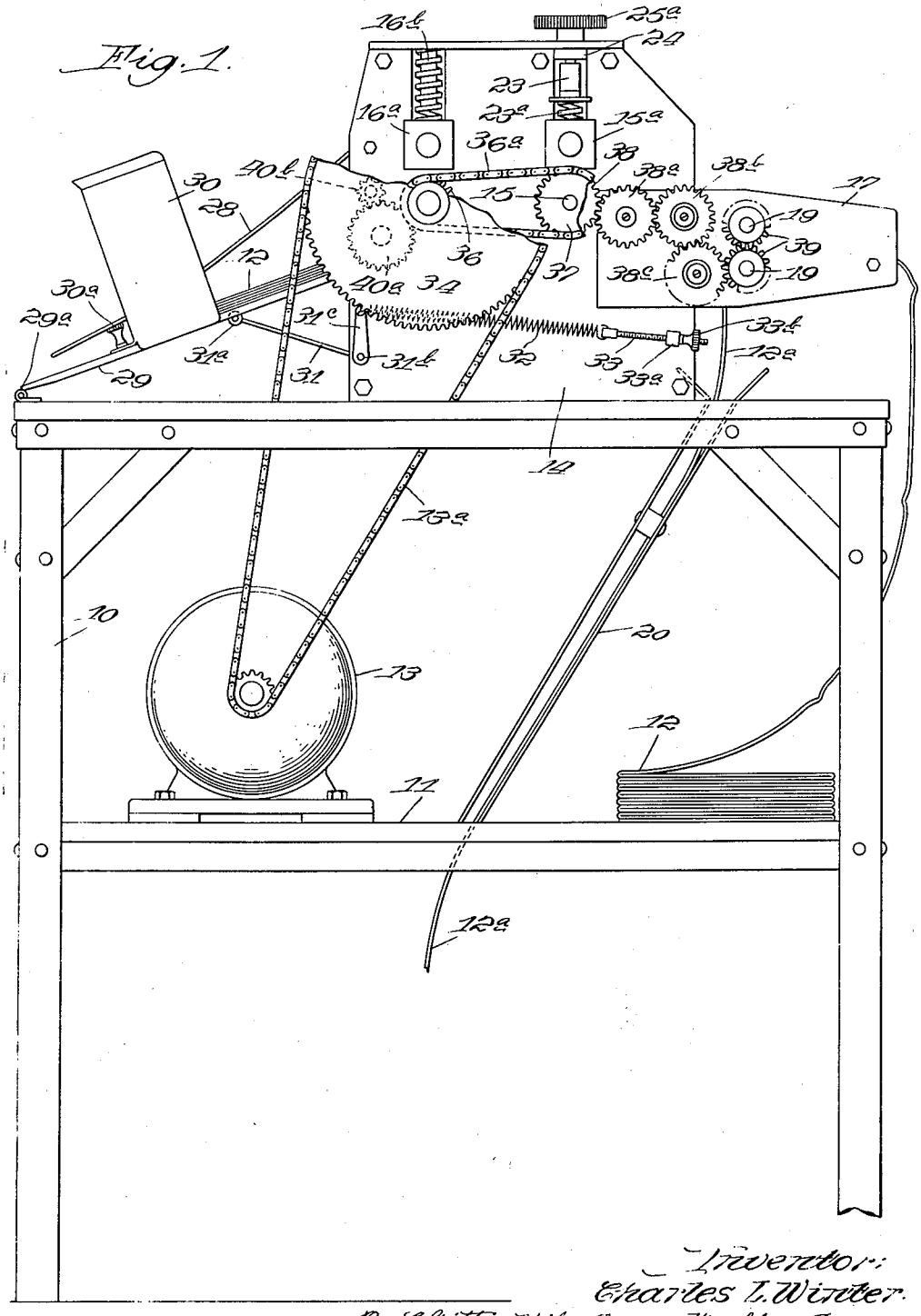
June 17, 1941. C. L. WINTER 2,246,228

BURSTING MACHINE

Filed Feb. 26, 1940 6 Sheets-Sheet 1

Fig. 1.



Inventor:
Charles L. Winter.
By Britton, Wiles, Davis, Kirschl & Dawson.
Attys.

June 17, 1941. C. L. WINTER 2,246,228

BURSTING MACHINE

Filed Feb. 26, 1940 6 Sheets-Sheet 2

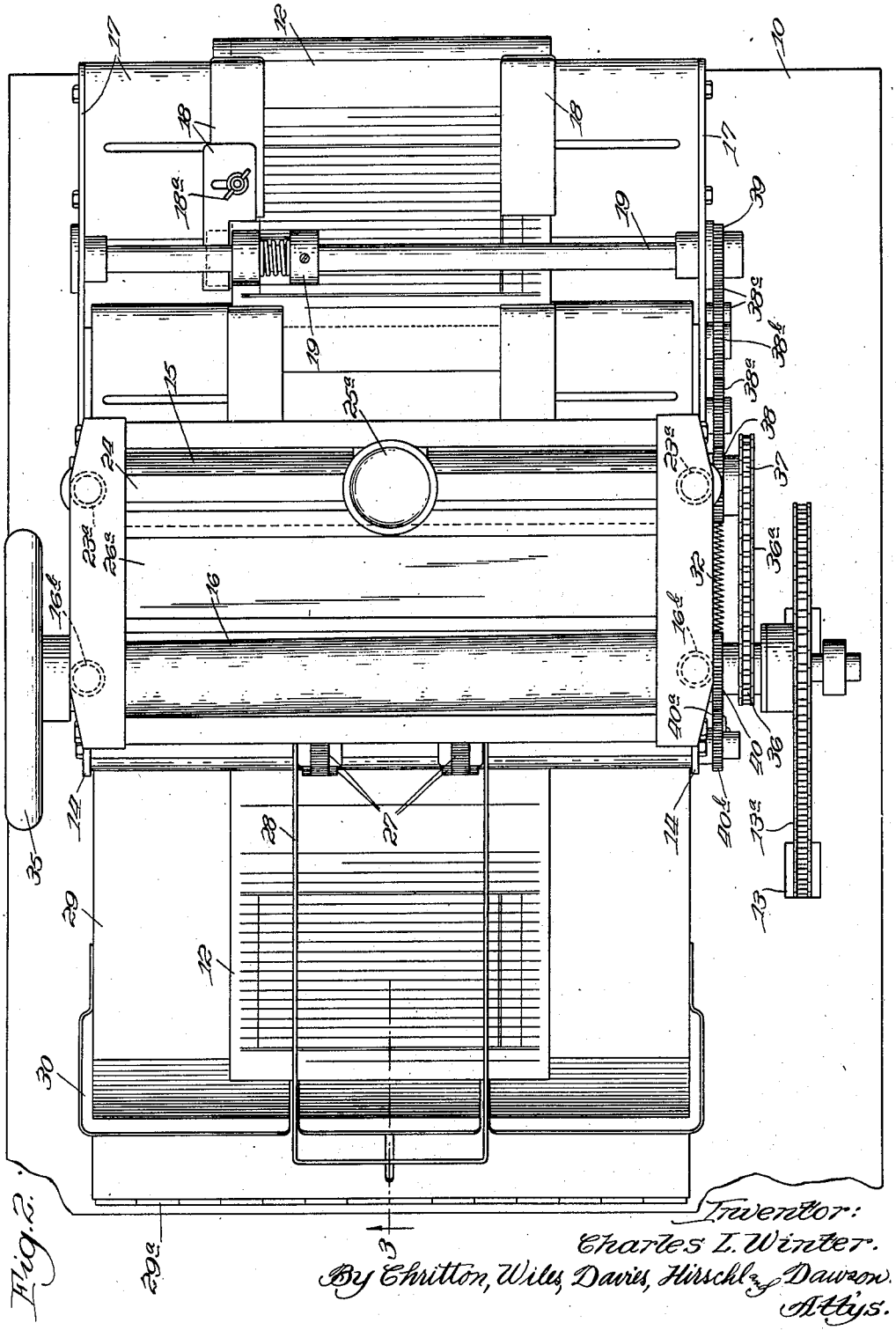


Fig. 2.

Inventor:
Charles L. Winter.
By Chritton, Wiles, Davies, Hirschland Dawson.
Atty's.

June 17, 1941. C. L. WINTER 2,246,228

BURSTING MACHINE

Filed Feb. 26, 1940 6 Sheets-Sheet 3

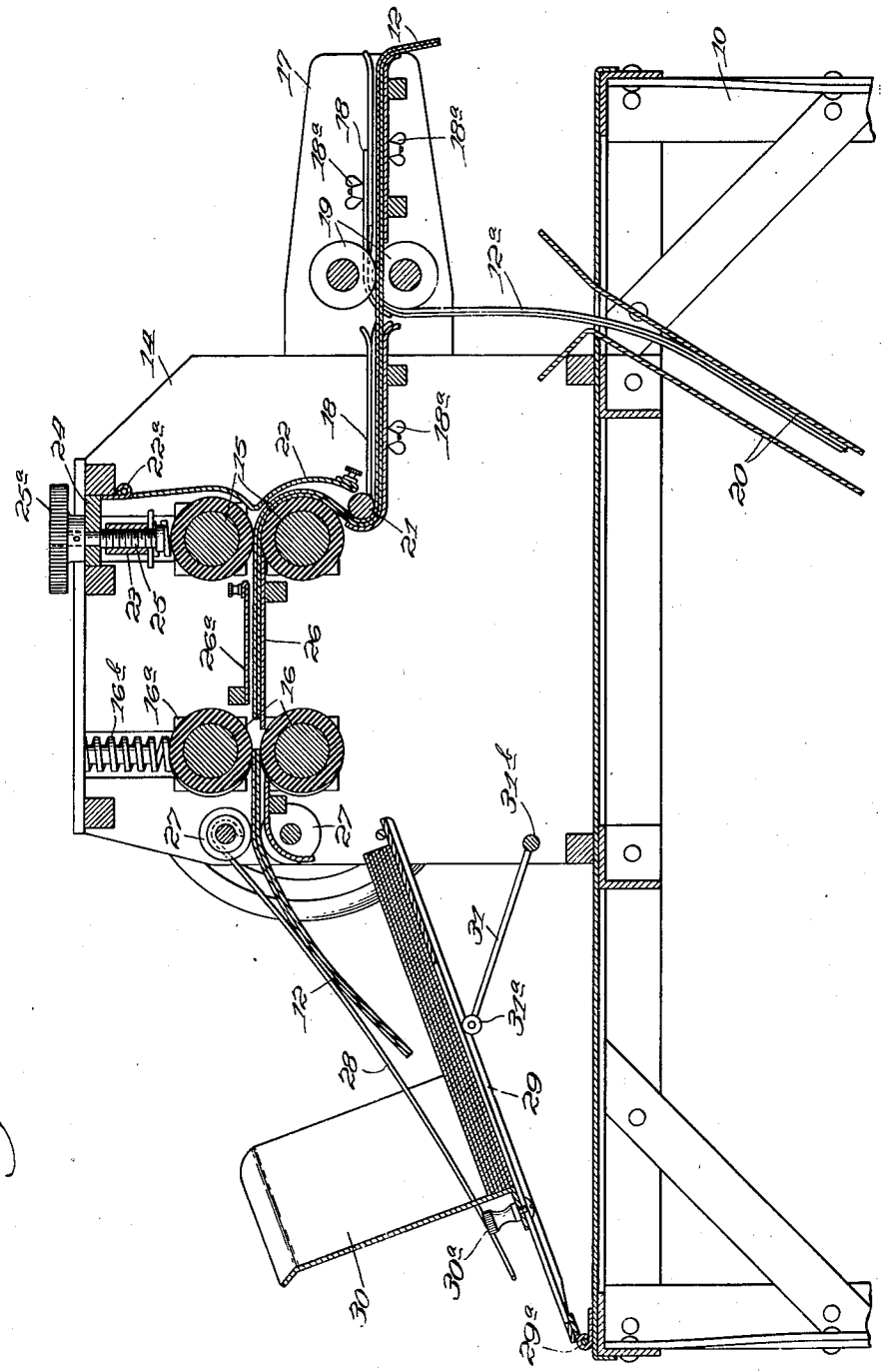


Fig. 3.

Inventor:
Charles L. Winter.
By Christon, Wiles, Davies, Hirschl & Dawson.
Attys.

June 17, 1941. C. L. WINTER 2,246,228

BURSTING MACHINE

Filed Feb. 26, 1940 6 Sheets-Sheet 4

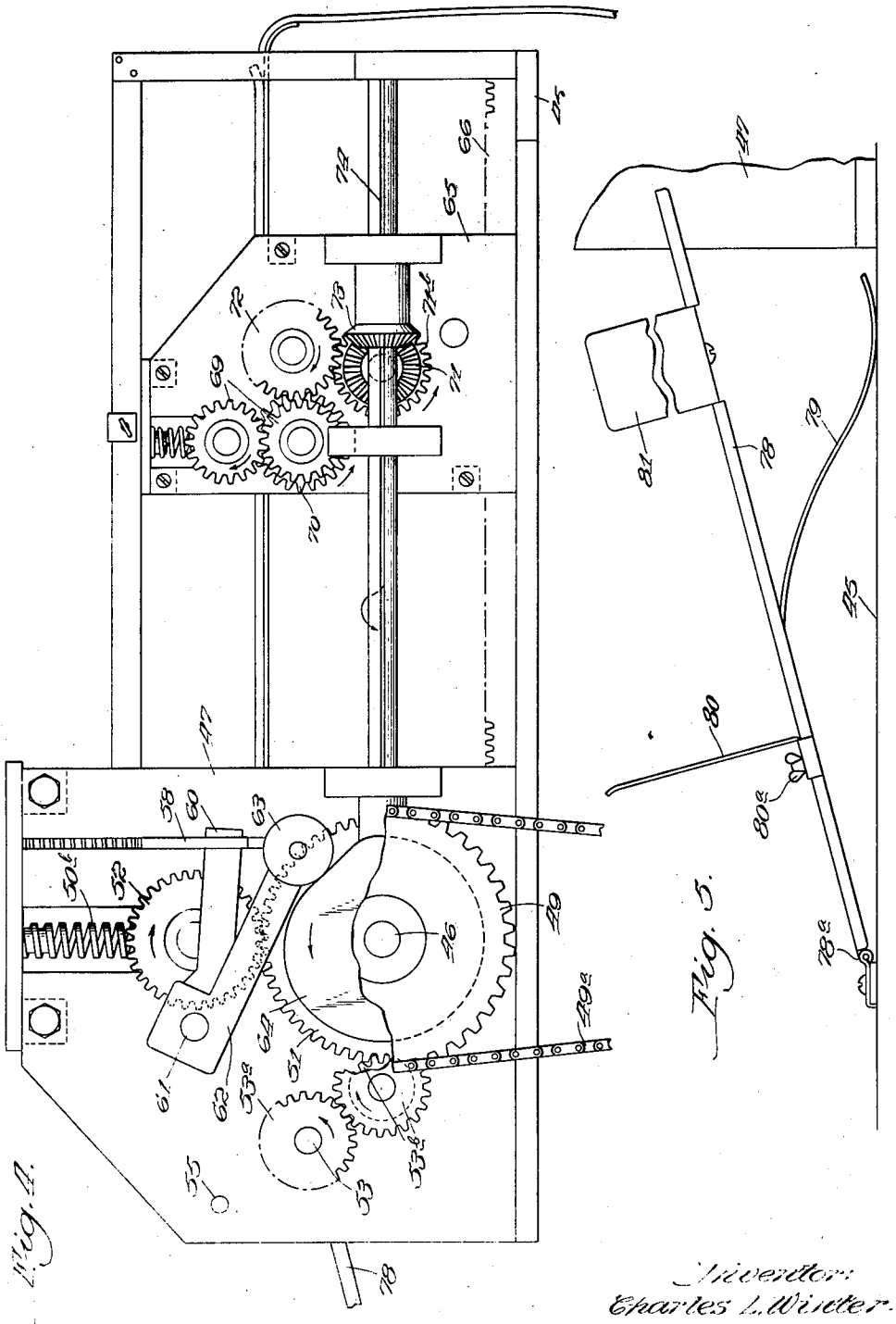


Fig. 4.

Fig. 5.

Inventor:
Charles L. Winter.
By Chrillon, Wills, Davis, Hirschler & Dawson.
Attys.

June 17, 1941. C. L. WINTER 2,246,228

BURSTING MACHINE

Filed Feb. 26, 1940 6 Sheets-Sheet 5

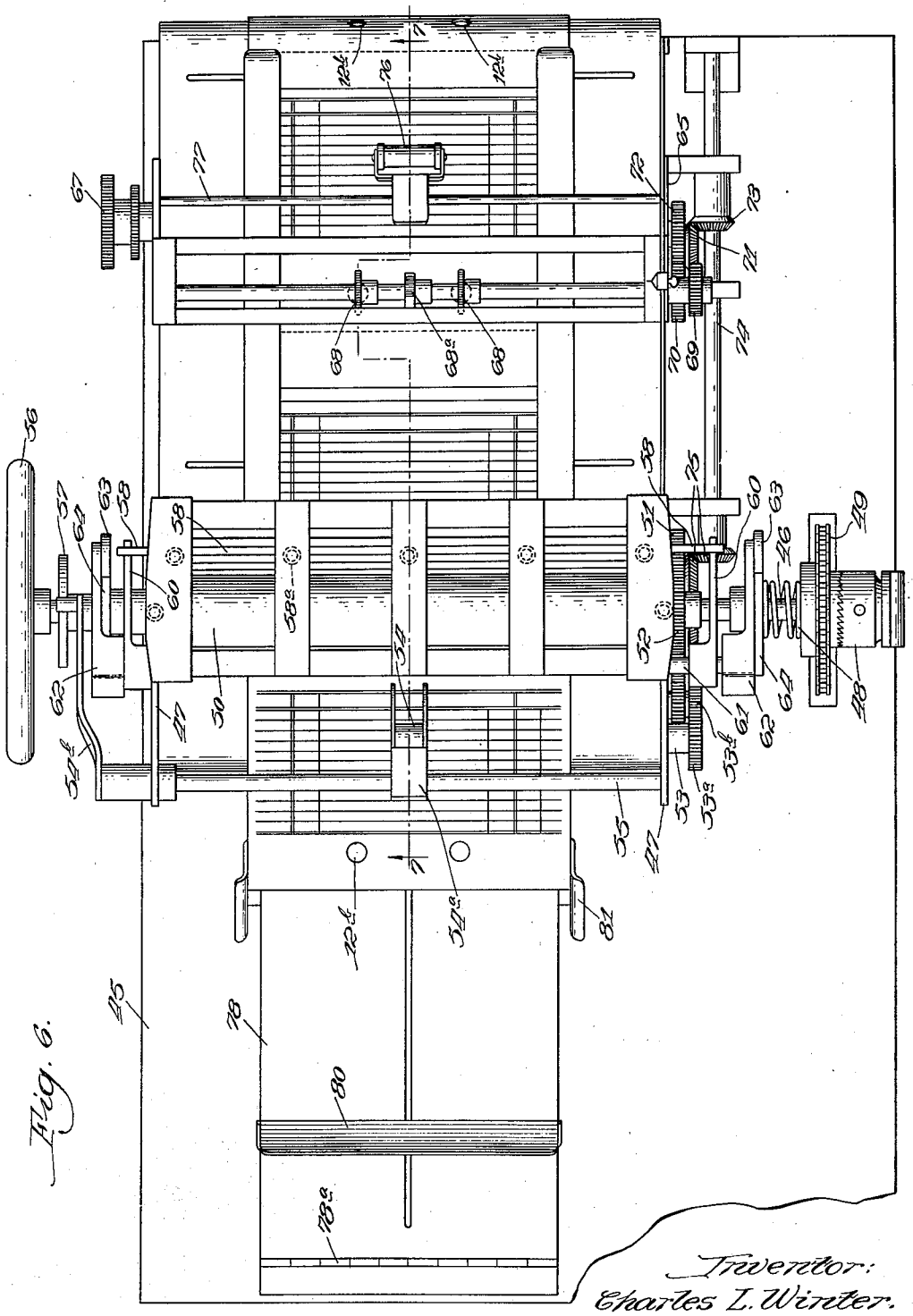


Fig. 6.

Inventor:
Charles L. Winter.
By Chittton, Wills, Davies, Hirschler & Dawson. Attys.

June 17, 1941. C. L. WINTER 2,246,228

BURSTING MACHINE

Filed Feb. 26, 1940 6 Sheets-Sheet 6

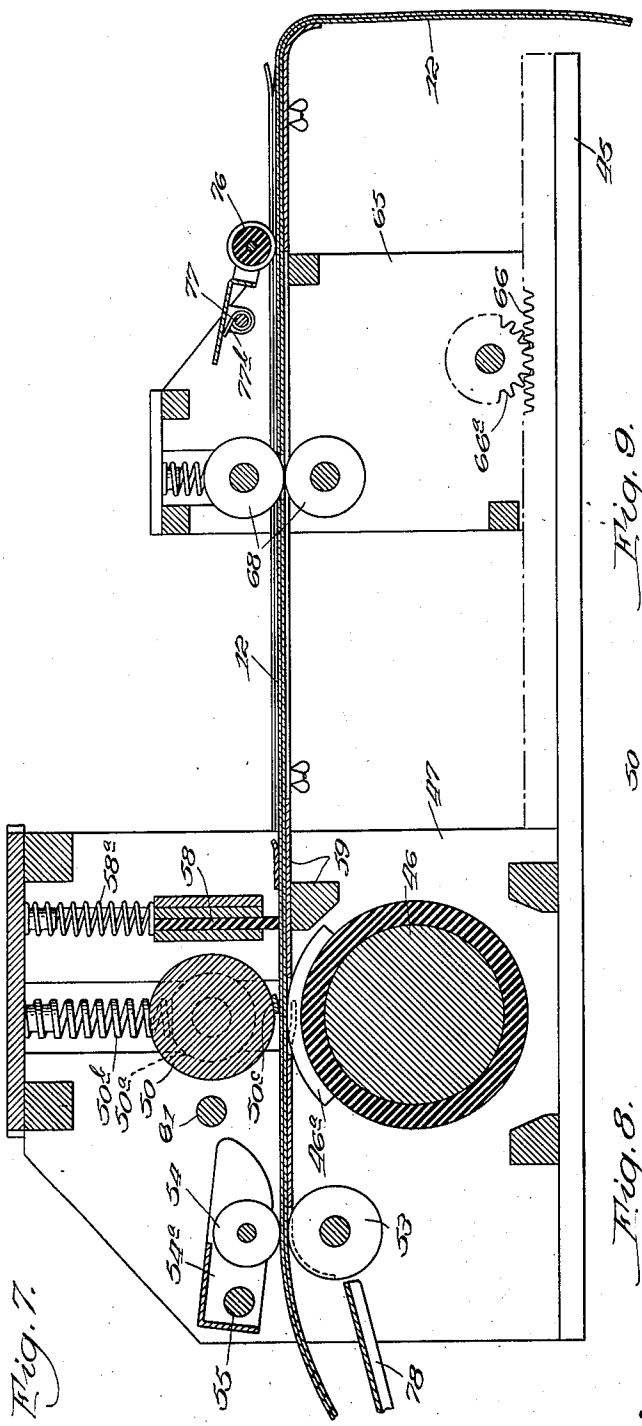


Fig. 7.

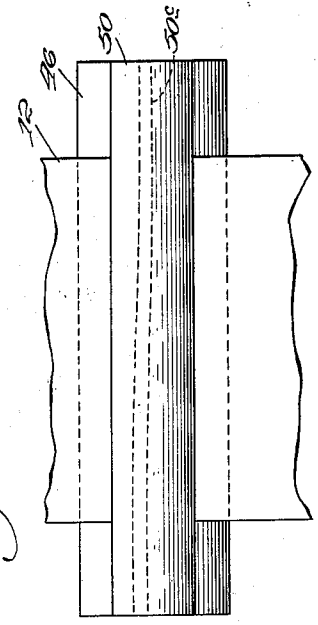


Fig. 9.

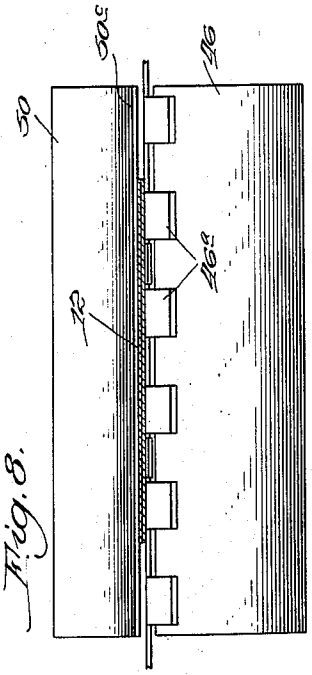


Fig. 8.

Inventor:
Charles L. Winter.
By Christie, Wiles, Davies, Hirschl & Dawson.
Attys.

Patented June 17, 1941 2,246,228

UNITED STATES PATENT OFFICE

2,246,228

BURSTING MACHINE

Charles L. Winter, Chicago, Ill., assignor to United Autographic Register Co., a corporation of Illinois

Application February 26, 1940, Serial No. 320,948

3 Claims. (Cl. 164—84.5)

This invention relates to a bursting machine adapted to separate continuous-form stationery into separate forms by automatically pulling the forms apart along preformed lines of weakening in the stationery strip.

Heretofore, continuous-form stationery which had been used in tabulating machines, Elliott-Fisher machines, "Address-o-graph" machines, and the like, was delivered in a single strip and it was necessary to separate the form by tearing them apart manually. This operation is not only time consuming but frequently the forms were not torn apart carefully and ragged edges remained where the forms had been connected together.

The primary object of the present invention is to provide an automatic continuously operating machine wherein it is only necessary to feed the end of the strip into the rolls and it will automatically separate the forms properly and stack them seriatim in superposed relation.

Another object of the invention is to provide an automatic bursting machine which may be readily adjusted to accommodate forms of various lengths or widths.

The invention is illustrated, in preferred embodiments, in the accompanying drawings, in which—

Figure 1 is a broken side elevational view of a machine embodying the invention in preferred form; Figure 2, a broken plan view of the same; Figure 3, a fragmentary sectional view, taken as indicated at line 3 of Figure 1; Figure 4, a broken elevational view, showing another embodiment of the invention; Figure 5, a fragmentary elevational view of one form of the stacking device; Figure 6, a broken plan view of the machine illustrated in Figure 4; Figure 7, a sectional view taken as indicated at line 7 of Figure 6; Figure 8, a fragmentary elevational view of the rear feed-rolls shown in Figure 7; and Figure 9, a plan view of the rolls shown in Figure 8, showing by dotted lines the curved gripping surface on the upper feed-roll.

In the preferred embodiment illustrated in Figures 1–3, inclusive, a table 10 is provided having an intermediate platform 11 which serves as a support for a stack of continuous-form stationery 12 fed into the machine. A driving motor 13 is also mounted on the platform and drives the movable parts of the mechanism by means of a sprocket chain 13a.

For the purpose of uniformity the entry side of the machine is considered the front, so that the stationery passes from the front to the rear. A pair of standards 14 are mounted on the top of the table and in these standards are journalled a pair of front feed-rolls 15 and a pair of rear feed rolls 16. The machine has a forwardly extending entry portion 17 which is provided with guides 18 which are laterally adjustable by means of winged nuts 18a.

Frequently the continuous-form stationery comprises a number of superposed strips which are connected at one marginal edge by gluing, stapling, or the like. In order to separate the connections between the strips, the connected marginal portion may be trimmed off by means of adjustable trim knives 19. The scrap 12a, which is trimmed off, may be directed down through a chute 20 provided in the table and discharged into an underlying basket. As shown in Figure 3, a guide-roll 21 is provided in the standards 14 and serves to direct the stationery strip around a large portion of the periphery of the lower feed roll 15. A guard member 22 is hinged above the feed rolls, as indicated at 22a, so that it may be swung out of the way during the loading operation. The upper feed roll 15 is provided with vertically movable journal blocks 15a and is urged downwardly by a cross-bar 23 through compression springs 23a. A fixed cross-bar 24 extends between the standards 14, and a screw 25, provided with a hand wheel 25a, is rotatably mounted in the bar 24 so that the pressure between the rolls 15 may be adjusted. This pressure regulates the grip of the front rolls and hence the tension on the stationery extending between the two pairs of rolls. As the tension gradually increases until the strip bursts at the line of weakening, less pressure is required on longer form lengths.

The stationery passes over a fixed guide 26 and under an upwardly swinging guide 26a to the rear feed-rolls 16. The upper feed-roll is mounted in journal blocks 16a and is urged downwardly by compression springs 16b. The axes of the rolls 16 are not parallel with the axes of the rolls 15, as will be clear from Figure 2. While the rolls 15 are disposed perpendicular to the direction of advance of the stationery, the rolls 16 are biased a few degrees from perpendicular. This arrangement applies more stress to one marginal edge portion of the stationery than the other, so that when the line of weakening bursts, it progresses from one edge to the other. This is an important feature in providing a clean straight separation of the form.

In rear of the rolls 16 is another feed device comprising upper and lower feed-rolls 27. This

feed device serves to feed the separated forms into the stacking device on the rear of the table. A bail 28 is hinged to the upper feed-roll shaft so as to direct the separated forms onto the stacking device.

The stacking device comprises a tray 29 which is hinged to the rear of the table, as indicated at 29a. The tray has a rear and laterally extending abutment 30 which is adjustably secured to the tray 29 by means of a finger nut 30a. As shown in Figures 1 and 3, the tray is held upwardly by means of a crank arm 31 provided at one end with a roller 31a. The crank is pivoted to the standard 14, as indicated at 31b, and has an arm 31c which is urged forwardly by a tension spring 32 provided with a screw 33 extending through a stud 33a on the standard 14 to an adjusting finger nut 33b. The spring pressure is arranged so that the tray 29 is urged upwardly towards the rear feed device when there are no forms in the stacking device. However, as the forms are built up into a stack, their weight presses the plate downwardly against the tension of the spring 32 and automatically accommodates the device to the height of the stack. This assures the forms being properly received, seriatim, into an orderly pile.

The various feed-rolls and trimming device are all driven in timed relation by the electric motor 13. One end of the lower rear feed-roll shaft is provided with a sprocket wheel 34, which is driven by the chain 13a and the other end of the shaft is provided with a hand wheel 35 which is useful in turning over the machine by hand during the loading operation. The shaft of the roll 16 has a sprocket wheel 36 which drives a larger sprocket wheel 37 on the lower front roll 15 by means of a sprocket chain 36a. Thus it will be seen that the rear feed-rolls travel slightly faster than the front feed-rolls and it is this action that produces a tension in the paper and results in a bursting of the strip into separate forms at the line of weakening. The shaft of the lower roll 15 is provided with a gear 38 which drives intermeshing gears 39 of the cutters 19 through idler gears 38a, 38b, and 38c.

The lower rear feed-roll is provided with a gear 40 which drives the rollers 27 by means of gears 40a and 40b.

As will be readily understood, the machine is loaded by turning the rollers over by hand and threading the stationery through the cutters 19, around roller 21 and between the sets of rolls 15 and 16 to the rollers 27. For short forms, i. e., where the lines of weakening are close together, considerable pressure is applied to the rolls 15 by means of the hand wheel 25a. This reduces the amount of slippage of the strip between the rolls and is adjusted so that each line of weakening will burst before it reaches the rolls 16. For longer forms, less pressure is applied to the rolls 15 and it is thereby readily adapted to accommodate forms of different lengths by an easy adjustment of the pressure. Once the device has been loaded and adjusted, the motor can be started and the forms can be separated with great speed and without requiring further attention.

In the modification shown in Figures 4–9, inclusive, the same result is accomplished in a slightly different manner. This modified machine is mounted on the top of a table 45 and has a lower feed-roll shaft 46 journalled in standards 47 and is provided with a clutch head 48 having a sprocket wheel 49 adapted to be driven from a motor (not shown) through a sprocket chain 49a. The clutch merely serves to permit the rolls to be turned over by hand without moving the motor. The roller 46 is provided in its periphery with a transverse series of feed segments 46a.

An upper feed-roll 50 is yieldingly mounted in journal blocks 50a which are urged downwardly by compression springs 50b. As shown in Figures 7 and 9, the roller 50 is provided with a narrow feed segment 50c which is adapted to cooperate with feed segments 46a on the lower roll and firmly grip the stationery during a part of its revolution. As will be clear from the dotted lines in Figure 9, the segment 50c is curved spirally so that it may grip the stationery 12 at one marginal edge first and progressively tear the line of weakening from that edge to the opposite edge. The rolls 46 and 50 are driven with the same peripheral speed by means of a pair of intermeshing gears 51 and 52. In rear of the rolls 46 and 50 is a feed device having a lower feed-roll 53 which is driven from gear 51, in timed relation thereto, by means of gears 53a, and a compound gear 53b.

As best shown in Figures 6 and 7, an upper presser roll 54 is journalled in an arm 54a fixed to a rock shaft 55 which is journalled in the standards 47.

As shown in Figure 6, one end of the lower feed-roll shaft 45 is provided with a hand wheel 56 and a cam 57 which serves to periodically raise the presser roll 54 by upward pressure on the arm 54b. In this device, the advance of the front portion of the stationery is completely arrested while the rolls 46 and 50 pull the stationery apart. The front portion of the stationery is held during this operation by means of an upwardly movable clamping bar 58 which is urged downwardly against a fixed cross-bar 59 by means of compression springs 58a. The ends of the bar 58 are engaged by crank arms 60 fixed to the rock shaft 61. The shaft 61 is also provided with fixed rock arms 62 carrying rollers 63 which ride on cam wheels 64 fixed to the shaft 45. Thus it will be understood that the presser bar 58 is normally held in its upper non-clamping position, until it is permitted to be lowered by a flat on the cam 64. The cam is timed so that this occurs while the segments 46a and 50c are engaging the stationery and pulling the forms apart at the interposed line of weakening.

In this form of device, it is necessary to feed the stationery into proper alignment with respect to the bursting device so that the line of weakening will be in proper interposed relation. The aligning device is mounted on a carriage 65 which may be moved longitudinally along a rack 66 by means of a gear 66a and hand wheel 67. Alignment is accomplished by means of two pairs of narrow feed disks 68 which are adapted to feed the paper along until they encounter a pair of perforations 12b in the stationery. At this point, having nothing to grip, the disks turn idly, and as the presser roll 54 is also raised at this time, the advance of the stationery stops.

The upper feed-roll shaft, as shown in Figure 6, is provided with a re-starter cam 68a which will cause the feed to be resumed when it reengages the paper. The disks 68 are driven in timed relation by means of a pair of intermeshing gears 69. The lower shaft is provided with a gear 70 which is driven from a bevel gear 71 by means of a spur gear 71b and an idler gear 72. Intermeshing bevel gear 73 is journalled

on one of the standards 65 and is splined to a shaft 74 which is driven from the shaft 46 by means of a pair of bevel gears 75. Thus it will be understood that the aligning device, although adjustable longitudinally to handle forms of different lengths, is always driven in timed relation to the clamping mechanism. A presser roller 76 is provided on a cross-shaft 77 and is normally urged into contact with the advancing stationary by means of a spring 77b.

The stacking device, illustrated in Figure 5, is somewhat similar to the form shown in Figure 3, and has a tray member 78 hinged to the table, as indicated at 78a, and is yieldingly urged upwardly by means of a leaf spring 79. The tray has a rear abutment 80 which is longitudinally adjustable by means of a winged nut 80a. Lateral guides 81 are also provided. In this device, as in the other device, the weight of the stationery will cause the tray 78 to swing downwardly against the pressure of the spring and accommodate the increasing height of a stack of forms.

To operate the modified device, the aligning mechanism on the carriage 65 is adjusted on the rack 66 so that when the perforations are engaged by the feed disks 68, the line of weakening between the advanced sets of forms will lie between the clamping bar 58 and the rolls 46 and 50. The stationery is threaded into the machine by rotating the hand wheel 56 and the machine is then ready to be power driven. The stationery is advanced by the disks 68 until a set of register perforations are encountered. At this point the feed stops, the clamping bar 58 is lowered, and the segments 46a and 50c on the rollers pull the advanced set of forms apart. The advanced forms are fed into the stacking device by the rollers 53 and 54 and when the cam raises clamping bar 58, the re-starter 68a engages the stationery and feed is resumed by the disks 68 until the next set of perforations is encountered and the bursting operation is repeated. These operations are continued automatically until all of the stationery has been burst into separate forms stacked on the tray 78.

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 machine for automatically bursting a continuous web of stationery into separate forms at lines of weakening between forms, comprising: a frame; a pair of front coacting feed-rolls journalled in said frame; a guide roll journalled in the frame adjacent to one of said front feed-rolls so as to direct a web of stationery into frictional contact with a substantial portion of the periphery of the roll before said web is gripped between the rolls; and a pair of rear feed rolls journalled in said frame and driven in timed relation to and slightly faster than the front rolls, said rear rolls being disposed so as to apply increasing tension in the web between the pairs of rolls progressively from one edge to the other.

2. A machine for automatically bursting a continuous web of stationery into separate forms at lines of weakening between forms, comprising: a frame; a pair of front coacting feed-rolls journalled in said frame; a guide roll journalled in the frame adjacent to one of said front feed-rolls so as to direct a web of stationery into frictional contact with a substantial portion of the periphery of the roll before said web is gripped between the rolls; a guard-member hinged to the frame above the front feed-rolls and depending so as to shield the entry side of the front feed-rolls and guide roll; and a pair of rear feed rolls journalled in said frame and driven in timed relation to and slightly faster than the front rolls, said rear rolls being disposed so as to apply increasing tension in the web between the pairs of rolls progressively from one edge to the other.

3. A machine as specified in claim 2, including a fixed guide for the web between the pairs of feed-rolls, and an upwardly swinging guide above said fixed guide to confine the web and guard the entry side of the rear feed-rolls.

CHARLES L. WINTER.