Oct. 13, 1953 H. PETERS ET AL 2,655,083

BUNCHING AND COUNTING MECHANISM

Filed Nov. 2, 1949

4 Sheets-Sheet 1

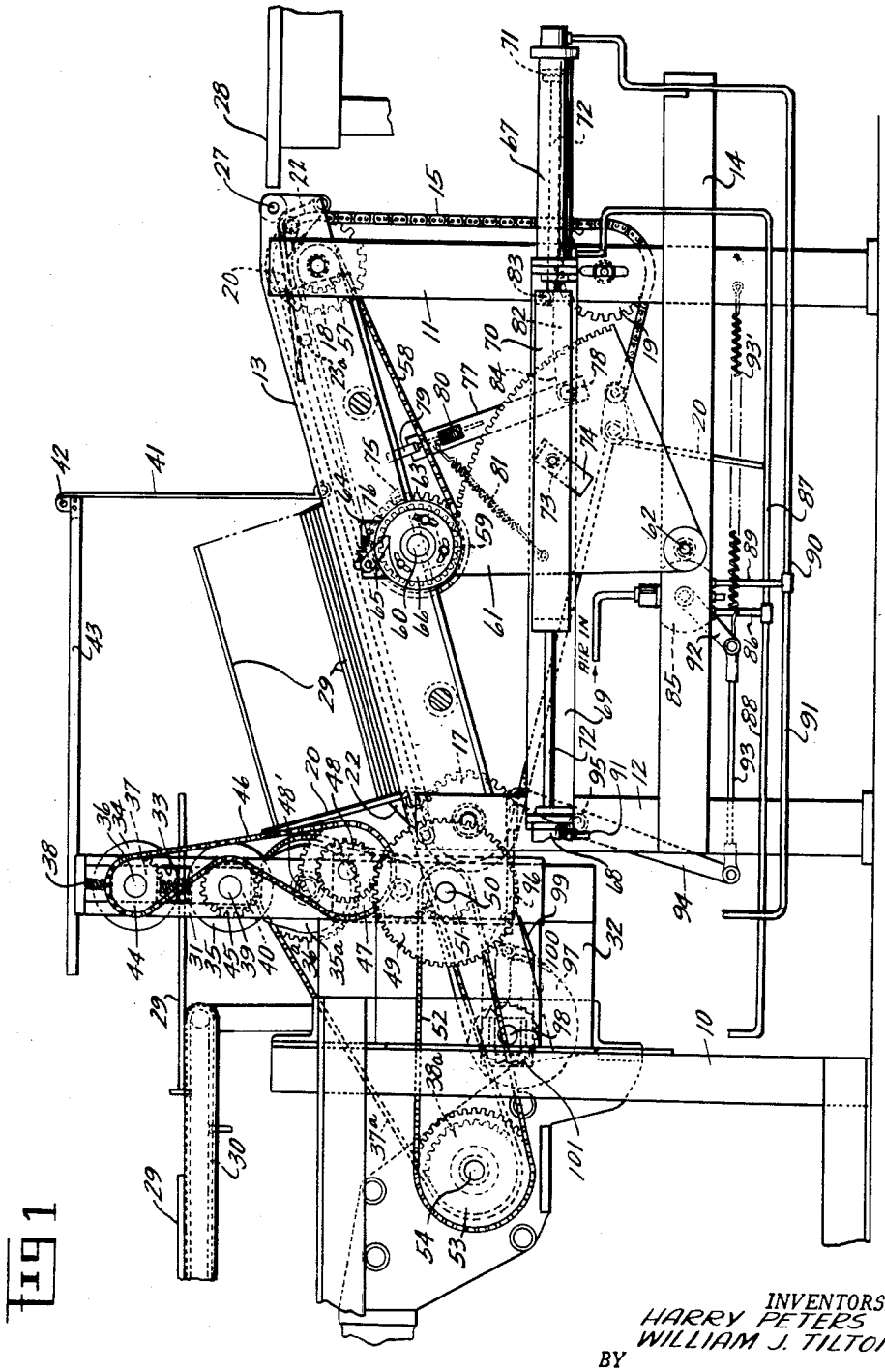


Fig 1

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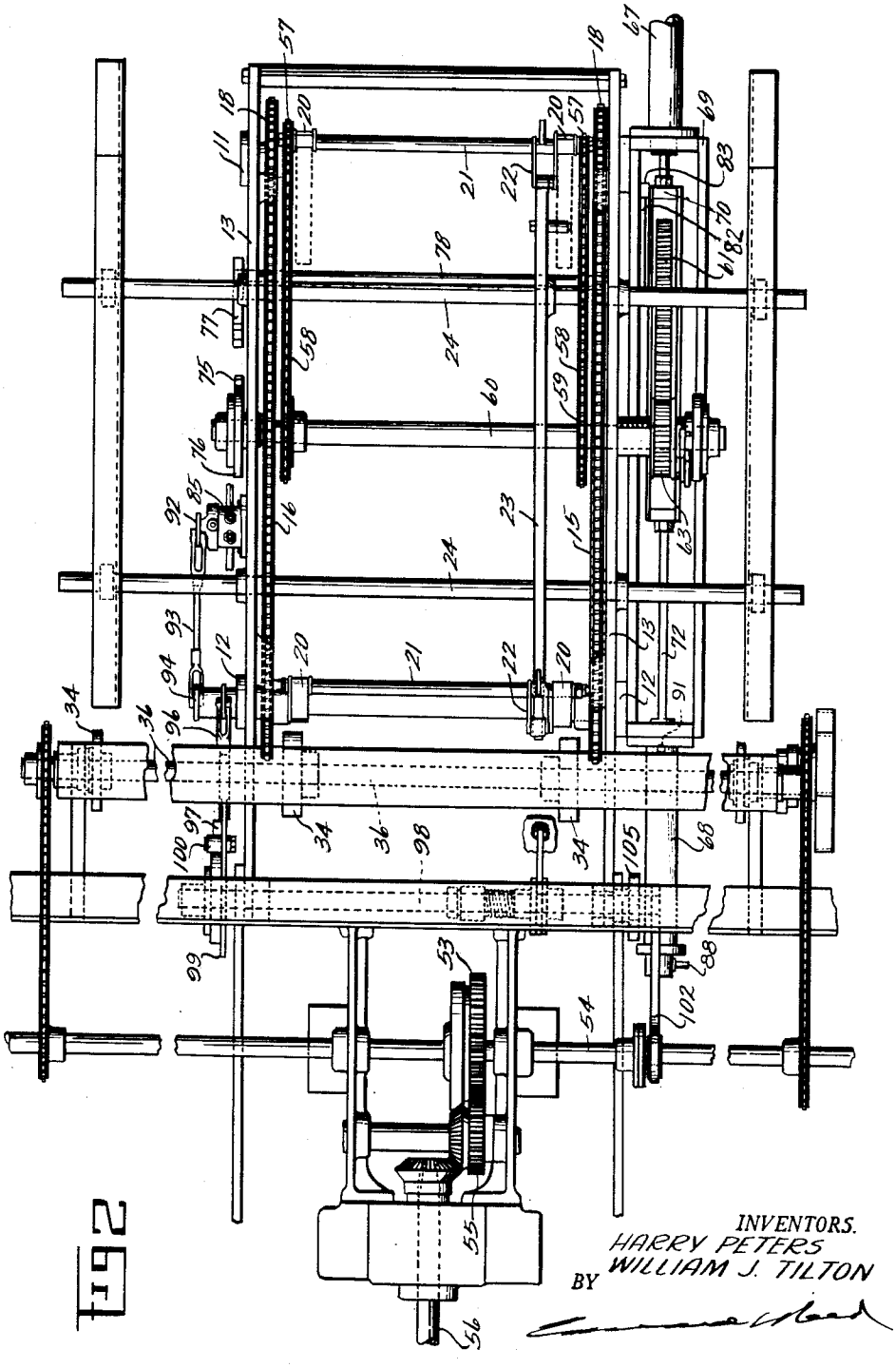


Fig 2

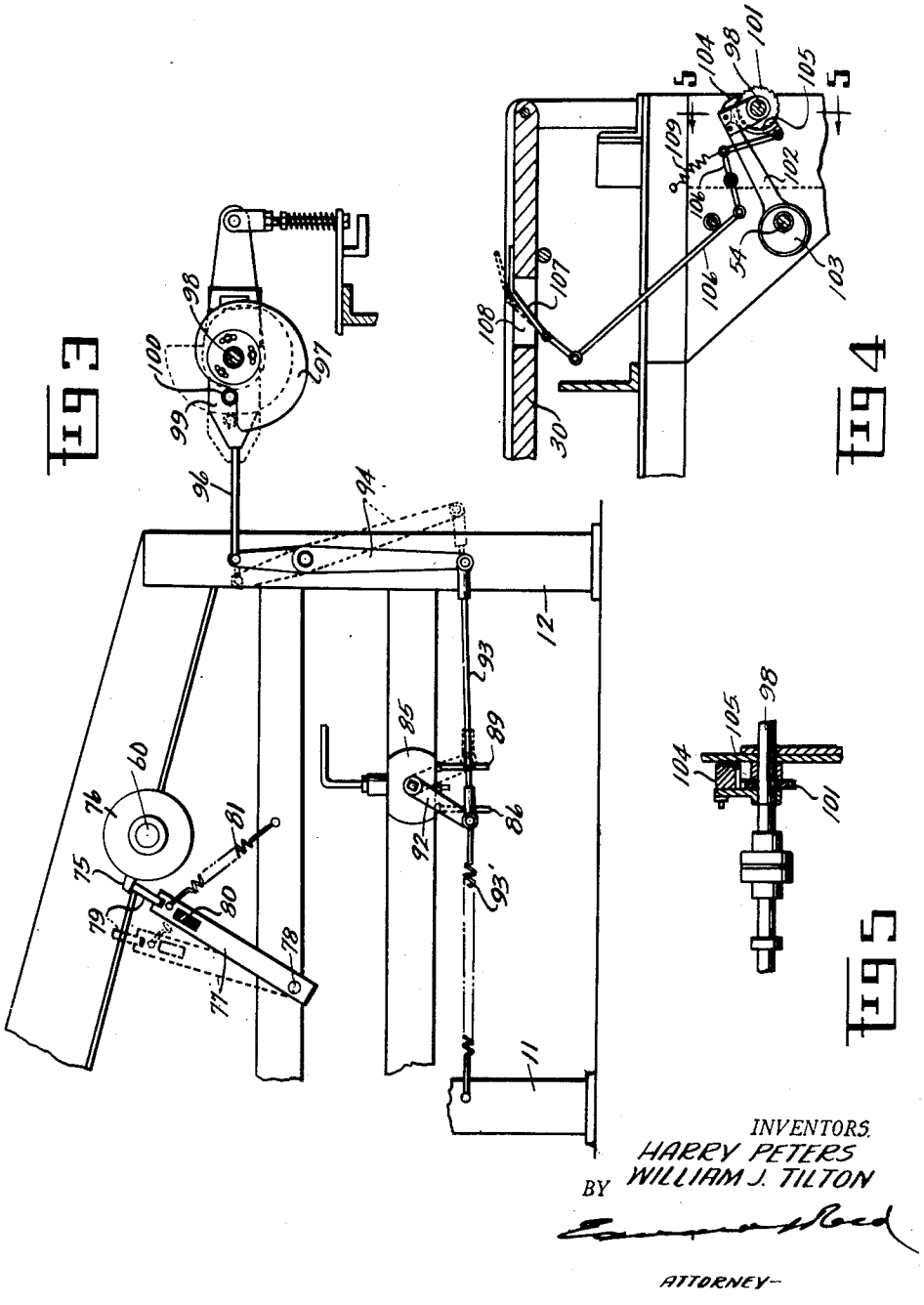
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BUNCHING AND COUNTING MECHANISM

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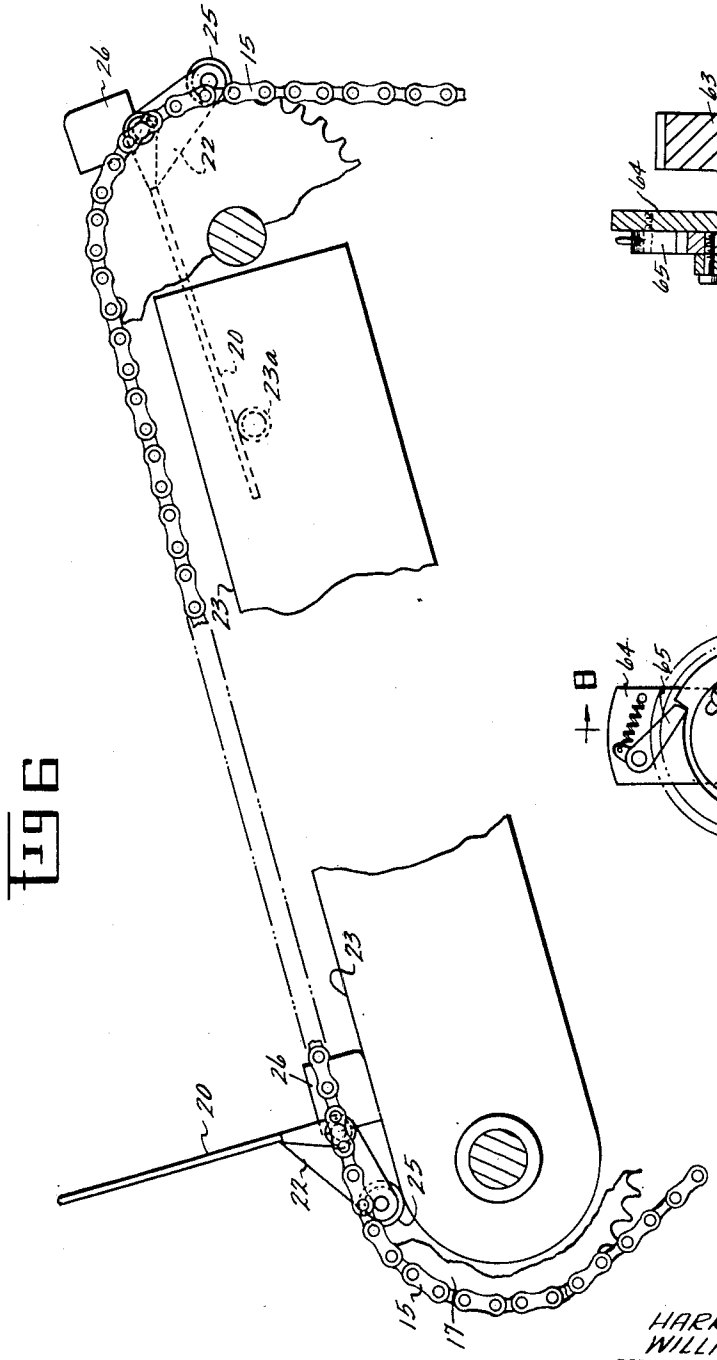


Fig. 6

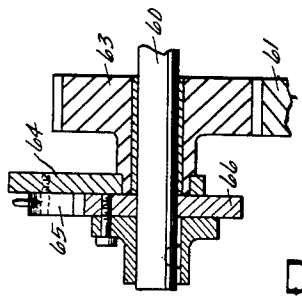


Fig. 8

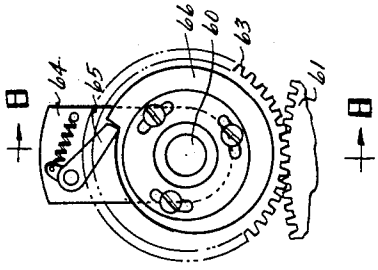


Fig. 7

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UNITED STATES PATENT OFFICE

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BUNCHING AND COUNTING MECHANISM

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Application November 2, 1949, Serial No. 125,148

16 Claims. (Cl. 93—93)

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This invention relates to an apparatus for counting, bunching and conveying articles.

This apparatus is an improvement on the apparatus shown in Patent No. 1,901,062, granted March 14, 1933, to Sharkey, and one object of the invention is to provide an apparatus which will receive bags from a bag processing machine, accumulate the same in bunches and convey each bunch to an inspection table, or other point of discharge.

A further object of the invention is to provide such an apparatus having an endless conveyor to receive the bags and automatically controlled power means for imparting forward movement to the conveyor when a predetermined number of bags has been deposited thereon.

A further object of the invention is to provide such an apparatus having means for accurately counting the bags as they are received from the processing apparatus and controlling the operation of the conveyor operating mechanism.

A further object of the invention is to provide such an apparatus in which intermittent movements are imparted to the conveyor by fluid operated mechanism, the operation of which is controlled by the counting mechanism.

Other objects of the invention may appear as the apparatus is described in detail.

In the accompanying drawings, Fig. 1 is a side elevation of an apparatus embodying the invention; Fig. 2 is a top plan view of such an apparatus, partly broken away; Fig. 3 is a side view of a portion of the apparatus, viewed from that side of the apparatus opposite the side shown in Fig. 1; Fig. 4 is a detail view of a portion of the counting apparatus; Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4; Fig. 6 is a side elevation, partly broken away, of the upper portion of the conveyor; Fig. 7 is a side elevation of a one-way clutch which connects the operating mechanism with the conveyor; Fig. 8 is a section taken on the line 8—8 of Fig. 7.

In these drawings we have illustrated one embodiment of the invention and have shown the same as designed for bunching sewed multi-wall paper bags discharged from a bag sewing machine, but it is to be understood that the apparatus as a whole, as well as the several parts thereof, may take various forms and may be used for bunching, counting and conveying articles of various kinds, without departing from the spirit of the invention.

In that embodiment of the invention here illustrated, the apparatus is mounted on a supporting structure which comprises a portion 10 of the

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sewing machine frame and a main frame supported independently of and rigidly connected with the sewing machine frame. The main frame comprises a pair of upright front end members 11, a pair of upright rear end members 12, a pair of longitudinal upper side members 13 and a pair of longitudinal lower side members 14, the front end members being of a height slightly greater than the height of the rear end members so that the upper longitudinal members 13 are inclined upwardly and forwardly. The upper longitudinal members 13 extend rearwardly beyond the rear end members 12 and are rigidly connected with the sewing machine frame 10. Mounted on this main frame is a conveyor which may be of any kind suitable to receive and convey the bags or other articles. Preferably it is an endless conveyor comprising two sprocket chains, 15 and 16. Each of the chains passes about and in engagement with a series of sprocket wheels mounted between the side members of the main frame. In the present arrangement each series includes sprocket wheels 17 and 18 adjacent the upper ends of the respective end members 11 and 12, and a third sprocket wheel 19 mounted on the front end member 11 a substantial distance below the sprocket wheel 18, the conveyor so supported being substantially triangular in form.

Preferably the conveyor is provided with a plurality of abutments, in the present instance three, spaced apart substantially equal distances and so mounted that when that portion of the conveyor on which an abutment is mounted is in the upper stretch of the conveyor, the abutment will be in a substantially upright position. In the present construction each abutment comprises two relatively narrow upright plates or bars 20 arranged adjacent the respective sprocket chains 15 and 16, and the two plates of each abutment are rigidly secured to a shaft 21 which extends between and is rotatably supported on the two sprocket chains. Rigidly connected with each abutment and with its shaft is a shoe 22 which extends rearwardly from the shaft and is adapted to engage and travel on the upper surface of a track bar 23 which is rigidly mounted on tie rods 24 forming a part of the main frame, said track being, in the present instance, arranged adjacent sprocket chain 15 and slightly below the level of the upper stretch of that chain. Preferably each shoe 22 is provided with a track engaging roller 25 at the rear end thereof, and with a forwardly extending track engaging part 26 to control the forward tilting of the abutment. Each such abutment is thus retained in a substantially

upright, but preferably inclined, position while it moves with the upper stretch of the conveyor. As will be hereinafter explained, the conveyor is operated intermittently to move successive bunches of bags onto a bag receiving table 28, and in the present arrangement, each abutment comes to a stop at the forward end of the conveyor with its axis slightly beyond the vertical plane of the axis of the upper front sprocket wheels. The track terminates in the rear of the vertical plane of the axes of the upper front sprocket wheels and in such a position that the shoe of the abutment will move out of engagement with the track an instant before the movement of the abutment is interrupted. The shoe having passed beyond the track moves downwardly about the axis of the abutment and moves the abutment rearwardly about said axis to a position substantially parallel with the track in which position it is supported by a stud 23*a*. The upper sprocket wheels being separately mounted on the respective side members of the frame the shoe is free to move across the axis of the sprocket wheels. However, during the forward movement of the conveyor the abutment may, and sometimes does, acquire momentum sufficient to overcome the weight of the shoe and cause the abutment to move forwardly into engagement with the tie rod 27, where it is supported in an inclined position. The next operative movement of the conveyor carries the abutment downwardly from either of said positions, about the lower front sprocket wheels and rearwardly beyond the latter and during this movement it assumes a downwardly extending position rearwardly beyond the front sprocket wheels, as shown in Fig. 1. Upon the next, or third, operative movement of the conveyor, the shoe approaches the rear sprocket wheels 17 in this downwardly extending position and as the chain moves about the sprocket wheels 17 the shoe engages the rear end of the track member, which is preferably curved, and moves upwardly over the same onto the straight line portion of the track and the abutment is thus moved to the upright position shown in Fig. 1.

Mounted on the supporting structure at the rear end of the main frame is a feeding device adapted to receive bags 29 from the delivery conveyor 30 of the sewing machine and to deposit those bags on the upper stretch of the conveyor in superposed relation one to the other. This receiving and feeding mechanism may be of any suitable type and in the present instance, a supplemental frame is rigidly mounted on a forwardly projecting part 32 of the sewing machine frame and comprises a pair of laterally spaced upright members 31, which are provided at their upper ends with parallel slots 33. A pair of rollers, 34 and 35, are supported on this supplemental frame, one above the other, and are so located that they will receive between them a forward portion of a bag 29 while the rear portion of that bag is in engagement with the sewing machine conveyor. As here shown, each of these rollers comprises a plurality of relatively narrow disc-like members. The several members of roller 34 are rigidly secured to a shaft 36, the ends of which are mounted in bearings 37, one of which is shown in Figure 1, and which are mounted in the slots 33 of the respective frame members 31. The bearings 37 have a limited movement in these slots and each bearing is urged downwardly by a spring 38. The several members of the roller 35 are rigidly secured to a shaft 39 which is journaled in bearings 40 slidably mounted in the slots 33 of the supplemental frame members. Preferably the lower roller 35 is normally supported a slight distance below the upper roller 34 so as to provide between the rollers an open space which the forward end of a bag may enter without resistance. After the forward end of the bag has passed between the rollers, the lower roller is moved upwardly into gripping relation to the upper roller so as to grip the bag and move the same quickly to a position above the conveyor and release the same while in a substantially horizontal position, so that it may drop on the conveyor, or on a bag previously deposited on the conveyor. While in gripping engagement with the bag, the rollers are operated at a speed somewhat greater than the speed of the sewing machine conveyor and the bag is discharged from the rollers with such force that it may be projected beyond its proper position on the conveyor. Therefore, we have provided a yieldable structure to limit the forward motion of the bag and if the bag over-shoots its proper position, to move the same rearwardly. As here shown this device comprises a pair of upright arms 41 pivotally supported at their upper ends by a shaft 42 mounted on a suitable support above the conveyor, such as bars 43 mounted on and extending forwardly from the upper end of the supplemental frame 31. The arms 41 being arranged between the horizontal bars 33 have free swinging movement and are of such weight that if displaced by the engagement of a bag therewith, they will return to their normal vertical positions and move the bag rearwardly.

The rollers 34 and 35 may be driven from any suitable source of power. In the present arrangement, the upper roller 34 is provided with a sprocket wheel 44 on shaft 36 and the lower roller 35 is provided with a sprocket wheel 45 on shaft 39. A sprocket chain 46 extends about the sprocket wheel 44 and about a sprocket wheel 47 mounted on a shaft 48 in the supplemental frame, and the rear stretch of the chain 47 engages the forward side of sprocket wheel 45, so that the two rollers are rotated in opposite directions about their respective axes and at the same speed. The sprocket wheel 47 has secured thereto a gear 48 which meshes with a relatively large gear 49 on a stud 50 to which is secured a small sprocket wheel 51, which is connected by a sprocket chain 52 with a sprocket wheel 53 which is rigidly secured to a shaft 54 rotatably mounted on the sewing machine frame. The shaft 54 may be driven from any suitable source of power but preferably it is connected through gearing 55 and shaft 56, Fig. 2, with the driving mechanism which operates the sewing machine conveyor 30, thus causing the rotation of the rollers 34 and 35 to be accurately timed with relation to the movement of the sewing machine conveyor.

Vertical movement may be imparted to the lower roller 35 in any suitable manner but preferably the roller is cam operated and in the arrangement here shown, cams, one of which is shown at 35*a*, are mounted on the shaft 48' and are driven by a sprocket wheel 36*a* on the shaft 48, which sprocket wheel is connected by a sprocket chain 37*a* with a sprocket wheel 38*a* on the shaft 54 and is thus driven in timed relation to the conveyor 30. The cams 35*a* are so shaped and so positioned on the shaft 48' that they will engage the bearings 40 of the lower roller 35 shortly after the forward end of a bag has entered the space between the two rollers, and move the

lower roller into gripping relation to the upper roller.

When a predetermined number of bags have accumulated on the conveyor 15—16, that conveyor is actuated to move the bunch of bags forwardly and discharge the same on the table 28. This movement may be imparted to the conveyor in any suitable manner and is so controlled that the movement will be imparted to the conveyor when said predetermined number of bags has accumulated thereon. In the present arrangement, a sprocket wheel 57 is rigidly connected with each of the sprocket wheels 18, on the inner sides of the latter, and said sprocket wheels 57 are connected by chains 58 with sprocket wheels 59 rigidly secured to a drive shaft 60 mounted in bearings on the upper frame members 13, whereby the two sprocket wheels 18 are rotated in synchronism when the shaft 60 is rotated. The shaft 60 is intermittently rotated by a reciprocatory actuating member 61 which, in the present instance, comprises a toothed segment which is pivotally mounted at 62 on the lower longitudinal frame member 14. This segment meshes with a gear 63 rotatably mounted on the shaft 60, and a pawl carrier 64 is rigidly connected to the gear 63 and carries a pawl 65 which cooperates with a one-toothed ratchet wheel 66 rigidly secured to the shaft 60, thus providing a one-way clutch between the actuating member and the conveyor. Suitable power mechanism is provided for imparting reciprocatory movement to the actuating member 61 and preferably this mechanism is fluid operated. In the arrangement here shown two air cylinders, 67 and 68, are rigidly connected with the respective ends of an elongate structure 69 mounted on the main frame and having laterally spaced side walls between which is supported an operating member 70. Each cylinder has within the same a piston 71 which is connected by a piston rod 72 with the adjacent end of the operating member 70. The operating member may be connected with the actuating device 61 in any suitable manner. In the present instance, the operating member 70 comprises spaced side bars between which the actuating device extends, and rigidly secured to the side bars is a block 73 which extends into a radial slot 74 in the actuating device, thus the reciprocation of the operating member by the air operated device moves the actuating device first in one direction and then in the other direction, the one movement serving to drive the conveyor, through the one-way clutch, and the other movement being a return movement which has no effect upon the conveyor.

To prevent the overrunning of the shaft 60, and the conveyor, at the end of the operative movement of the actuating device, there is provided a suitable mechanism comprising a stop member 75 which is rigid with the shaft 60 and which is here shown as a projection on a disc 76 secured to that end of the shaft 60 opposite the one-way clutch. Cooperating with the stop 75 is a stop member 77, here shown as an arm pivotally mounted at one end on a transverse shaft 78 and having at its other end a part 79 which is movable into and out of the path of the stop 75 by the movement of the shaft 78. Preferably the part 79 is slidably mounted in the arm 77 and is retained in its extended position by a spring 80, thus cushioning the impact of the stop 75 therewith. The stop member 77 is biased toward the path of stop member 75, as by a spring 81, and means are provided for retaining the same normally in its retracted position, as shown in Fig. 1. The shaft 78 extends across the main frame and is provided adjacent the operating member 70 with an arm 82 which is rigidly secured thereto and extends forwardly at the side of the operating member 70. Rigidly secured to the operating member is a part, such as a laterally projecting roller 83, which overhangs the arm 82 and when the actuating device is in its retracted or initial position, retains the stop member 77 in its retracted position. As the operating member moves in operating direction the roller 83 moves lengthwise of the arm 82 toward and beyond the axis thereof and as it moves beyond the axis of the arm it releases the latter for movement about its axis and permits the stop member 77 to move into the path of the stop 75. Preferably the upper surface of the rear portion of the arm is slightly inclined at 84 to enable the pivotal movement thereof to begin before the roller passes the axis thereof. Thus the stop member 77 is retained in its retracted position during a substantial portion of the movement of the segment 61 and is then released for movement by its spring into the path of the stop 75, the parts being so arranged that the stop member 77 will enter the path of the stop 75 just before the shaft 60 completes a single rotation.

The air operated devices 67 and 68 are connected with a source of supply of air under pressure through a valve 85 and means are provided for actuating that valve when a predetermined number of bags have been deposited on the conveyor. In the arrangement here shown, one port of the valve 85 is connected through conduits 86 and 87 with the cylinder 67 on the inner side of its piston 71, and is connected through conduits 88 and 88 with the cylinder 68 on the outer side of its piston. A second port of the valve is connected through conduits 89 and 90 with cylinder 67 on the outer side of its piston, and through conduits 89 and 91 with the cylinder 68 on the inner side of its piston. Thus when either port is open fluid will enter the two cylinders in such a manner as to move both pistons in the same direction. The valve may be of any suitable character which will alternately open and close the two ports. It is here shown as a rotary valve and is actuated by a valve arm 92. A spring 93' is connected with the valve arm and with a fixed part of the structure and tends to move the valve in a direction to open the port leading to the conduit 89, and as shown in Fig. 1, that port is closed. The valve arm 92 is connected by a rod 93 with one end of a lever 94 which is pivotally mounted between its ends at 95 and is connected at its other end with a rod 96 which is actuated by a bag counting mechanism. That mechanism includes a spiral cam 97 rigidly secured to a shaft 98. A bracket 99 rigidly secured to the rod 96 and having sliding support on the shaft 98, carries a roller 100 which is held in contact with the periphery of the cam 97 by the spring 93'. The shaft 98 and the cam are rotated in timed relation to the rotation of the shaft 54 which drives the bag feeding rollers. In the arrangement shown, a ratchet wheel 101 is secured to the shaft 98 and a pitman 102 is mounted on an eccentric 103 on the shaft 54, and the pitman 102 is pivotally connected with a pawl 104 which actuates the ratchet wheel 101 a distance of one tooth upon each rotation of the shaft 54. When, as in the present instance, the bags are multi-walled bags and are of a substantial thickness, a relatively

small number of bags is included in each bunch and the ratchet wheel 101 is, therefore, provided with a small number of teeth, preferably twenty-five, and the cam 97 completes one rotation when twenty-five bags have been deposited on the conveyor. As shown in Fig. 1, the cam has almost completed one rotation and the roller 100 is on the highest point of the cam and will be released upon the next advance of the ratchet wheel and will then move on to the low point of the cam, as shown in Fig. 3. As the cam rotates the valve arm is slowly moved against the action of the spring 93, thereby placing that spring under relatively high tension and when the roller moves off the high point of the cam, the spring will quickly reverse the valve and connect the outer end of cylinder 67 and the inner end of cylinder 68 with the fluid supply and quickly operate the actuating device to advance the conveyor.

To avoid an inaccurate count in the event a bag or bags should be missing from the spaces on the sewing machine conveyor, there is provided a device for interrupting the operation of the cam 97. The device here shown, is similar to that shown in the above mentioned patent and comprises a shield 105 mounted for movement about the toothed edge of a ratchet wheel 101 into and out of a position between the ratchet wheel and the pawl 104 and is connected through linkage 106 with a trip arm 107 pivotally mounted below the table of the conveyor 30 and extending through an opening 108 in that table. The upper end of the lever 107 is bent forwardly with relation to the conveyor to a position in which a bag passing over the opening in the table engages the lever and presses the same downwardly toward the table, thereby causing the linkage 106 to move the shield 105 to an inoperative position in relation to the pawl and retaining the same in that position as long as a bag is in engagement with the lever 107. When no bag is in engagement with the lever 107, the shield is moved by a spring 109 to a position between the pawl and the ratchet wheel, thus preventing the operation of the ratchet wheel by the pawl until another bag engages the lever 107.

While we have shown and described one embodiment of our invention, we wish it to be understood that we do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having fully shown and described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In an apparatus for bunching and counting articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said conveyor in superposed relation one to the other, means for intermittently actuating said conveyor including a gear rotatably mounted on said supporting structure, a reciprocatory toothed member meshing with said gear to rotate the same in either of two directions, means including a one-way clutch for drivingly connecting said gear with said conveyor when said gear is rotated in one direction and for disconnecting said gear from said conveyor when said gear is rotated in the other direction, power operated means for reciprocating said toothed member, means for counting the articles deposited on said conveyor, and means controlled by said counting means for initiating the operation of said toothed member by said power operated means when a predetermined number of articles have been deposited on said conveyor.

2. In an apparatus for bunching and counting articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said conveyor in superposed relation one to the other, means for intermittently actuating said conveyor including a gear rotatably mounted on said supporting structure, a reciprocatory toothed member meshing with said gear to rotate the same in either of two directions, means including a one-way clutch for drivingly connecting said gear with said conveyor when said gear is rotated in one direction and for disconnecting said gear from said conveyor when said gear is rotated in the other direction, power operated means for reciprocating said toothed member, means for counting the articles deposited on said conveyor, means controlled by said counting means for initiating the operation of said toothed member by said power operated means when a predetermined number of articles have been deposited on said conveyor, and means controlled by the relative movements of said gear and said toothed member for preventing the overrunning of said conveyor.

3. In an apparatus for bunching and counting articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said conveyor in superposed relation one to the other, means for actuating said conveyor comprising a shaft drivingly connected therewith, a gear rotatable on said shaft in either of two directions, a one-way clutch for connecting said gear with said shaft when said gear is rotated in one direction and for disconnecting said gear from said shaft when said gear is rotated in the other direction, a toothed segment pivotally mounted on said structure, meshing with said gear and operable to move said gear in either direction about its axis, a power operated member operatively connected with said segment, means for counting the articles deposited on said conveyor, and means controlled by said counting means for initiating the operation of said power operated member.

4. In an apparatus for bunching and counting articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said conveyor in superposed relation one to the other, means for actuating said conveyor comprising a shaft drivingly connected therewith, a gear rotatable on said shaft in either of two directions, a one-way clutch for connecting said gear with said shaft when said gear is rotated in one direction and for disconnecting said gear from said shaft when said gear is rotated in the other direction, a toothed segment pivotally mounted on said structure and meshing with said gear and operable to move said gear in either direction about its axis, a power operated member operatively connected with said segment, means for counting the articles deposited on said conveyor, means controlled by said counting means for initiating the operation of said power operated member, a stop connected with said shaft for rotation therewith, an arm pivotally mounted on said structure and having a part movable into and out of the path of said stop,

spring means tending to move said part of said arm into the path of said stop, and means controlled by said power operated member for retaining said arm normally in a retracted position and for releasing the same for movement by said spring means into the path of said stop during the operative movement of said segment.

5. In an apparatus for bunching and conveying articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said conveyor in superposed relation one to the other, means for actuating said conveyor comprising a shaft drivingly connected therewith, a gear rotatable on said shaft, a one-way clutch for connecting said gear with said shaft, a toothed segment pivotally mounted on said structure and meshing with said gear, a power operated member operatively connected with said segment, means for counting said articles deposited on said conveyor, means controlled by said counting means for initiating the operation of said power operated member, a stop connected with said shaft for rotation therewith, an arm pivotally mounted upon said structure and having a part movable into and out of the path of said stop, spring means tending to move said part of said arm into the path of said stop, a second arm rigidly connected with the first mentioned arm, and a part connected with said power operated member and engaging said second arm to retain the first mentioned arm normally in a retracted position and to release the same for movement into the path of said stop as the latter approaches the end of one rotation, and to retract said second arm prior to the next operation of said power operated member.

6. In an apparatus for bunching and conveying articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said upper stretch of said conveyor in superposed relation one to the other, means for actuating said conveyor including an actuating device mounted for movement in one direction to impart movement to said conveyor and for idle movement in the other direction, an operating member connected with said actuating device to impart both movements thereto, means for counting the articles deposited on said conveyor, and means controlled by said counting means for energizing said motor and controlling the direction of the movement of said operating member.

7. In an apparatus for bunching and conveying articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing said articles on said conveyor in superposed relation one to the other, means including an actuating device for imparting movement to said conveyor, an operating member connected with said actuating device, a fluid operated device for imparting movement to said operating member, means including a valve for connecting said fluid operating device with a source of fluid under pressure, means for counting the articles deposited on said conveyor, and means controlled by said counting means for actuating said valve.

8. In an apparatus for bunching and conveying articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said conveyor in superposed relation one to the other, an actuating device, means including a one-way clutch for connecting said actuating device with said conveyor, a reciprocatory member for operating said actuating device, fluid operated devices connected with the respective ends of said reciprocatory member, means including a valve to supply fluid under pressure to both fluid operated devices to move said reciprocatory member first in one direction and then in the other direction, means for counting the articles deposited on said conveyor, and means controlled by said counting means for actuating said valve.

9. In an apparatus for bunching and conveying articles, a supporting structure, an endless conveyor supported on said structure and having the upper stretch thereof arranged to receive and support articles, means for depositing articles on said conveyor in superposed relation one to the other, means including an actuating device for imparting intermittent movement to said conveyor, a reciprocatory operating member connected with said actuating device, a stop member connected with said conveyor for one complete rotation upon each movement of said conveyor, a second stop member pivotally supported on said structure and biased toward the path of the first mentioned stop member, an arm connected with said second stop member adjacent the pivotal axis thereof and extending in the direction of movement of said operating member and a part carried by said operating member and engaging said arm to normally retain said second stop member in a retracted position and movable with said operable member to a position adjacent the pivotal axis of said second stop member to release the latter for movement into the path of the first mentioned stop member.

10. In combination with an article delivery mechanism, a normally stationary endless chain type conveyor, a feeding device to receive articles from said delivery mechanism and deposit the same on said conveyor, a plurality of abutment means on said conveyor for accumulating articles in superposed relation one to the other, means including a fluid operated device for imparting intermittent movement to said conveyor to successively move said abutment means into article receiving position, means including a valve to connect said fluid operated device with a source of fluid under pressure, a cam, means for actuating said cam in timed relation to the operation of said delivery mechanism, and means controlled by said cam for actuating said valve when a predetermined number of articles have been accumulated on said conveyor, whereby to move the accumulated articles away from said feeding device and position the next successive abutment in article receiving position.

11. In combination with an article delivery mechanism, a normally stationary endless chain type conveyor, a feeding device to receive articles from said delivery mechanism and deposit the same on said conveyor, a plurality of abutment means on said conveyor for accumulating articles in superposed relation one to the other, means including a fluid operated device for imparting intermittent movement to said conveyor to successively move said abutment means into article receiving position, means including a valve to connect said fluid operated device with a source

of fluid under pressure, spring means tending to move said valve in one direction, a cam, means for actuating said cam in timed relation to the operation of said delivery mechanism, means controlled by said cam for moving said valve in the other direction against the action of said spring means and to quickly release said valve for movement by said spring means when a predetermined number of articles have been accumulated on said conveyor, whereby to move the accumulated articles away from said feeding device and position the next successive abutment in article receiving position.

12. In a bunching and counting apparatus, a normally stationary endless conveyor adapted to be mounted with the upper stretch thereof in article receiving relation to an article delivery mechanism, superposed rollers supported adjacent the rear end of said conveyor above the level thereof to receive articles from said delivery mechanism, means for rotating said rollers at high speed to project said articles beyond the same in substantially horizontal positions and deposit said articles one upon another on said stationary conveyor, means for moving said upper stretch of said conveyor forwardly from said rollers and discharging said articles therefrom, means for counting articles deposited on said conveyor, and means controlled by said counting means for imparting said forward movement to said stretch of said conveyor when a predetermined number of articles have been deposited thereon.

13. In a bunching and counting apparatus, a normally stationary endless conveyor adapted to be mounted with the upper stretch thereof in article receiving relation to an article delivery mechanism, superposed rollers supported adjacent the rear end of said conveyor above the level thereof to receive articles from said delivery mechanism, means for rotating said rollers at high speed to project said articles beyond the same in substantially horizontal positions and deposit said articles one upon another on said upper stretch of said stationary conveyor, means for intermittently operating said conveyor including an actuating device movable in one direction from a normal position to move said upper stretch of said conveyor forwardly from said rollers and discharge said articles therefrom and then movable in the other direction to said normal position, a reversible motor connected with said actuating device for imparting said movements thereto, means for counting the articles deposited on said conveyor, and means controlled by said counting means for energizing said motor and imparting said movements to said actuating device when a predetermined number of articles have been deposited on said conveyor.

14. In a bunching and counting apparatus, a normally stationary endless conveyor, parallel rollers supported above the rear portions of said conveyor and spaced vertically one from the other to enable the forward end of a moving article to enter between them, means for rotating said rollers at high speed and in opposite directions about their respective axes, periodically acting moving means for moving one of said rollers toward the other roller in timed relation to the movement of an article between said rollers, whereby to grip the article between said rollers and project the same beyond said rollers in a substantially horizontal position and thus deposit successive articles flat one upon the other on said stationary conveyor, a drive shaft connected with said conveyor, a reciprocatory actuating member, means for connecting said shaft with said actuating member for movement thereby in one direction only, mechanism for counting said articles as they move toward said conveyor, and means controlled by said counting mechanism to operate said actuating member.

15. In a bunching and counting apparatus, a normally stationary endless conveyor movable about spaced parallel axes, means for depositing a plurality of articles on said stationary conveyor in superposed relation one to the other, a drive shaft between and spaced from said axes of said conveyor, means directly connecting said shaft with said conveyor, a reciprocatory actuating member, means connecting said drive shaft with said actuating member for movement thereby in conveyor operating direction, power means for operating said actuating member, means for counting said articles as they are deposited on said conveyor, and means controlled by said counting means for initiating the operation of said power means when a predetermined number of articles have been deposited on said conveyor and thereby actuating said conveyor to discharge said articles therefrom.

16. In a bunching and counting apparatus, a normally stationary endless conveyor, means for depositing a plurality of articles on said stationary conveyor in superposed relation one to the other, a drive shaft, means directly connecting said shaft with said conveyor, a reciprocatory actuating member, means connecting said drive shaft with said actuating member for movement thereby in one direction only, a reversible fluid operated motor operatively connected with said actuated member to move the latter first in an operative direction and then in an inoperative direction, a valve to control the operation of said motor, mechanism for counting said articles as they are deposited on said conveyor, and means controlled by said counting mechanism for actuating said valve.

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