

Sept. 1, 1964

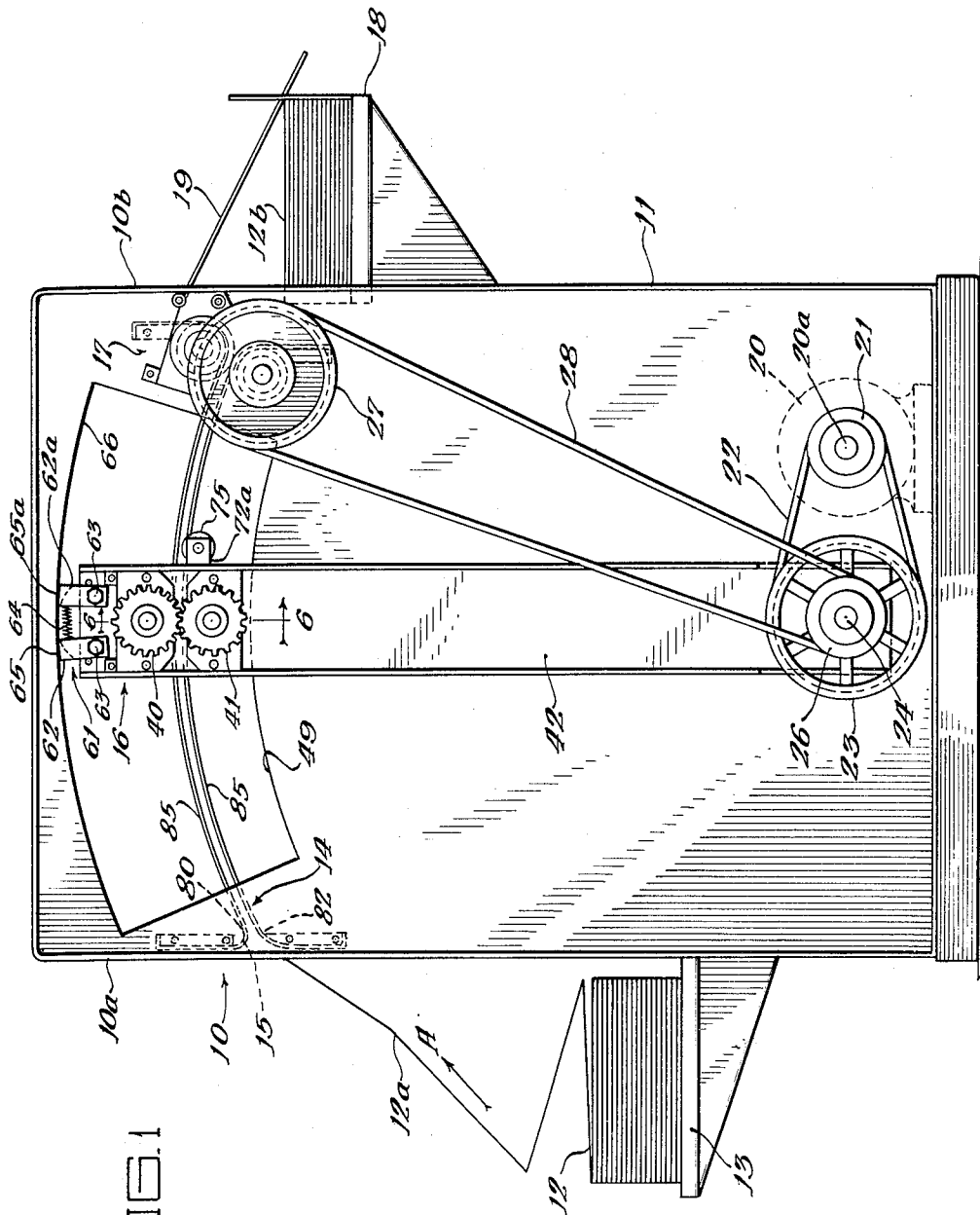
C. L. PETERSON

3,146,927

FORMS BURSTER

Filed Dec. 31, 1962

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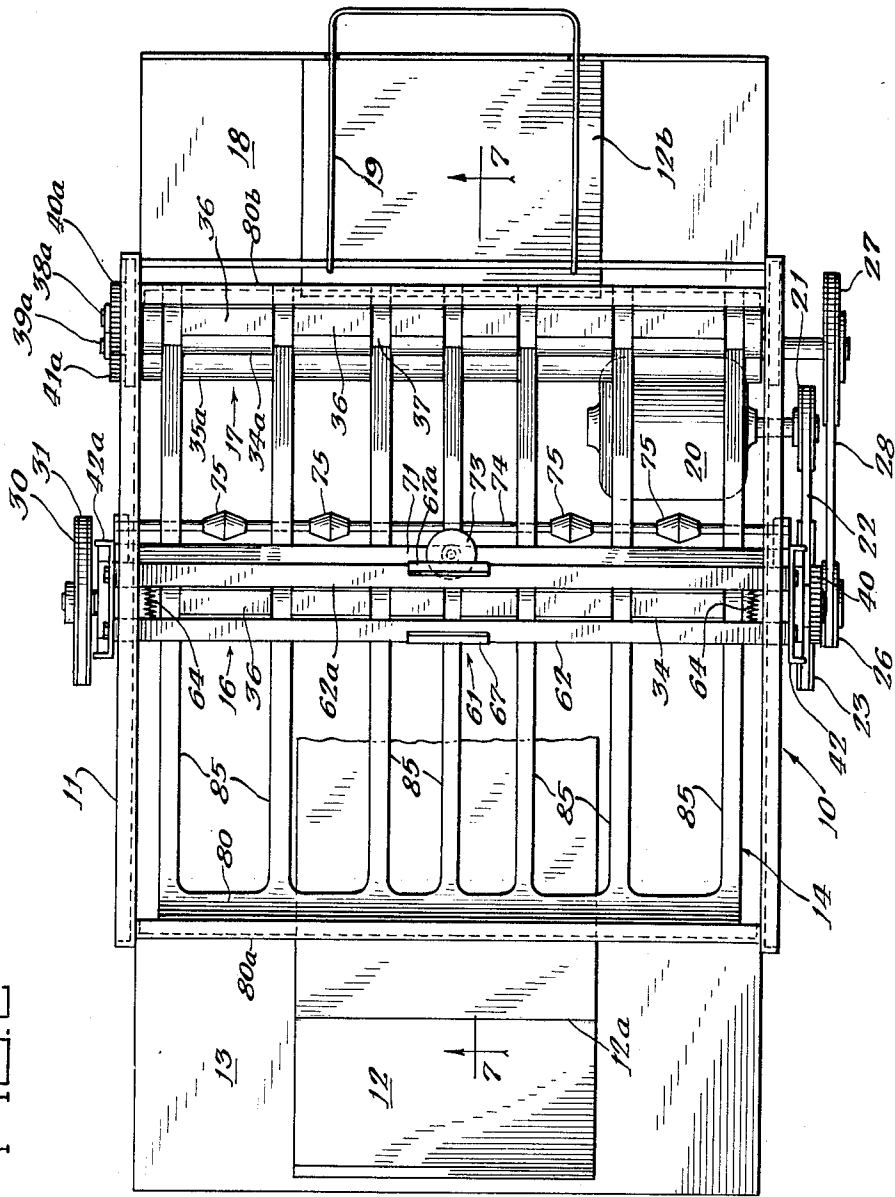
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FIG. 2



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FIG 3

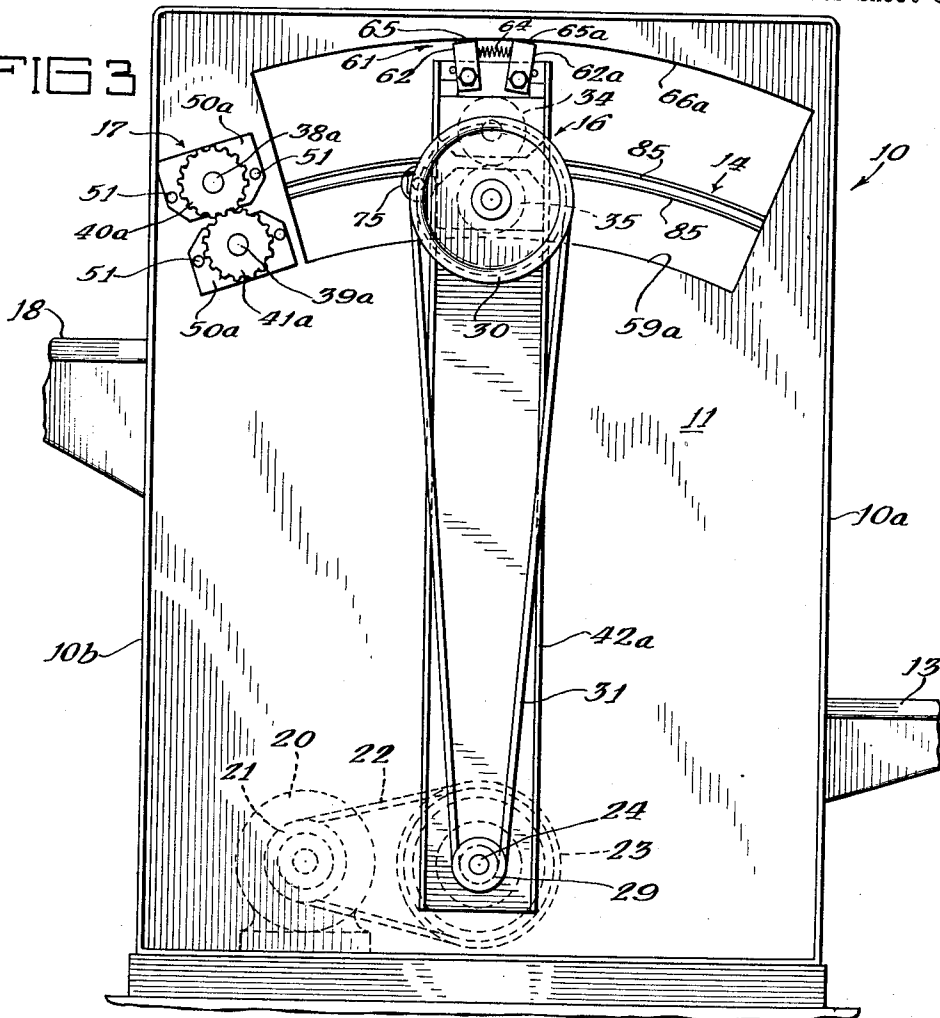
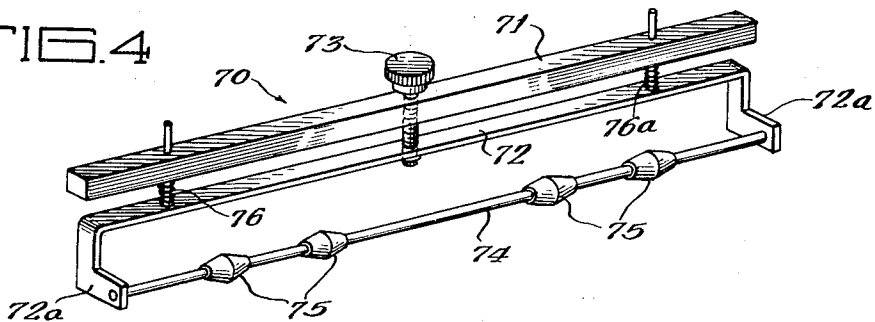


FIG. 4



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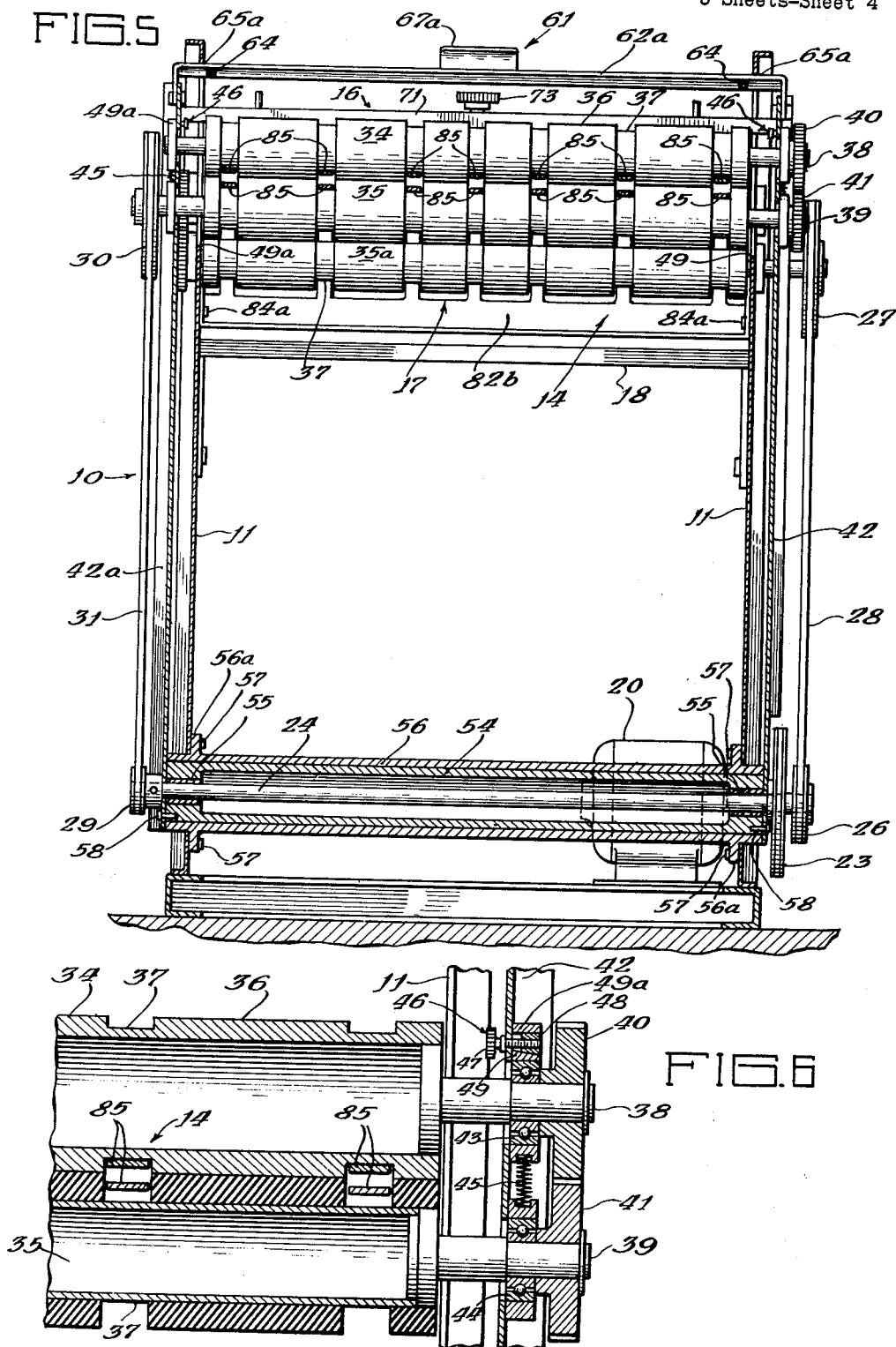
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FIG. 5



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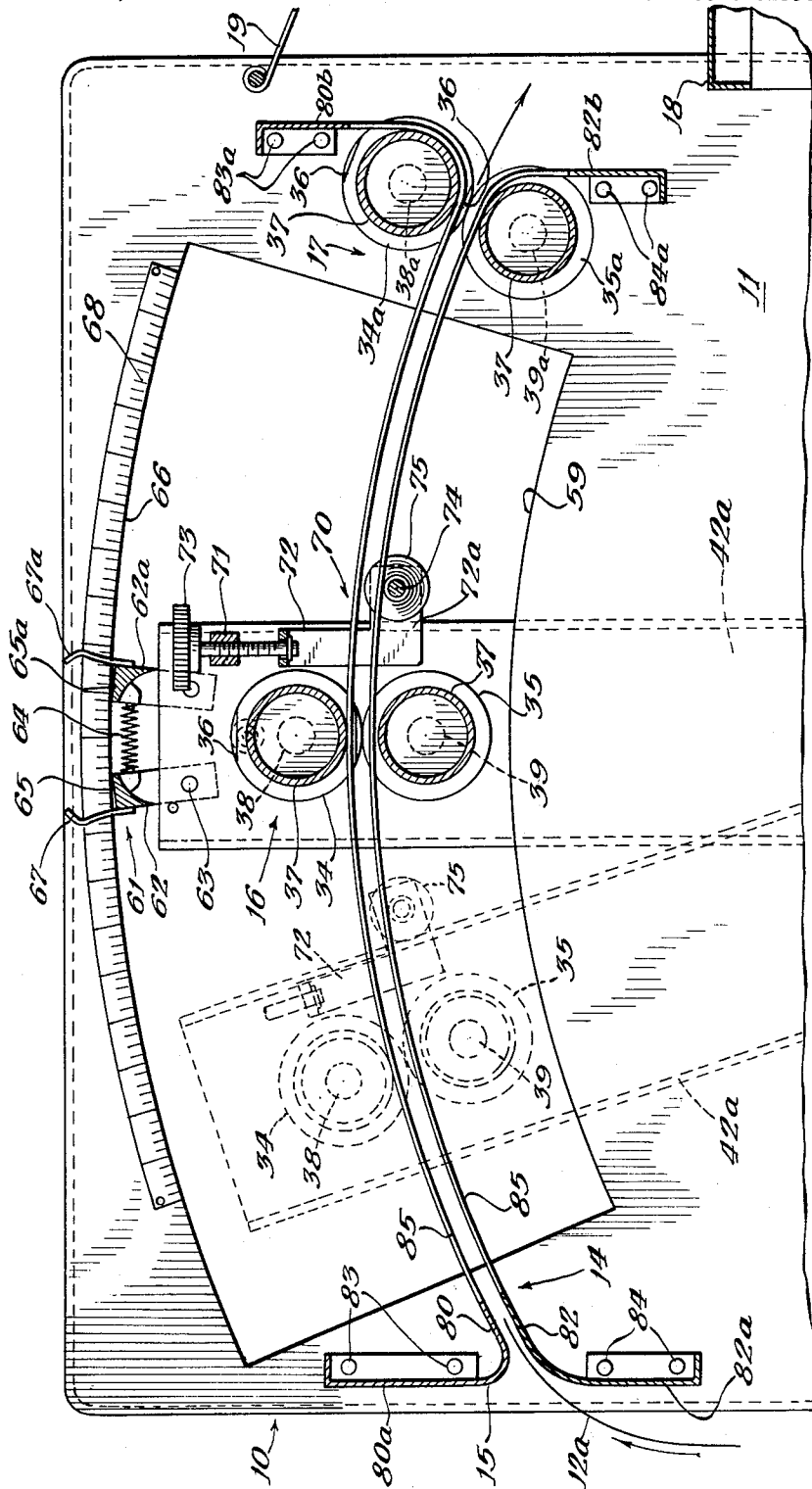
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FIG. 7



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Charles L. Peterson, Crystal Lake, Ill., assignor to Uarco Incorporated, a corporation of Illinois
Filed Dec. 31, 1962, Ser. No. 248,476
11 Claims. (Cl. 225—100)

This invention relates to stationery processing mechanisms and more particularly to a bursting device for separating form lengths from continuous form stationery.

Bursting machines have been developed which utilize the principle of two sets of timed rollers for separating the individual form length from the continuous form. These rollers are provided with "flats" in order to allow stationery to pass freely therebetween at periodic intervals so as to substantially eliminate "bubbles" which may appear in the surface of the stationery being fed through the machine. Usually the most rearward of the two sets of rollers is driven at a faster speed than the other set and has a number of flats on the periphery thereof, which in relation to the number of flats on the other set of rollers, is inverse to the ratio of the speed of the rearward set of rollers to the speed of the other set of rollers. In order to adapt the bursting machine for bursting continuous form stationery of different form lengths, the intermediate set of rollers must be movable relative to the rearward set of rollers. It is important that the timed relationship between the two sets of rollers is not lost. Bursters have been developed such as those illustrated in the co-pending application of Robert M. Pine and Donald J. Steidinger, Serial No. 210,982, filed July 19, 1962, entitled "Burster," and owned by the assignee of this invention, in which a different means is provided for moving the intermediate set of rollers relative to the rearward set of rollers without interfering with the timed relationship therebetween.

It is therefore an object of this invention to provide a new and improved burster device.

It is another object of this invention to provide a new and improved burster having an intermediate roller unit which is adjustable relative to a fixed rear roller unit to vary the space therebetween for various form lengths of stationery while maintaining a predetermined timed relationship between the units.

It is still another object of this invention to provide a new and improved burster having two roller units therein, the first roller unit being adjustable relative to the second roller unit to vary the space therebetween for adapting the burster for various form lengths of stationery, the first set of rollers being manually adjustable and self-locking at any preselected position.

It is a further object of this invention to provide a new and improved burster mechanism having two roller units therein driven by a common power source; the rear roller unit being in a fixed position in the burster and the front roller unit being mounted on a pivoted arm and manually laterally adjustable relative to the rear unit and self-locking in any preselected position to adapt the unit for processing continuous form stationery of different form lengths; both roller units having a plurality of longitudinal flats thereon with the front roller unit being driven at a reduced speed relative to the rear roller unit, the ratio of the speed of the rear and intermediate roller unit being inverse to the ratio of the number of flats on the individual rollers of the rear and intermediate roller units.

Other objects, features and advantages of the present invention will be readily apparent from the following description of the preferred embodiment illustrated in the accompanying drawings, in which:

FIGURE 1 is a broken side elevational view partially

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diagrammatic of a burster unit embodying this invention; FIGURE 2 is a top plan view of the device shown in FIGURE 1;

FIGURE 3 is a fragmentary broken side elevational view of the device shown in FIGURE 1 taken from the opposite side thereof;

FIGURE 4 is an enlarged fragmentary view showing the breaker roll assembly;

FIGURE 5 is a vertical section view of the device of this invention taken generally normal to the path of stationery travel therethrough;

FIGURE 6 is a fragmentary enlarged section view taken along the line 6—6 of FIGURE 1 showing the front roller mounting in detail; and

FIGURE 7 is an enlarged fragmentary section view taken along the line 7—7 of FIGURE 2.

The burster 10 of this invention is enclosed in a generally rectangular frame 11 as shown in FIGURES 1 and 2. The burster is adapted to receive a zigzag folded stack 12 of continuous form stationery 12a which is deposited on a shelf 13 at the front end 10a thereof. From the stack 12 the continuous form stationery 12a is driven through the burster in the direction indicated by the arrow A in FIGURE 1. The stationery is fed in the paper guide means 14 at the front end infeed or channel 15 thereof. The guiding means directs the stationery during its path of travel through the driven front and rear roller units, 16 and 17, respectively. The front and rear roller units are operably associated, as will be explained later, and cooperate to separate the continuous forms stationery into individual form lengths 12b which are deposited on a shelf 18 at the rear end 10b of the burster. A paper holding device 19 is pivotally mounted on the burster above the rear shelf 18 for holding the individual form lengths 12b thereon.

Mounted within the frame 11 and positioned at the bottom thereof is a motor 20 having a motor pulley 21 mounted on one end of the motor shaft 20a. A motor pulley drive belt 22 interconnects the motor pulley 21 and the drive shaft pulley 23 for supplying rotation thereto. The drive shaft pulley 23 is mounted at one end of the drive shaft 24 which extends across the bottom of the burster at the mid-point thereof substantially transverse to the line of paper travel. Mounted on the drive shaft 24 at one end thereof is a rear drive roller drive shaft pulley 26 which is interconnected with the rear drive roller pulley 27 by a belt 28 for supplying rotational force thereto. Mounted on the other end of the drive shaft 24, opposite from the pulley 26, is the front drive roller drive shaft pulley 29 which is interconnected with the front drive roller pulley 30 by a belt 31 for supplying motive force to the front drive roller unit 16.

Each roller unit 16 and 17 is provided with a pair of vertically adjacent rollers extending generally transverse to the path of paper travel, such as top rollers 34 and 34a, respectively, which are positioned above the line of paper travel, and bottom rollers 35 and 35a, respectively, which are positioned below the line of paper travel. The aforementioned top rollers have a means for releasing the grip on the stationery at periodic intervals, or longitudinally extending flats 36. In the preferred embodiment of this invention the rear rollers 34a and 35a are driven at twice the speed as the front rollers 34 and 35 and thus the rear roller 34a has half as many flats thereon as the front roller 34. An actual two-to-one ratio is not necessary so long as the ratio of the speed of the two roller units is inverse to the ratio of the number of flats on the individual rollers and these rollers maintain a timed relationship so that the flat on roller 34 and one of the flats on roller 34a are in opposed relationship to their respective lower roller at the same time. This permits any bubbles or any

build-ups in the stationery which might occur to periodically pass on through the rollers and thus eliminate one of the major causes of jamming of burster machines or creasing of continuous form stationery. Each of the rollers is also provided with a plurality of longitudinally spaced areas of reduced diameter 37 which permit elements of the guiding means 14 to pass through the roller units and continuously throughout the path of travel of the stationery through the burster.

Each of the rollers 34 and 35 and 34a and 35a have axially mounted outwardly extending spindles 38, 39, and 38a and 39a, respectively, which have meshing spur gears 40 and 41, and 40a and 41a, respectively, mounted thereon on the ends opposite from their respective drive pulley. The front unit drive pulley 27 is mounted on the lower front unit roller spindle 39 and rotation of this spindle causes rotation of the lower shaft gear 41 at the end opposite from the pulley which is in meshing engagement with the upper shaft gear 40, thus driving both rollers of the unit. Similarly, the rear drive roller pulley 27 is mounted on the lower rear roller spindle 39a. Rotation of the pulley 27 thus rotates the lower spindle 39a which has mounted on its opposite end the spur gear 41a in meshing engagement with the gear 40a of the upper roller shaft 38a, thus driving both rollers of the rear roller unit 17.

The intermediate roller unit 16 projects laterally outward from arcuate slots 59 and 59a formed in the side walls of the frame and is mounted at each end thereof on the arms 42 and 42a which are pivotally mounted on the drive shaft casing 25. The means by which the aforementioned rollers are journaled for rotation is illustrated in detail in FIGURE 6. The upper and lower drive spindles, 38 and 39, respectively, are journaled in bearings 43 and 44, respectively, and are spaced apart by means of a coil spring 45 interposed therebetween. The lower bearing 44 is secured to the arm 42 but the upper bearing 43 floats relative thereto held apart from the lower bearing 44 by the aforementioned spring 45. Positioned in the arm 42 above the bearing 43 is the drive roller adjusting means 46 for adjusting the distance between the spindles 38 and 39 and, therefore, the peripheries of the rollers 34 and 35.

The adjusting means 46 includes a manually operated screw 47 having a biasing member 48 threaded thereon. The biasing member 48 comprises a nut having one face which is angled relative to the longitudinal extent of the screw shank. Positioned between the biasing member 48 and the upper bearing 43 is a variable spacing member 49. The spacing member 49 comprises a spacer block or wedge having one face also angled relative to the shank of the screw member 47 and mating with the biasing member 48. As the screw 47 is turned and the biasing member 48 is drawn up along the shank thereof the cooperating wedging action of the mating inclined surfaces of the biasing member 48 and the spacer 49 cause a resultant lateral movement in a direction generally perpendicular to the screw shank. Since the adjusting means housing member 49a prevents the lateral movement from being applied in a direction thereabove it must be directed therebelow to the upper roller bearing housing 43 which presses against the spring means 45 thus bringing the peripheries of the rollers 34 and 35 in closer proximity to each other.

The rear roller unit 17 is rotatably journaled at each end in bearing blocks 50 and 50a which are mounted at the rear of the burster. The blocks 50 and 50a are commonly secured to each side of the burster frame 11 by bolts or screws 51 to form the unit 17. Roller unit 17 is provided with an adjusting means similar to the adjusting means 46 of roller unit 16.

As shown in FIGURE 5, a sleeve 54 is concentrically mounted on the drive shaft 24 and bearings 55 are interposed between the sleeve and shaft at either end there-

of permitting rotation of the sleeve relative to the casing. The sleeve 54 is similarly positioned within a circumferentially surrounding cylinder 56 having flanges 56a at either end through which bolts 57 pass to secure the cylinder, which thus houses the sleeve 54 and the drive shaft 24, to the burster frame 11. The roller unit arms 42 and 42a are secured to the sleeve 54 by pins 58, thus making the arms rotatable or pivoted relative to the drive shaft 24. This mounting does not disturb the operable relation between the drive components, namely the drive shaft pulley 29 and the roller unit pulley 30, since the pulley 30 is mounted on the roller shaft 39 and is therefore fixed relative to the arms 42 and 42a which are pivotal relative to the pulley 29. Thus when the arms 42 and 42a are pivoted about their mounting to position the roller unit 16 at preselected points of stationary travel, the timed relationship between the rollers of the roller unit 16 and 17 are not disturbed since the arms pivot about a common center with that of the pulley 29 so that the individual rollers of the roller unit 16 are not rotated during such pivotal movement of the arms.

Positioned on the top of the roller unit 16 and extending thereacross is the front roller unit positioning and locking means 61. This locking and positioning means 61 is provided for changing the relative distance between the front unit 16 and the rear unit 17 to adjust the burster for bursting continuous form stationery having individual form lengths of different dimensions. The positioning and locking means 61 includes a pair of parallel spaced bars 62 and 62a extending across the path of paper travel and spaced thereabove. The bars 62 and 62a are each pivotally secured at their respective ends by means, such as pins 63, to the upright arms 42 and 42a. Resilient means, such as a spring 64, is interposed between the bars 62 and 62a at each end thereof and yieldingly urges the bars apart, causing the upper surfaces 65 and 65a of each end of the bars 62 and 62a, respectively, to contact the upper inner edge 66 and 66a of the arcuate slots 59 and 59a, respectively, thus frictionally locking the roller unit 16 in preselected positions on the path of travel of the stationery through the burster. An upstanding handle 67 and 67a is provided at the mid-portion of each bar 62 and 62a, respectively, to permit squeezing by hand pressure to bring the bars together in opposition to the resilient means 64. This causes the bars to turn inwardly about their pivotal mounting and brings the surfaces 65 and 65a out of frictional engagement with the inner arcuate edges 66 and 66a. Thus the roller unit 16 may then be freely moved along the path of stationery travel by pivoting the unit about its mounting with the sleeve 54. Upon release of the handles 67 and 67a the resilient means 64 then urges the bars 62 and 62a apart relative to each other about their pivotal mountings and brings the surfaces 65 and 65a into frictional engagement with the arcuate edge 66 and 66a, respectively, to mount the roller unit in any preselected position along the path of stationery travel through the burster.

As shown in FIGURE 7 an appropriate scale 68 may be provided above the arcuate slot 59 for providing means for measuring the relative distance between the two roller units. In particular, this scale may be graduated into form lengths of stationery which the burster is adapted to burst when the front roller unit 16 is at any given position along the length thereof.

Positioned at the rear of the front roller unit 16 and between the roller units 16 and 17 is a stationery breaker means 70. The breaker means 70 includes a supporting bar 71 extending across the path of paper travel and spaced thereabove and secured at each end to the arms 42 and 42a. The generally L-shaped breaker roller shaft mounting bar 72 is secured therebelow by a securing and adjusting screw 73 which extends through the supporting bar 71 and mounting bar 72 in threaded engagement therewith. The mounting bar 72 has a leg portion 72a extending below the path of paper travel and generally

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parallel thereto. The breaker roller shaft 74 is rotatably journaled at either end in the leg portion 72a and has a plurality of breaker rollers 75 mounted thereon. Resilient spacer means such as spring 76 and 76a are interposed between the supporting bars 71 and mounting bar 72 for cooperating with the securing and adjusting screw 73 to maintain the bars in a preselected position. By turning the screw 73 the two bars may be brought closer together or farther apart which thus causes portions of the peripheries of the breaker roller 75 to move accordingly into or out of the path of paper travel. Thus this mere action of turning the thumb screw which vertically adjusts the mounting bar will adjust the breaker rollers as well. With a portion of the peripheries of the rollers 75 extending slightly above the line of paper travel, the stationery passing through the burster is caused to be deflected slightly upward at that point. Such vertical deflection will cause an increase in the tension in the stationery. As the transverse line of weakening passes the point of the breaker rollers the driving engagement of the rear roller unit will cause the stationery to be progressively torn evenly along that line of weakening creating the "burst" or separation of the individual form lengths from the remainder of the continuous form stationery.

Extending in the direction of paper travel and positioned above and below the line of paper travel is the paper guide means 14. The guide means 14 consists of two rigid elongate generally arcuate members of sheet metal 80 and 82 which are positioned above and below the path of paper travel, respectively, to form a paper guiding channel. The upper guiding member 80 has a front upturned end 80a which is secured at either side to the interior side of the wall of the burster as at 83 and a similarly upturned rear end 80b which extends around the periphery of the rear roller 37 and is similarly secured to the interior of the burster wall as at 83a. Accordingly, the lower paper guiding member 82 has a similarly downturned front end 82a secured at either side to the interior walls of the burster as at 84 and a downturned rear end 82b extending around the periphery of the roller 37 and secured at either side to the interior of the rearward wall of the burster as at 84a. The outturned front ends 80a and 82a of the upper and lower guiding members cooperate to form the aforementioned front infeed channel 15 through which the stationery passes as it is fed into the burster. The channel 15 forms a restricted infeed passage which tends to smooth out stationery entering the burster.

Each guide means 80 and 82 is cut away in the body portion to form a series of rigid bars 85 laterally spaced from each other and extending generally in the direction of paper travel. Each bar 85 extends continuously throughout the path of paper travel through the burster, passing through the roller unit 16 and 17 in the recessed areas 37 of the individual rollers. The closely spaced bar elements 85 of the guide means 80 and 82 dampen the vertical movement of the stationery 12a without substantially limiting the horizontal movement thereof.

As stationery is fed into the front end of the burster it is directed through the channel 15 and thence continuously supported from below and confined from above by the spaced bars 85 throughout its path of travel through the burster. Thus the paper guide means 14 aids the flow of paper through the burster and also promotes the constant feeding thereof.

This new and improved burster provides a means for maintaining a constant rate of paper feed by providing for two sets of rollers having flat portions thereon with the sets of rollers being timed in reverse proportion to the number of flats on each set. The two sets of rollers may be positioned at different spaced distances to accommodate different form lengths of stationery by simple means which does not interfere with the timed relationship therebetween. Mere application of hand pressure and release thereof will adapt the front set of rollers for

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swinging about an arc parallel to the line of paper travel and thence lock the rollers at any preselected position along the aforementioned path of paper travel. This simple positioning and self-locking means does not require the use of any auxiliary motors or complicated gearing mechanisms. The front and rear set of rollers are driven from a common source and they receive their motive power along two independent channels, thus allowing this adjustment to take place without interfering with the aforementioned timed relationship therebetween. This burster is also provided with a means for guiding the paper along its path throughout the machine so as to minimize vertical deflection and thus substantially eliminate "buckling" in the stationery. The vertically adjustable breaker roller allows the burster to be independently adjusted to conform to the tensions of various types of stationery which may be fed therethrough and thus improve the bursting action. Moreover the individual sets of rollers may be adjusted so that the relative distance between the peripheries thereof may be made to conform to the thickness of the stationery being processed by the burster.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, for some modifications will be obvious to those skilled in the art.

I claim:

1. A bursting machine for bursting continuous form stationery into form lengths between transverse lines of weakening, comprising; a base frame, a first pair of coaxing driven rollers mounted in said frame, said rollers having adjacent surfaces with a plurality of longitudinally extending flats formed thereon, said first pair of coaxing rollers being geared together for rotation at a common peripheral rate; a pivotally mounted arm extending substantially normal to the direction of paper travel; a second pair of coaxing driven rollers operatively mounted on said arm, said second pair of rollers having adjacent surfaces and also having a plurality of longitudinally extending flats, said second pair of rollers being driven at a reduced speed relative to said first pair of rollers, the ratio of the speed of said first and second rollers being inverse to the ratio of the number of flats on said first to the number of flats on said second rollers.

2. The device of claim 1 wherein said pivotally mounted arm is movable as a unit in the direction of paper travel so that movement of said arm will not turn the second pair of rollers and therefore the timed relationship between said first and second pairs of rollers is maintained upon movement of the arm in the direction of paper travel.

3. In a bursting machine having first and second pairs of driven rollers driven at different speeds, means for mounting one of said pairs of rollers for movement relative to the other pair comprising a pivoted arm in which said one pair of rollers is journaled.

4. In a bursting machine having a first pair of driven rollers mounted in said frame and a second pair of rollers driven at a reduced speed relative to said first pair of rollers, a pair of pivoted arms for mounting said second pair of rollers for lateral movement relative to said first pair of rollers to adjust said machine for bursting stationery of different form lengths.

5. In a bursting machine having a frame, a first pair of driven rollers mounted in said frame, said first pair of rollers having longitudinally extending flats thereon, and a second pair of rollers having a plurality of longitudinally extending flats thereon and driven at a timed reduced speed relative to said first pair of rollers, the number of flats on said first and second rollers being in inverse ratio to the speed thereof; a pair of pivoted arms for mounting said second pair of rollers for movement relative to said first pair of rollers to adjust said machine for bursting stationery of different form lengths without disturbing the timed relationship of said pairs of rollers.

6. In a bursting machine having a frame, a first pair

of driven rollers mounted in said frame, said first pair of rollers having longitudinally extending flats thereon, and a second pair of rollers having a plurality of longitudinally extending flats thereon and driven at a timed reduced speed relative to said first pair of rollers, the number of flats on said first and second rollers being in inverse ratio to the speed thereof, a pair of pivoted arms for mounting said second pair of rollers for lateral movement relative to said first pair of rollers to adjust said machine for bursting stationery or different form lengths without disturbing the timed relationship of said pairs of rollers, and locking means mounted on said arms and normally urged in locking engagement with said frame to lock said pivoted arms and position the rollers at selected positions along the path of stationery travel spaced from said first pair of rollers, said locking means being releasable upon actuation thereof to move said arms and adapted to automatically engage in locking relation with said frame upon termination of release thereof.

7. The bursting machine of claim 6 wherein said locking means includes a spring loaded member normally in frictional engagement with said frame, said member being manually compressible to permit movement of said arms and said second pair of rollers in selected positions along the path of paper travel and adapted to frictionally engage said frame in locking engagement thereto upon release thereof.

8. In a bursting machine for bursting continuous form stationery into form lengths, a frame, driving means in said frame, a first pair of rollers driven by said driving means, said first pair of rollers having longitudinally extending flats thereon, a second pair of rollers having a plurality of longitudinally extending flats thereon and driven by said driving means at a timed reduced speed relative to said first pair of rollers, the number of flats on said first and second pairs of rollers being in inverse ratio to the speed thereof; a pair of pivoted arms for mounting said second pair of rollers for movement relative to said first pair of rollers to adapt said machine for bursting stationery into different form lengths without disturbing the timed relationship of said pairs of rollers.

9. The bursting machine of claim 8 wherein said means for driving said rollers includes a driven shaft positioned in the pivotal mounting for said arms and about which said arms are rotatable relative thereto, one end of said shaft having a pulley thereon; one end of each of said pairs of rollers also having a pulley thereon for receiving a driving force from said driven shaft through an interconnecting belt, so that the timed relationship between said first and second pair of rollers will be maintained as said second pair of rollers is moved in the direction of paper travel by swinging said arms about said pivotal mounting to adapt said machine for bursting stationery of different form lengths.

10. The bursting machine of claim 9 including locking means for locking the pivoted arms to secure the rollers

at selected positions along the path of stationery travel comprising: a spring loaded member normally in frictional engagement with said frame, said member being manually compressible to permit movement of said arms and said second pair of rollers in selected positions along the path of paper travel and adapted to frictionally engage said frame in locking engagement upon release thereof.

11. A bursting machine for bursting continuous form stationery into form lengths between transverse lines of weakening, comprising: a frame; driving means in said frame including a driving shaft generally transverse to the path of stationery travel through the machine; side panels mounted to said frame outside the path of stationery travel, each side panel having a relatively wide arcuate slot therein extending generally parallel to the path of stationery travel; a first pair of stationery rollers driven by said driving means, said rollers being mounted in said slots in said frame generally transverse to the path of paper travel and having longitudinally extending flats thereon; a second pair of rollers mounted in said frame transverse to the path of stationery travel and across said slots in said side panels having a plurality of longitudinally extending flats thereon and driven by said driving means at a timed reduced speed relative to said first pair of rollers, the number of flats on said first and second pairs of rollers being in inverse ratio to the speed thereof; a pair of arms pivoted to said drive shaft and positioned outside said side panels for mounting said second pair of rollers for movement in said slots relative to said first pair of rollers; means interconnecting one end of said drive shaft to said first pair of rollers and the other end of said drive shaft to the second pair of rollers so that movement of said arms to move said second set of rollers to adapt said machine for bursting stationery of different form lengths will not disturb the timed relationship of said rollers; and locking means on said second set of rollers including a pair of spaced bars pivoted to the second set of rollers and being normally urged apart by a spring interposed therebetween, said bars having surfaces at either end thereof normally in frictionally locking engagement with said slot in response to the urging of said spring; said spring further being manually compressible to move said bars toward each other and out of frictional locking engagement with said slot to permit movement of said arms and said second pair of rollers to selected positions along the path of stationery travel and automatically moving said bars in frictional locking engagement with said slot upon the release of said spring.

References Cited in the file of this patent

UNITED STATES PATENTS

2,252,736	Sherman et al.	Aug. 19, 1941
2,375,542	Euth	May 8, 1945
2,380,949	Davidson	Aug. 7, 1945
2,513,093	Hageman	June 27, 1950