring 14 extends from the body of the lever 8 substantially in line with the lever body, and that when the lever is in the operative position in the machine, as shown in Fig. 1, a straight line between the axis of the slitter disk 7 and the point of contact between the screw 44 of the spring 14 and the beam 43 will lie below the bottom of the notch 29 which receives the knife edge 31, as previously described. By having this line between the axis of the disk 7 and the point of engagement of the spring 14 with the abutment 43 extend in proximity to the fulcrum axis, the lever is afforded a relatively high degree of stability on the fulcrum with little or no tendency for the lever to turn laterally on the fulcrum.

The use of the knife-edge fulcrum 31 affords a material improvement over the semi-circular or rounded fulcrum conventionally employed in this type of slitter mechanism. The slitter disks 7 are almost invariably slightly irregular or out of round at the periphery, and at the higher speeds of operation, these slight irregularities have a tendency by reaction with the drum to cause the disk to jump away from the drum surface with consequent momentary partial release of the slitting pressure. Increase in the slitter tension will compensate for this undesirable action, but only to the extent that the slitter bar has freedom of movement on its fulcrum. Thus the greater the friction loss in the fulcrum, the greater will be the tension required and the lower the degree of compensation. The substantial elimination of friction loss in the fulcrum due to use of the knife edge affords more efficient slitting with reduced tension.

It will be noted further with reference to Fig. 5 that the wings 38 of the spacer element 35, which as previously set forth lie closely against the opposed faces of the side plates 9, 9, overlie the recesses 23 in the said plates in which are established the head ends of the pin 24. The wings 38, 38 thereby function in effect to close or seal the recesses, preventing access thereto of dust or lint which otherwise might find its way to the bearings 21. Similarly the close fit between the side plates 9 and the hub 22 of the disk 7 tends to prevent passage of dust and dirt to the bearings between the disk and the plates. In some instances, as shown in Fig. 9, a lever may be mounted on the fulcrum bar between two adjoining spacers 35, or in direct contact with another of the levers. Contact between the sides of the lever and the outer faces of the wings 38 of the spacers effects the bearing seal described above; and direct contact between the side faces of two immediately adjoining levers affords a mutual sealing effect.

I claim:

1. In a slitter lever assembly, spaced side plates having aligned apertures terminating respectively in recesses in the outer faces of the plates, said apertures being in the form of slots having enlarged portions, a pin neatly fitting the relatively small portions of the apertures and having enlarged heads at the ends thereof together with an enlarged mid portion insertable in the apertures through the said enlarged portions of the latter, said heads being confined to the said recesses entirely inside of the planes of the outer faces of the plates, and a slitter disk closely fitted between the plates and mounted on the said mid portion of the pin.

2. In a slitter unit of the type described, a lever having a rotary slitter disc at one end, a tensioning spring at the other end, and means for establishing a fulcrum at a point interme-

diate the spring and the disc, the axis of the disc, the outer end of the spring and the fulcruming means being relatively disposed so that after flexure of the spring, as in normal operation, a straight line intersecting the axis of the disk and the said spring end will lie substantially on or beyond the fulcrum point in the direction of said flexure.

3. In a slitter unit of the type described, a lever having a rotary slitter disc at one end, a tensioning spring at the other end, a fulcrum-receiving socket intermediate said disc and spring, the axis of the disc, the socket and the outer terminal end of the spring being in approximate alignment so that when the spring is flexed as in normal operation a straight line intersecting the axis of the disc and the said spring end will also intersect the said socket.

4. In a slitter unit of the type comprising a lever, a slitter element mounted in the lever, a leaf spring, and means for securing the spring to the lever; a seat on the lever for the spring, a clamp embracing and fitting closely against the sides of the lever and the spring around the seat, means on the clamp operative by reaction with the lever to draw the spring forcibly against the seat, and means for positively interlocking the clamp with the lever.

5. In a slitter assembly of the type comprising a lever having a fulcrum-receiving socket, a slitter element at one side of the socket, and a tensioning spring at the other side of the socket; a fulcrum bar of generally rectangular cross sectional form, said bar having a knife edge projecting from the top surface thereof for engagement in the said lever socket and a flat shoulder at each side of said knife edge, an inwardly and downwardly inclined surface forming one face of a longitudinal notch in one side face of the bar, and a spacer element having a recess for reception of said bar and seating solely against one side of the bar and said shoulders, said spacer having a slot-like opening in the top for reception of the lever, and a clamping screw in one side arranged substantially normal to and for engagement with the said inclined surface of the bar.

6. In a slitter assembly of the type comprising a lever having a fulcrum-receiving socket, a slitter disk at one side of the socket, and a spring at the other side of the socket for resiliently retaining the disk in engagement with a relatively movable platen; a bar forming a pivotal support for the lever and having a knife edge for engagement as a fulcrum in said socket.

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