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2,776,007

STRIP FEEDING AND BURSTING APPARATUS

Filed Oct. 11, 1954

4 Sheets-Sheet 1

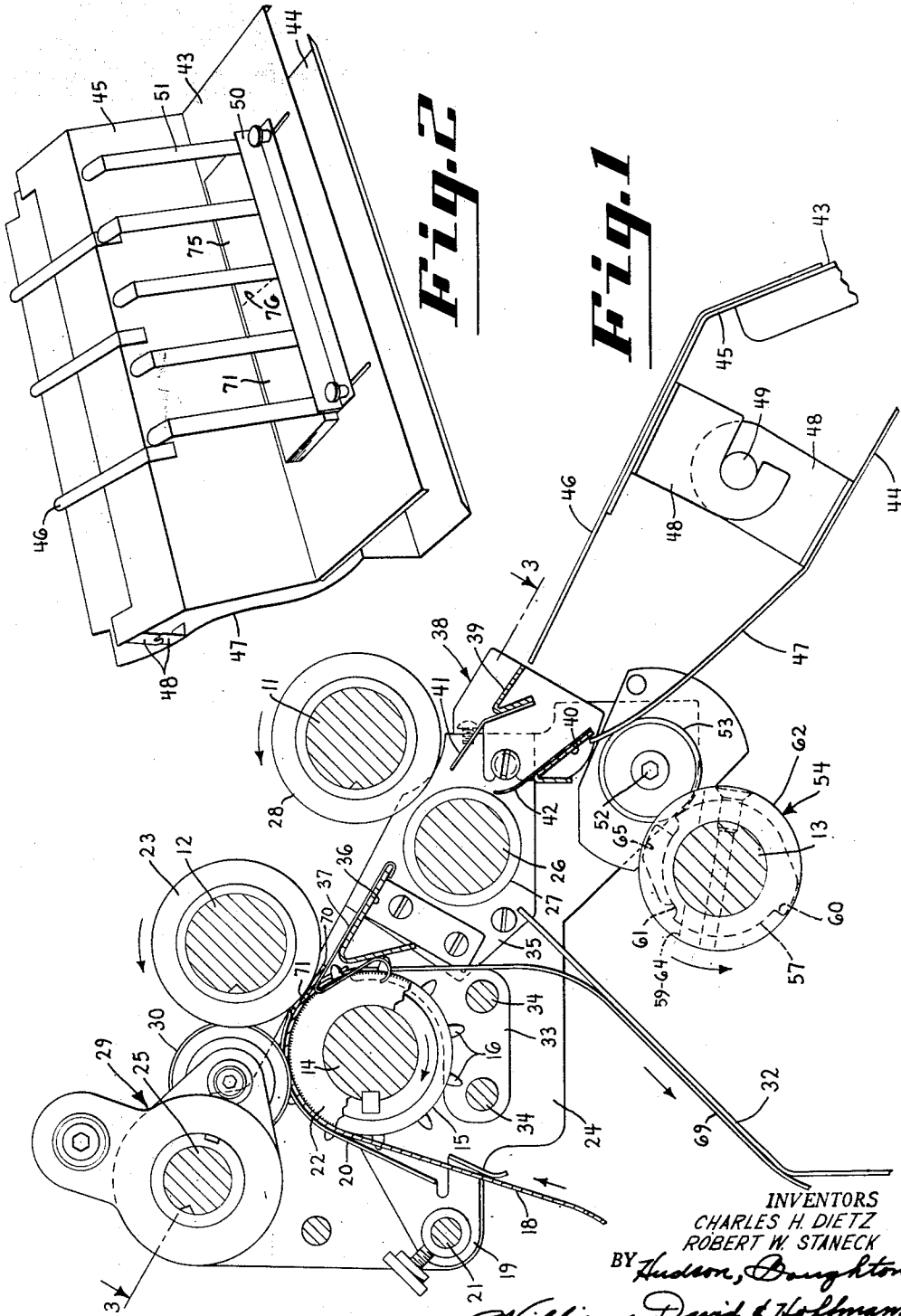


Fig. 2

Fig. 1

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4 Sheets-Sheet 3

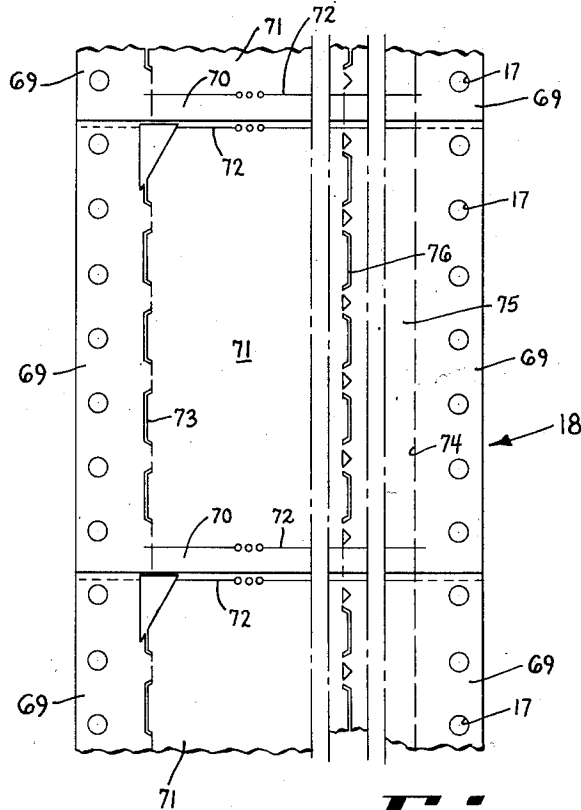


Fig. 4

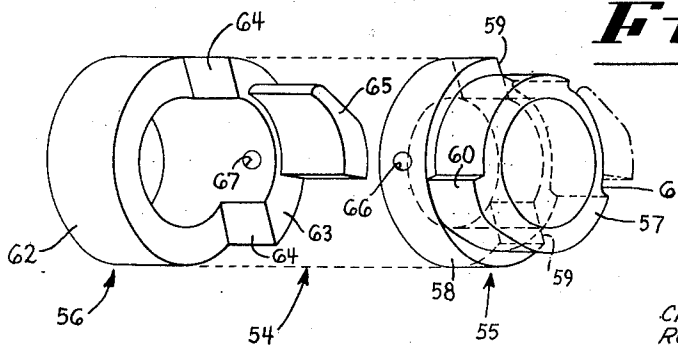


Fig. 6

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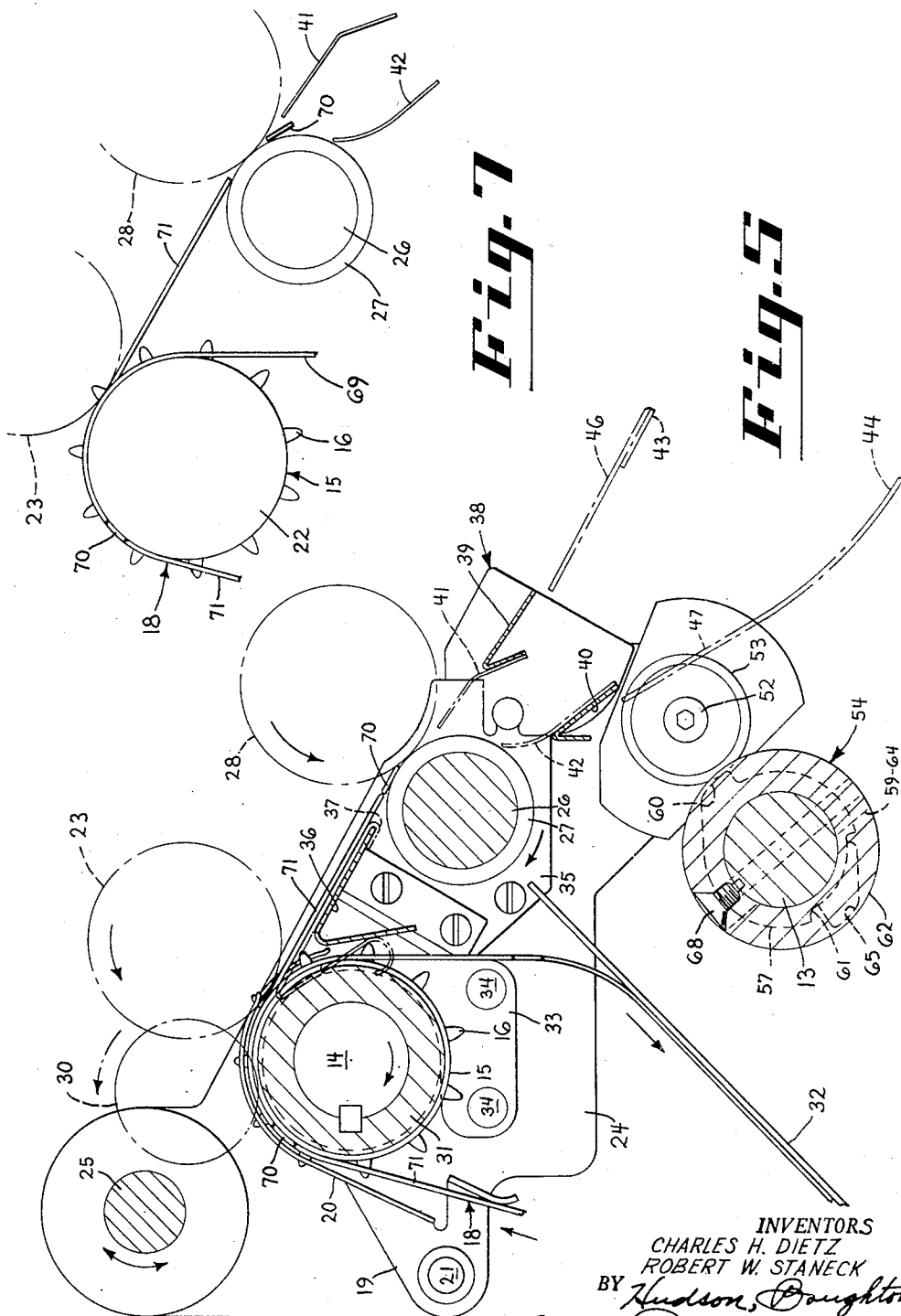


Fig. 7

Fig. 5

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2,776,007

STRIP FEEDING AND BURSTING APPARATUS

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Application October 11, 1954, Serial No. 461,452

12 Claims. (Cl. 164—84.5)

This invention relates to strip feeding and severing or bursting apparatus.

More particularly, the invention relates to apparatus of the type having means for advancing a strip of continuous series connected printed forms, cards or lengths through a severing or bursting station wherein the strip is severed at longitudinally spaced intervals into the separate forms, cards or lengths.

Heretofore apparatus has been employed for advancing a strip of continuous series connected printed business or other data receiving forms or cards all of equal length past a severing or bursting station wherein the forms or cards are each severed from the strip during a single feeding cycle of the strip. An example of the apparatus referred to is disclosed in United States Letters Patent to J. T. Davidson, No. 2,380,949, August 7, 1945.

Apparatus of the type shown in said Patent 2,380,949 includes means for feeding the strip from a supply source between cooperating snubbing rollers. The feeding means may be of a positive character such as the pin-wheel arrangement that cooperates with predeterminedly longitudinally spaced openings in the side margins of the strip. The strip passes from between the snubbing rollers between cooperating snatching or bursting rollers spaced therefrom in the direction of travel of the strip. The strip of predetermined longitudinally spaced locations is provided with transverse weakened division lines defining the separate cards of equal length. The cooperating snubbing rollers and the cooperating snatching rollers include upper and lower snubbing rollers and upper and lower snatching rollers. The upper rollers are on fixed axes while the lower rollers are on axes mounted in common rocker arms. The lower snubbing and snatching or bursting rollers intermittently and automatically are moved relatively toward and from their cooperating upper rollers by the rocking of the rocker arms so as to intermittently grip the strip therebetween and at such time the snatching or bursting rollers are rotated at an accelerated rate compared to the rate of rotation of the snubbing rollers. The snatching rollers grip the leading form or card adjacent its leading end while the snubbing rollers grip the following card or form adjacent its leading end. Consequently a longitudinal pulling strain or tension is exerted upon the strip by the snatching or bursting rollers and the result is that the leading card or form is severed from the strip at the transverse weakened division line between it and the next following card or form. The previous apparatus functions to sever cards or forms of equal length from the strip, one at a time, during each feeding cycle of the strip.

An object of the invention is to provide an apparatus of the type referred to which is capable of severing or bursting from the advancing strip during each feeding cycle thereof two uniform length or two non-uniform length portions of the strip.

A further object is to provide an apparatus of the type referred to which is capable of severing or bursting from the advancing strip alternately a long length strip

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portion and a shorter length strip portion during each feeding cycle.

Still more specifically an object is to provide an apparatus of the type referred to which is capable of operating upon a continuous series connected strip composed of card or form portions separated longitudinally by interconnecting dividing or spacing portions of comparatively short length and equivalent to a line of single spacing in typewriters or tabulators, with the apparatus functioning intermittently and alternatively to burst or sever the card portions and the dividing portions from the strip and then sequentially to deposit and stack the severed card or form portions in a suitable receptacle therefor and deliver the separated dividing portions into a different receptacle.

A further object is to provide in apparatus of the type referred to in the preceding objects means which can be readily varied to adapt the apparatus to function in each feeding cycle either to burst or sever therefrom two portions of uniform length or to burst or sever therefrom two portions of different lengths.

Another object is to provide an apparatus as referred to in the last named object and wherein the said means is so located and so constructed as to be readily accessible for quickly varying the same or for changeover without requiring the disassembly of the apparatus and without requiring special tools or skill.

A more general object of the invention is to provide a bursting apparatus which is readily adapted for multipurpose operation, such as the severing or bursting from the continuous strip of portions of uniform length or the severing or bursting therefrom alternatively of portions of two different lengths.

Another general object is to provide a severing or bursting apparatus which is an improvement over the prior apparatus of this type both as to its construction and mode of operation and which may be economically manufactured, is of simple design requiring relatively few operating parts and which can function throughout long periods of use without much maintenance care and without the likelihood of requiring repair operations thereon.

Further and additional objects and advantages not hereinbefore specified will become apparent during the detailed description of an embodiment of the invention which is to follow and which embodiment is illustrated in the accompanying drawings forming a part of this specification and wherein,

Fig. 1 is a vertical sectional view through an apparatus embodying the invention and illustrating the feeding and bursting mechanism of the apparatus in the interim period between bursting or severing operations and while the strip or web is being freely advanced and the lower snubbing rollers and the lower snatching rollers are separated or spaced from their upper cooperating rollers; the apparatus housing and other parts being omitted from this view for purposes of clarity.

Fig. 2 is a fragmentary perspective view of that portion of the apparatus at the right hand side of Fig. 1 with the side plates of the apparatus omitted, said Fig. 2 supplementing the disclosure of Fig. 1 with respect to the right hand side of the apparatus as viewed in Fig. 1 and showing the receptacle for sequentially receiving and stacking the severed cards or forms and the different receptacle or tray for receiving the dividing portions of the strip that are located between the cards or forms.

Fig. 3 is a fragmentary partial plan and partial sectional view of the apparatus and is taken approximately along line 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a fragmentary plan view of the continuous series connected strip showing the cards or forms thereof

which are interconnected by the overlapped shorter dividing portions of the strip, the strip also having the longitudinal marginal or side edge feeding portions provided with the longitudinally spaced openings for the pins of the pinwheel feeding mechanism and which marginal feeding portions are severed from the strip prior to the bursting operation.

Fig. 5 is a vertical sectional view somewhat similar to Fig. 1 but showing the relationship of the parts when the apparatus is acting upon the strip to sever or burst the leading dividing portion from the strip, said view being taken approximately along irregular line 5-5 of Fig. 3 looking in the direction of the arrows.

Fig. 6 is an exploded elevational view of the cam assembly for timing the bursting or severing operations of the apparatus so as to sever alternately the short dividing portions and then the longer card portions of the strip; and

Fig. 7 is a fragmentary view similar to a portion of Fig. 5 and illustrates the action of the apparatus immediately following the severing or bursting from the strip of the leading dividing portion which has connected in spaced relationship the previously severed or bursted card or form portion and the following card or form portion, the upper and lower snubbing rollers and the upper and lower snatching or bursting rollers still being in contact.

The apparatus illustrated and described herein and embodying the present invention is similar in its general aspects to the apparatus disclosed in said Davidson Patent 2,380,949 and hence the disclosure of certain parts which are common to both apparatus have been omitted herefrom for the sake of brevity.

The bursting apparatus embodying the present invention is adapted to be supported in elevated position on a table or stand or other suitable support and as in said Patent 2,380,949 comprises a base (not shown herein) which supports upright spaced side plates, one of which is indicated at 10 in Fig. 3. The side plates 10 may be interconnected by suitable tie rods as will be well understood. As in said Patent 2,380,949, the driving gear trains for the apparatus are located outside of the side plates and may be enclosed and protected by suitable casings or housings and which also enclose the driving motor for the apparatus (not shown herein). The mechanism by which the continuous strip or web is advanced to the severing or bursting station and tensioned is located between the side plates 10.

As disclosed in said Patent 2,380,949 the driving motor is operatively connected to one end of the upper bursting roller shaft 11 beyond one end of the side plates and which shaft is rotatably mounted in suitable bearings in both side plates 10. The opposite end of the shaft 11 beyond the other side plate has fixed thereto a pinion which meshes with the larger of a pair of different size idler gears mounted on one end of the upper snubbing roller shaft 12 which is rotatably supported by the side plates 10.

The shaft 12 on its opposite end mounts a pair of pinions one of which meshes with an idler gear that in turn meshes with a gear fixed on the cam shaft 13 which is journaled in the side plates 10. The other pinion of the pair of pinions on the shaft 12 meshes with a gear on the feed mechanism and lower snubbing roller on shaft 14 and said shaft 14 is journaled in rocker arms later to be referred to. It will be understood that the ratios of the several gears in the drive trains to the shafts 11 and 12 are such that the shaft 12 is driven at a constant speed materially less than that of the shaft 11.

Also it will be understood that by the use of interchangeable gears the drive to the cam shaft 13 can be selected to effect faster or slower rotation of the cam shaft and which, of course, will cause a change in the timing of the swinging or oscillating movements imparted to the rocker arms later to be referred to.

In view of the complete disclosure of the drives to the shafts 11, 12, 13 and 14 in said Davidson Patent 2,380,949, it is felt unnecessary to illustrate or to further explain the same herein since reference can be had to the disclosure of said patent.

The cam shaft 13 rotates counterclockwise while the feed and lower snubbing roller shaft 14 rotates clockwise and is driven at a constant speed correlated to the particular speed of the cam shaft 13 so as to effect cyclic operation of the cam assembly on the cam shaft (later to be described) in accordance with the particular lengths of the strip portions which are to be severed or bursted from the continuous strip or web.

The feed shaft 14 mounts a pair of pinwheels 15 and which wheels rotate with the shaft 14 and are relatively adjustable axially of said shaft and are provided on their circumferences with the usual circularly spaced radially extending pins 16. The pinwheels 15 constitute the rotary positive feeding elements of the feeding mechanism of the apparatus and the pins 16 thereof progressively engage in the longitudinally spaced perforations 17 in the side margins of the continuous strip or web 18 (later to be described) which is drawn by the wheels from a supply compartment and passes over and is guided by a suitable guiding surface and then extends partially about the periphery of the pinwheels 15.

The guiding surface over which the strip 18 passes is formed on the arm 19 which also mounts a finger 20 that overhangs the pinwheels and maintains the web or strip 18 in engagement with the peripheries of the pinwheels and with the pins 16 extending through the perforations 17 of the strip. The finger 20 is bifurcated to provide clearance for the rotating pins 16. The arm 19 is mounted on and secured to a tie rod 21.

The feed shaft 14 intermediate the pinwheels 15 mounts a plurality of axially spaced rollers 22 which are adapted to cooperate with similar rollers 23 on the shaft 12. The rollers 22 and 23 may be termed the lower and upper feed or snubbing rollers, respectively, and preferably are formed of rubber or similar material so as to have the necessary friction. These rollers, as will later be explained, intermittently engage or grip the continuous strip or web 18 beyond the point where the perforated marginal portions thereof have been detached from the strip.

As already stated, the side plates 10 journal the shafts 11, 12 and 13. The feed shaft 14 is journaled in a pair of rocker arms 24 located adjacent the side plates 10 and which are mounted on a rock shaft 25 parallel to shafts 11, 12, 13 and 14 and journaled in adjustable eccentric bushings or bearing sleeves carried by the side plates 10. This enables the rocker arms 24 to be adjusted in the direction of strip feeding movement and also vertically to vary the engaging force when the upper and lower snubbing and snatching rollers are brought into contact. The means for imparting such adjustments to the rock shaft 25 and rocker arms 24 is clearly shown in Fig. 7 of said Davidson Patent 2,380,949.

The rocker arms 24 rotatably support an idler shaft 26 which carries the lower snatching or bursting roll 27 that cooperates with the upper snatching rollers 28 on the shaft 11. The roll 27 and rollers 28 are similar to the rollers 22 and 23 on the shafts 14 and 12, respectively, which, as previously stated, are the lower and upper snubbing or feed rollers. It will be understood that the snatching rollers 28 are driven at an accelerated speed with respect to the snubbing or feed rollers 22 and 23. The rocker arms 24 are raised and lowered in intervals of predetermined timing during the cycle of operation of feeding movement by the cam assembly later to be referred to and such movement of the rocker arms alternately brings the lower rollers 22 and roll 27 into cooperating relationship with the upper rollers 23 and 28, respectively, then separates said cooperating rollers for a purpose

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which will later become evident. The interconnected rocker arms 24 may be termed a rockable carrier.

As in said Davidson Patent 2,380,949 the trimming assemblies 29 are mounted on the rocker shaft 25 for axial adjustment thereon and also for relative rotation with respect to said rock shaft so as to move the assemblies to an inoperative position when desired.

In the present apparatus one of the trimming assemblies i. e., the right hand one as shown in the drawing, is provided with the usual trimming disk 30 which bears against the hardened collar 31, see Fig. 3. The other trimming assembly i. e., the assembly on the left side of the apparatus is somewhat different in that it is provided with a disk having a flat surface instead of a trimming disk such as the disk 30 that has a sharp edge for slitting purposes.

The left hand trimming assembly is not shown in the drawings and the reason it differs from the right hand trimming assembly is because of the particular make-up of the continuous strip or web that is illustrated herein and which will be more fully explained hereinafter. At the present it should suffice to say that the two perforated longitudinal marginal edges of the continuous strip which may be termed the traction or feeding margins of the strip are separated from the strip by the trimming mechanism as the strip is positively driven by the pinwheels 15 and just prior to the strip passing between the rollers 22 and 23. The separated traction margins of the strip are removed from the strip and apparatus as scrap and are guided into a receiving tray 32 by a stripper member 33 which prevents the detached traction margins from moving in a circuitous path about the pinwheels. The stripper member 33 is axially adjustable in unison with the axial adjustment of the pinwheels 15 along the rods 34 which support the stripping member. The rods 34 and also the rod 21, as well as the shafts 14 and 26, are supported in the rocker arms 24 and move with said rocker when the latter are rockably oscillated. The rocker arms 24 on their inner or adjacent sides have secured thereto journal blocks 35, see Figs. 1 and 3, and which blocks rotatably support the idler shaft 26.

A supporting bar 36 is secured to the journal blocks 35 and is located intermediate the pinwheels 15 and the lower snatching rollers 27 on the idler shaft 26. The supporting bar 36 has attached to it table sections or fingers 37 spaced longitudinally of the bar 36. These table sections or fingers project from the bar toward the shaft 14 and are illustrated herein as being formed of spring metal and substantially V-shaped in cross section, with one arm overlying and engaging and parallel to the outer surface of the supporting bar 36 and having an intumed end clipping onto the supporting bar 36 while the other arm of the sections or fingers extends downwardly at an angle from the first mentioned arm and at its lower end engages an angularly disposed portion of the supporting bar 36, see Fig. 1.

The journal blocks 35 to the right of the idler shaft 26 and the lower snatching roller 27, as viewed in Fig. 1, have fastened thereto a separating assembly indicated generally at 38. The separating assembly 38 includes an upper support 39 and a lower support 40, said supports extending transversely of the apparatus intermediate the blocks 35 and have their upper surfaces downwardly inclined for a reason later to be explained, with the upper surface of the lower support 40 inclined at a steeper angle than the upper surface of the upper support 39.

The upper support 39 mounts a number of extension fingers 41, said fingers being spaced longitudinally of the upper support 39 and projecting therefrom toward the roller 27 substantially in the plane of the upper side of the upper support 39 and substantially tangentially to the roller 27. The lower support 40 is provided on its upper surface with a relatively wide extension plate 42 which is located centrally of the apparatus and extends longitudinally of the lower support 40. The extension plate 42

has its upper or free end curved upwardly as clearly shown in Fig. 1 and said free end of the extension plate is located in closer proximity to the circumference of the roller 27 than is the free end of the extension fingers 41.

To the right of the upper and lower supports 39 and 40 as viewed in Fig. 1, are located an upper tray 43 for sequentially receiving and stacking the severed or bursted cards or form portions and a lower tray 44 for receiving the dividing or separating portions severed from the continuous strip or web. The upper tray 43 at its left hand edge includes an intermediate upwardly inclined portion 45 composed of two angularly disposed sections. The upwardly inclined portion 45 of the tray 43 is provided with a plurality of fingers 46 spaced transversely of the apparatus and extending toward and into close proximity to the upper support 39 and overlying the cutaway upper edge of the upwardly inclined portion 45. The lower tray 44 includes an upwardly extending portion 47, the upper or free edge of which underlies the lower edge of the lower support 40 as clearly shown in Fig. 1. The upper and lower trays 43 and 44 are maintained in properly spaced relationship by means of brackets 48 which cooperate with headed studs 49 secured to the side plates 10. The trays 43 and 44 accordingly can be readily removed or mounted in the apparatus, thus facilitating the servicing or repair of the apparatus. The upper tray 43 adjustably mounts a stop bar 50 against which the severed cards or forms strike when projected into the tray as will later be described. The stop bar 50 is provided with a series of upwardly extending stop fingers 51 spaced longitudinally of the stop bar and acting to guide the severed cards into the tray 43.

As shown in Figs. 1 and 3, the right hand rocker arm 24, as viewed in said figures, mounts a stud 52 which projects inwardly from the inner side of the rocker arm and this stud rotatably mounts a cam follower roller 53 that cooperates with a cam assembly on the cam shaft 13 and indicated generally at 54. The cam assembly 54 is so designated that the rocker arm 24 will be raised and lowered twice during each complete revolution of the cam shaft 13. In other words, during each complete revolution of the cam shaft 13 and each feeding cycle of the apparatus the lower rollers 22 and 27 will be moved twice into engagement with the upper rollers 23 and 28, respectively, and away from such engagement. This is accomplished by providing the cam assembly with two angularly spaced camming lobes that engage the cam follower roller 53 to twice raise the rocker arms 24 and then allow the same to move downwardly during each complete rotation of the cam shaft.

The cam assembly 54 shown in Fig. 6 has its two camming lobes arranged diametrically opposite each other so that equal time intervals occur between the engagement of each cam lobe with the cam follower roller 53. The cam assembly is formed of two interconnected sections indicated generally at 55 and 56. The cam section 55 may be termed the stationary section since it is not movable axially of the cam shaft 13 and is fixed relative to the section 56 which latter section may be termed the floating or movable cam section. The cam section 55 comprises a sleeve 57 which has at one end a segmental collar or flange 58, the opposite ends of which present circularly spaced flats or shoulders 59. The sleeve 57 is provided on its circumference with a cam lobe 60. Also the sleeve 57 is provided with a recess 61 that is the length of the sleeve and also extends circularly thereof but is located in circumferentially spaced relationship to the cam lobe 60. The cam section 55 is mounted on the cam shaft 13 and is fixed thereto for rotation therewith but is held against axial movement so that the cam lobe 60 will be in position to engage with the cam follower roller 53.

The floating or movable cam section 56 comprises a collar 62 having an internal diameter to fit the cam shaft 13 and corresponding to the internal diameter of

the bore in the sleeve 57. The collar 62 is provided with an axially extending segmental portion 63 which at its opposite circularly spaced ends presents flats or shoulders 64. The outer end of the segmental portion 63 is provided with an axially projecting cam lobe 65. When the cam sections 55 and 56 are coupled together on the cam shaft 13 the segmental collar or flange 58 of the section 55 complements the segmental portion 63 of the cam section 56 to form therewith a continuous circular sleeve with the flats or shoulders 59 on the collar or flange 58 bearing against the flats or shoulders 64 on the segmental portion 63.

The cam lobe 65 of the cam section 56 will when the two cam sections are assembled on the shaft 13 extend into the recess 61 of the sleeve 57 and bear against said sleeve. The cam lobes 60 and 65 are formed so that when the cam sections are coupled together said cam lobes will have identical lifting effect on the cam follower roller 53 and the rockable carrier to which it is attached. The collar 58 of the cam section 55 is provided with a radial opening 66 which when the section 55 is mounted on the cam shaft 13 aligns with a diametrically extending opening in the cam shaft. When the cam section 56 is assembled on the cam shaft 13 and coupled to the cam section 55 the segmental portion 63 of the section 56 is so located that a radial opening 67 therein aligns with the diametral opening just referred to in the shaft 13. Consequently a key pin can be passed through the opening 66 in the cam section 55 through the diametral opening in the cam shaft 13 and into the opening 67 in the cam section 56 to lock said cam sections to the shaft 13 and in coupled relationship to each other. The key pin may be backed up by a headed screw 68 screwed into the opening 66 as shown in Fig. 5.

Assuming the cam sections 55 and 56 of Fig. 6 are secured on the cam shaft 13 and are coupled together, it will be seen that equal time intervals occur between the engagement of the cam lobe 60 with the cam follower roller 53 and the engagement of the cam lobe 65 therewith since said lobes are diametrically opposed.

The continuous strip 18 for which the apparatus illustrated is adapted to function is shown in Fig. 4. As already stated, the longitudinal side margins 69 of the strip are each provided with a series of longitudinally spaced openings 17 for feeding cooperation with the pins 16 of the pinwheels 15. The continuous strip 18 is formed of alternating dividing portions 70 of relatively short length and card portions 71 of relatively long length. Separating the dividing portions 70 from the card portions 71 are preweakened transversely extending lines of severance 72. These lines of severance 72 extend between the longitudinally extending preweakened line 73 near the left side of Fig. 4 and the longitudinally extending preweakened line 74 near the right of Fig. 4. The preweakened lines 73 and 74 interconnect the longitudinal side margins 69 of the strip with the dividing portions 70 and the card portions 71. The card portions 71 include a stub 75 integrally attached to the main card portion 71 by a longitudinally extending series of configurations 76, wherefore the stubs 75 can be folded over on the cards 71. Herein wherever card portions 71 are referred to it will be understood that they include in addition to the main card the stubs 75.

The continuous strip illustrated herein and just described is formed of commercially marketed record cards or forms connected together in continuous series in an overlapping arrangement. However, it is believed that sufficient details of the continuous strip have been shown and described herein to enable a complete and clear description to be set forth of the advantages incident to the apparatus embodying the invention and the manner or mode in which it functions to sever or burst from the continuous strip two portions during each complete ro-

tation of the cam shaft and which portions may be of unequal length or of equal length.

In order to coordinate the description thus far set forth and to clearly bring out the manner in which the apparatus functions a résumé of its operation will now be given.

It will be assumed that the cam shaft 13 rotates at a faster speed than does the feed shaft 14 and that the ratio between the speeds of rotation of the cam shaft 13 and feed shaft 14 is such that the cam shaft makes a complete revolution when the feed shaft has made a partial revolution that advances the web one form length. A form length is the distance between the leading edge of the leading dividing strip portion 70 of the web and the division line 72 which separates the following card portion 71 of the web from the next dividing strip portion thereof.

Even though the cam lobes 60 and 65 of the cam assembly 54 are diametrically opposed they can be utilized to effect bursting of the relatively short dividing strip portions 70 and of the relatively long card portions 71 of the web. This is accomplished by utilizing the last part only of one cam lobe for dividing strip snatching or bursting and the entire camming surface of the other cam lobe for card snatching or bursting. In addition, the rocker arms 24 are adjusted by adjusting the rock shaft 25 so as to move the lower snubbing rollers 22 and the snatching roll 27 forwardly in the direction of web feeding to change the point of contact between the upper and lower snubbing rollers and between the upper snatching rollers and the lower snatching roll. Also the rocker arms are adjusted so that the lower rollers will be brought into contact with the upper rollers with sufficient pressure to compress the material of the rollers and thus extend the area of contact between the rollers from a line contact to a surface contact on each side of their theoretical line of tangency.

In order to clearly bring out the manner in which the diametrically opposed cam lobes can function to effect bursting or severing of strip portions of unequal length it is thought necessary to give a specific example utilizing the actual dimension of a single form of the web, i. e., the length of a dividing strip portion and a card portion. It may be assumed that a form length is $3\frac{1}{2}$ inches, that is the measurement between the leading edge of the leading dividing strip portion 70 and the preweakened division line 72 separating the following card portion 71 from the following dividing strip portion 70. The dividing strip portions are $\frac{1}{4}$ inch and the card portions are $3\frac{1}{4}$ inches in length. It may also be assumed that the pinwheels 15 have a circumference of $5\frac{1}{2}$ inches and carry eleven equally circularly spaced pins 16 so that for each rotation of the feed shaft 14 the web is fed forwardly $5\frac{1}{2}$ inches. However, the diametrically opposed cam lobes 60 and 65 of the cam assembly 54 must both operate to raise the rocker arms during the feeding of a form length of the web, namely, during a form feeding cycle of $3\frac{1}{2}$ inches. This means, of course, that the cam shaft 13 makes a complete revolution for each partial revolution of the feed shaft 14 which in the illustration would be for each $\frac{7}{11}$ revolution of the feed shaft. This ratio between the speed of rotation of the feed shaft and of the cam shaft can be readily obtained by the use of suitable conventional gears in the drive trains to these shafts as will be understood from the disclosure of said Davidson Patent 2,380,949.

It may further be assumed and understood that in the particular example the centers of shafts 11 and 12 as well as the centers of shafts 14 and 26 are spaced apart $2\frac{1}{2}$ inches. It may be assumed that the web 18 has been positioned on the pinwheel 15 so that the leading edge of the leading dividing strip portion and which constitutes the leading edge of the first form is spaced beyond the point of tangency between the snubbing rollers in the feeding direction, that is toward the right as viewed in

Fig. 1. Likewise, the preweakened division line 72 between the leading dividing strip portion 70 and the following card portion 71 of the web should be substantially at the point of tangency. The location of the leading edge of the leading dividing strip portion 70, i. e., the leading edge of the first form, may be assumed to be one-fourth inch beyond the point of tangency of the web with respect to the pinwheels and lower snubbing rollers 22, since the length of this portion is one-fourth inch. The cam shaft 13 is now adjusted independently of the feed shaft 14 until the cam lobe 65, for instance, is in the position just after it leaves contact with the follower 53 as indicated in Fig. 1. At this time the rocker arms are in their lower position and the upper and lower snubbing and snatching rollers are separated. Now assuming the cam shaft and feed shaft are again operatively correlated and that the apparatus is placed in operation, the web will have been fed forwardly by the pinwheels $1\frac{3}{4}$ inches by the time the cam lobe 60 contacts the follower 53. This means that the leading edge of the leading dividing strip portion 70 is now two inches beyond the point of tangency between the web and the snubbing rollers. Since the centers of the shafts 11 and 12 and of the shafts 26 and 14 are spaced apart $2\frac{1}{2}$ inches, it will be evident that the leading edge of the leading dividing strip portion 70 is still one-half inch from the snatching grip location between the snatching rollers 23 and roll 27. A portion of this one-half inch discrepancy may be compensated for by adjusting the rock shaft 25 to move the rock arms in the direction of web feeding a slight amount so as to move the leading edge of the leading dividing strip portion closer to the snatching point. Also the rock shaft 25 may be adjusted to change the vertical axis of rocking movement of the rocker arms 24 so that the lower snubbing and snatching rollers, when engaged with their cooperating upper rollers will exert sufficient pressure thereon so the rollers are compressed thus widening the zone of contact between the rollers, wherefore the snatching rollers will have snatching contact with each other a slight distance on each side of the theoretical line contact between the snatching rollers.

It will be recalled that the snubbing and snatching rollers are formed of rubber or other compressible material and hence readily function to widen the area of contact between the rollers when the rollers are pressed together. This widening of the contact between the rollers compensates additionally to take up part of the one-half inch discrepancy between the leading edge of the leading dividing strip portion and the snatching point. Also at the time the cam lobe 60 first engages the follower 53 the leading edge of the leading dividing strip portion 70 has not yet reached the snatching point and even though the cam lobe 60 raises the rocker arms to engage the cooperating snubbing and snatching rollers, the feeding movement continues during the major portion of the action of the cam lobe 60 on the follower until the leading edge of the leading dividing strip portion has reached the snatching point. This occurs near the end of the engagement of the cam lobe 60 with the follower. In other words, feeding continues during the major part of the engagement of the cam lobe 60 with the follower 53 and it is only near the end of such engagement that the snatching action occurs with respect to the dividing strip portion. At this time the following card portion 71 is gripped by the snubbing rollers and only a brief snatching action is needed by the snatching rollers to detach the leading dividing strip portion 70 from the following card portion 71. As this occurs the cam lobe 60 passes out of contact with the follower 53 and the rocker arms drop down and the snubbing and snatching rollers are separated, whereupon the detached or severed dividing strip portion 70 falls by gravity into the tray 44. The operation of the mechanism continuing the leading edge of the following card portion of the web advances between the separated snatching rollers $1\frac{3}{4}$ inches before

the cam lobe 65 first engages the follower 53. This means that a substantial part of the forward end of the following card portion 71 overlies and rests upon the extension fingers 41 of the upper support 39 before the snatching action commences. When the cam lobe 65 first contacts the follower 53 the feeding movement of the web has advanced the following card portion 71 in the manner stated and also has brought the following dividing strip portion 70 between the snubbing rollers but with its leading edge that is connected to the card portion 71 by the preweakened line 72 located in the feeding direction just beyond the point of snubbing contact between the snubbing rollers. The instant that the camming lobe 65 has engaged the follower 53 and has raised the rocker arms 24 the snatching action commences and the card portion 71 is severed or bursted from the following dividing strip portion 70 that is now held by the snubbing rolls. The continued engagement of the cam lobe 65 with the follower 53 acts to feed the card portion 71 forwardly due to the accelerated rotation of the snatching rollers and to provide the necessary force to propel the card into the tray 43 for stacking. Also during the continued engagement of the cam lobe 65 with the follower 53 the following dividing strip portion 70 has continued its feeding movement until its leading edge is $\frac{1}{4}$ inch beyond the snubbing point so the operation may be repeated for a new form length. This mode of operation is repeated successively for the succeeding form lengths of the series connected web.

Although a preferred embodiment of the invention has been illustrated and described herein it will be understood that the invention is susceptible of various modifications and adaptations within the scope of the appended claims.

Having thus described our invention, we claim:

1. A strip severing or bursting apparatus including a pair of snatching rollers and a relatively spaced pair of snubbing rollers, a rockable carrier upon which one roller of each pair is mounted for simultaneous intermittent movement toward and from the other roller of the respective pairs of rollers to momentarily grip therebetween a strip to be severed, a strip feeding means mounted upon the carrier and operative to advance the strip relative to the rollers, driving means for imparting to the snatching rollers peripheral speed greater than that of the snubbing rollers and to the feeding means a speed substantially equal to the speed of the snubbing rollers and for rocking the carrier in timed sequence with the operation of the rollers and feeding means and including a cam follower on said carrier and a cam assembly having cam lobes sequentially engaging said follower to effect multiple rocking of said carrier during each complete cycle of operation of said cam assembly.

2. A strip severing or bursting apparatus as defined in claim 1 and wherein said lobes of said cam assembly are so spaced as to provide equal time intervals between the rocking movements of the carrier in each complete operative cycle of the assembly.

3. A strip severing or bursting apparatus as defined in claim 1 and wherein said cam assembly is rotatable.

4. A strip severing or bursting apparatus as defined in claim 1 and wherein said cam assembly is rotatable and said lobes are equally spaced apart 180° .

5. A strip severing or bursting apparatus as defined in claim 1 and wherein said cam assembly is rotatable and includes a section that is axially fixed and is provided with a cam lobe and a section that is axially movable relative to the first-named section and is provided with a cam lobe, and means for operatively interconnecting said sections.

6. A strip severing or bursting apparatus as defined in claim 5 and wherein the cam lobes of the two sections of the cam assembly are diametrically opposed.

7. A strip severing or bursting apparatus as defined in claim 5 and wherein the axially fixed section of the cam assembly includes a sleeve provided on its circumference

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with a cam lobe and with a recess angularly spaced from said cam lobe, said axially fixed section also including a segmental collar located at one end of said sleeve, said other section of the cam assembly including a collar having an axially extending segmental portion adapted to cooperate with said segmental collar at the first section when the sections are interconnected, said segmental portion being provided with an axially extending cam lobe engaging in said recess of said sleeve of the first section when said sections are interconnected.

8. A strip bursting apparatus for severing into separate portions a continuous strip formed of a series of the portions longitudinally arranged and interconnected by transverse weakened division lines, said apparatus comprising an upper snubbing roller and an upper snatching roller spaced therefrom with both of said rollers rotatable on fixed axes, a carrier rockable on an axis parallel to the axes of said rollers, a lower snubbing roller and a lower snatching roller spaced therefrom and both rotatable on axes supported by said carrier and parallel to the rocking axis of said carrier, wherefore said lower rollers will be moved by the rocking of the carrier into and out of engagement with the upper rollers to cause a strip passing between the upper and lower rollers to be intermittently gripped thereby, a strip feeding means rotatable on the axis of the lower snubbing roller, a cam follower supported by said carrier, a camshaft rotatable on a fixed axis; means for driving said snubbing rollers, said feeding means and said camshaft at correlated speeds of rotation and for driving said upper snatching roller at an accelerated speed of rotation relative to the rotating speed of the snubbing roller, and a cam assembly on said camshaft and provided with angularly disposed lobes cooperating with said follower to rock said carrier and effect multiple gripping of the strip by the snubbing and snatching rollers and multiple severing of portions from the strip during each complete rotation of said cam assembly.

9. A strip bursting apparatus as defined in claim 8

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and wherein the lobes of said cam assembly are two in number and are diametrically opposed to each other to provide equal time intervals between the sequential engagements of the cam follower by said lobes.

10. A strip bursting apparatus as defined in claim 8 and wherein said cam assembly includes two sections, one axially fixed on said camshaft and provided with one cam lobe and another section movable axially of said camshaft and provided with one cam lobe, and means for interconnecting said sections with said cam lobes arranged to move with the assembly in the same circular path with one lobe following the other lobe.

11. A bursting apparatus as defined in claim 10 and wherein the lobes of the two sections of the cam assembly are diametrically opposed.

12. A strip bursting apparatus as defined in claim 10 and wherein one section of the cam assembly includes a sleeve provided on its circumference with a cam lobe and with a recess spaced angularly from said lobe, said sleeve also being provided at one end with a segmental collar, the other section of said cam assembly including a cylindrical collar from which axially projects a segmental portion provided at its free end with an axially extending cam lobe, said first section having its sleeve mounted on said camshaft and being axially fixed relative to said camshaft, said second section having its cylindrical collar mounted on said camshaft and its segmental portion cooperating with the segmental collar of the first section and with the cam lobe of the second section engaging the sleeve of the first section and located in the circumferential recess thereof and angularly disposed to the cam lobe of the first section.

References Cited in the file of this patent

UNITED STATES PATENTS

2,328,582	Ratchford	Sept. 7, 1943
2,380,949	Davidson	Aug. 7, 1945