

Nov. 30, 1965

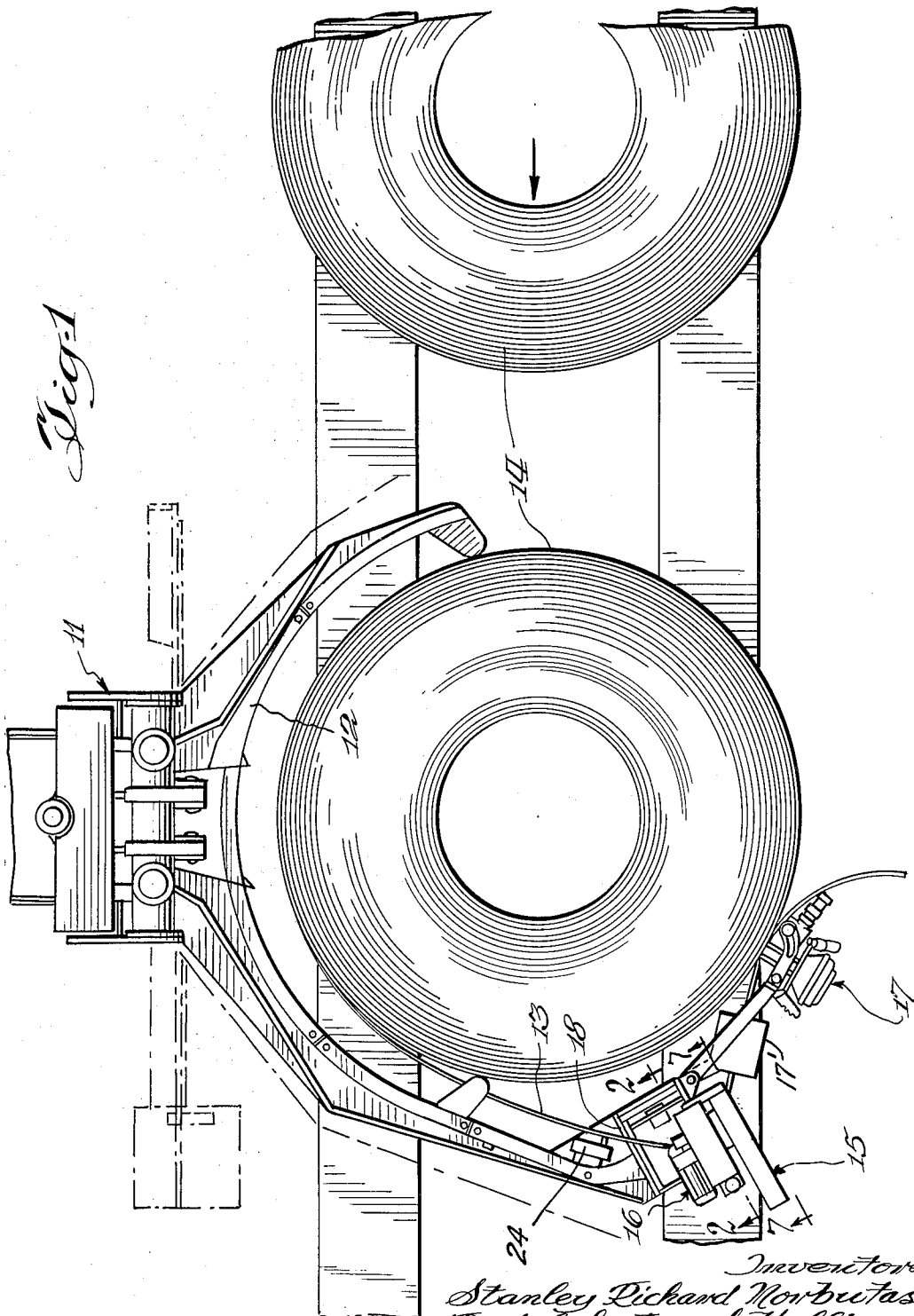
S. R. NORBUTAS ET AL

3,220,338

PACKAGE BINDING SYSTEM

Filed May 1, 1964

6 Sheets-Sheet 1



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PACKAGE BINDING SYSTEM

Filed May 1, 1964

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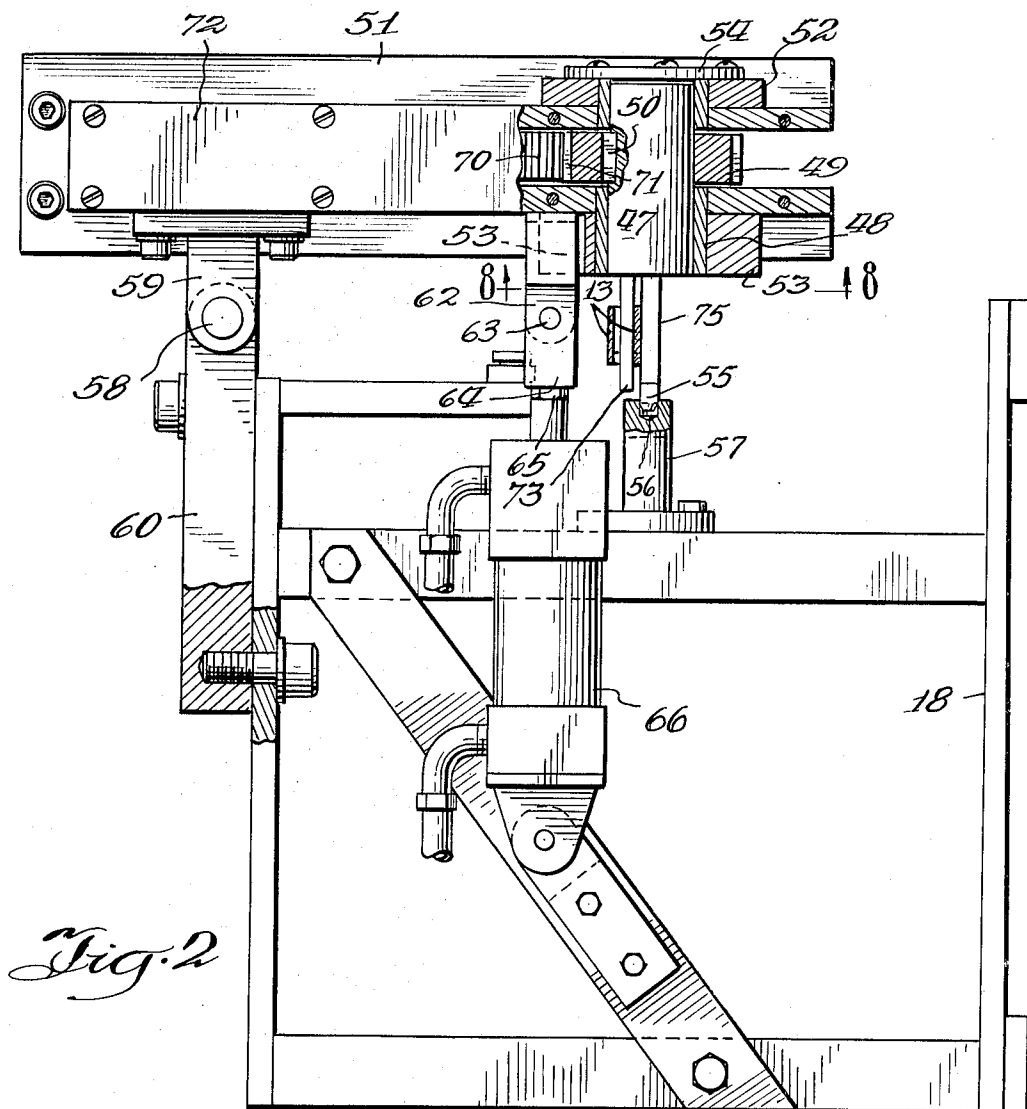
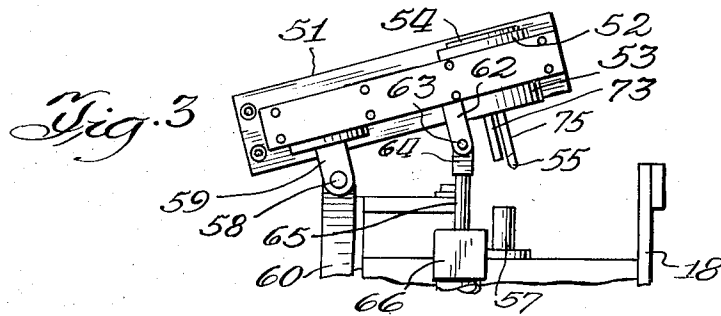


Fig. 2

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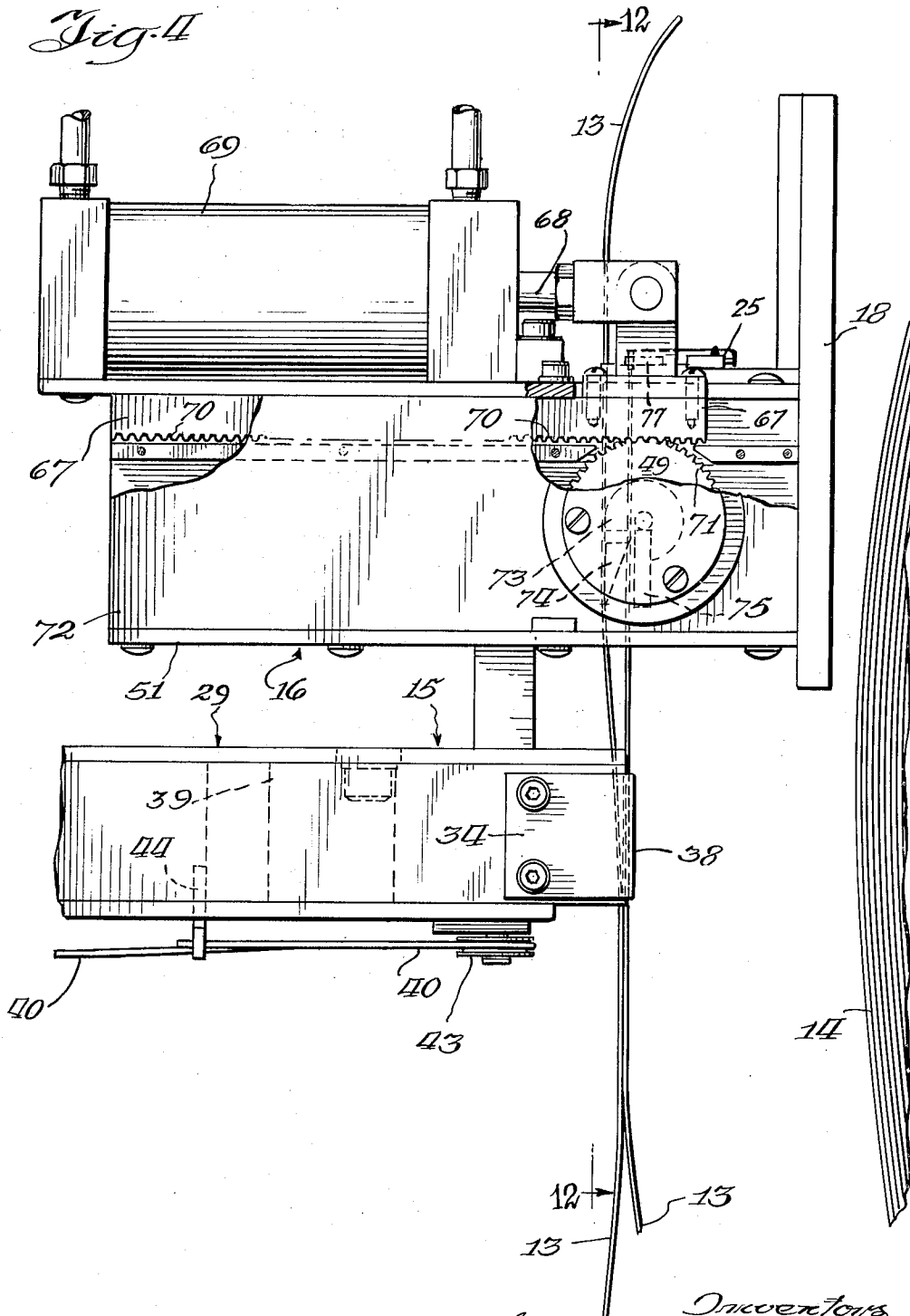
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Filed May 1, 1964

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Fig. 4



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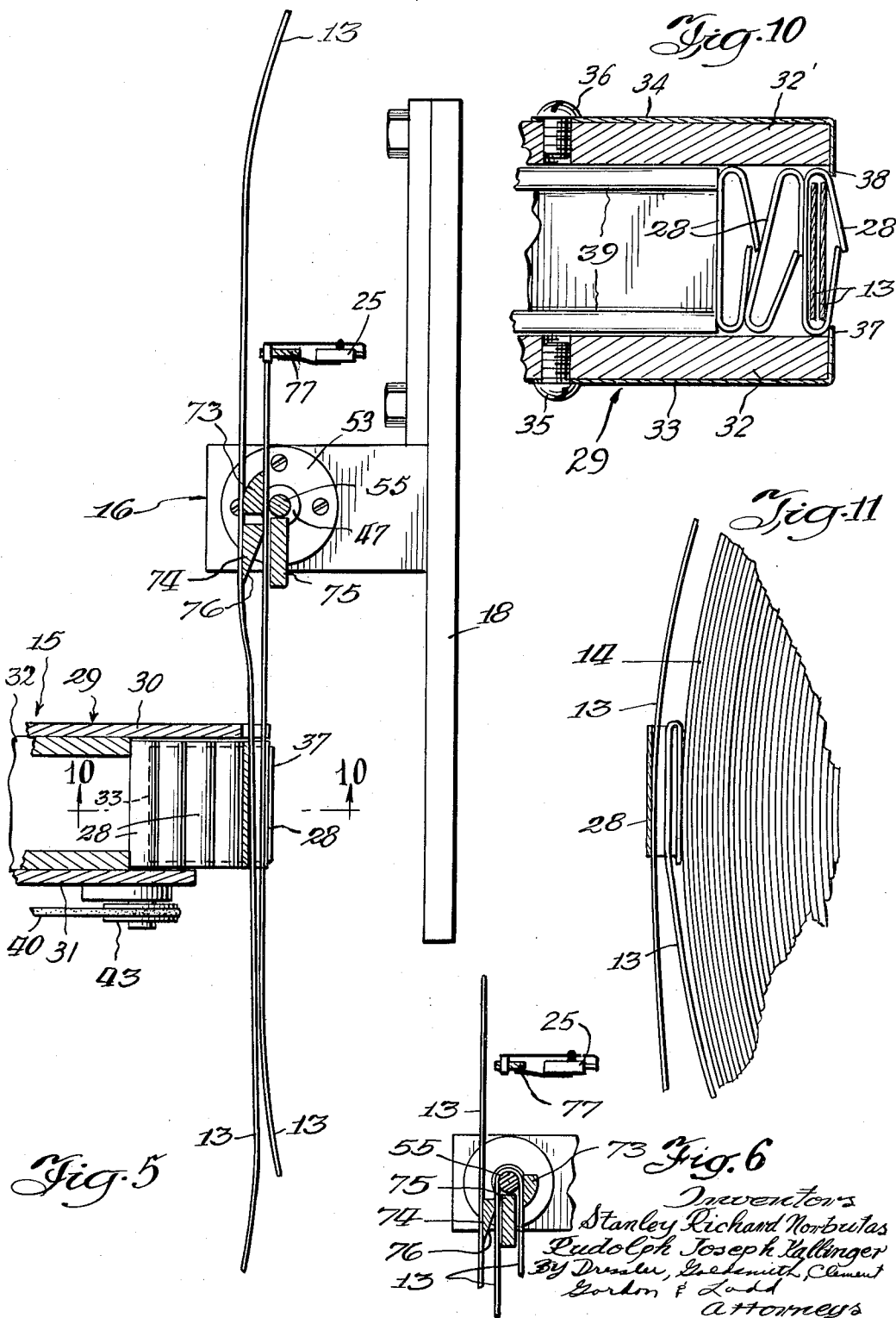
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PACKAGE BINDING SYSTEM

Filed May 1, 1964

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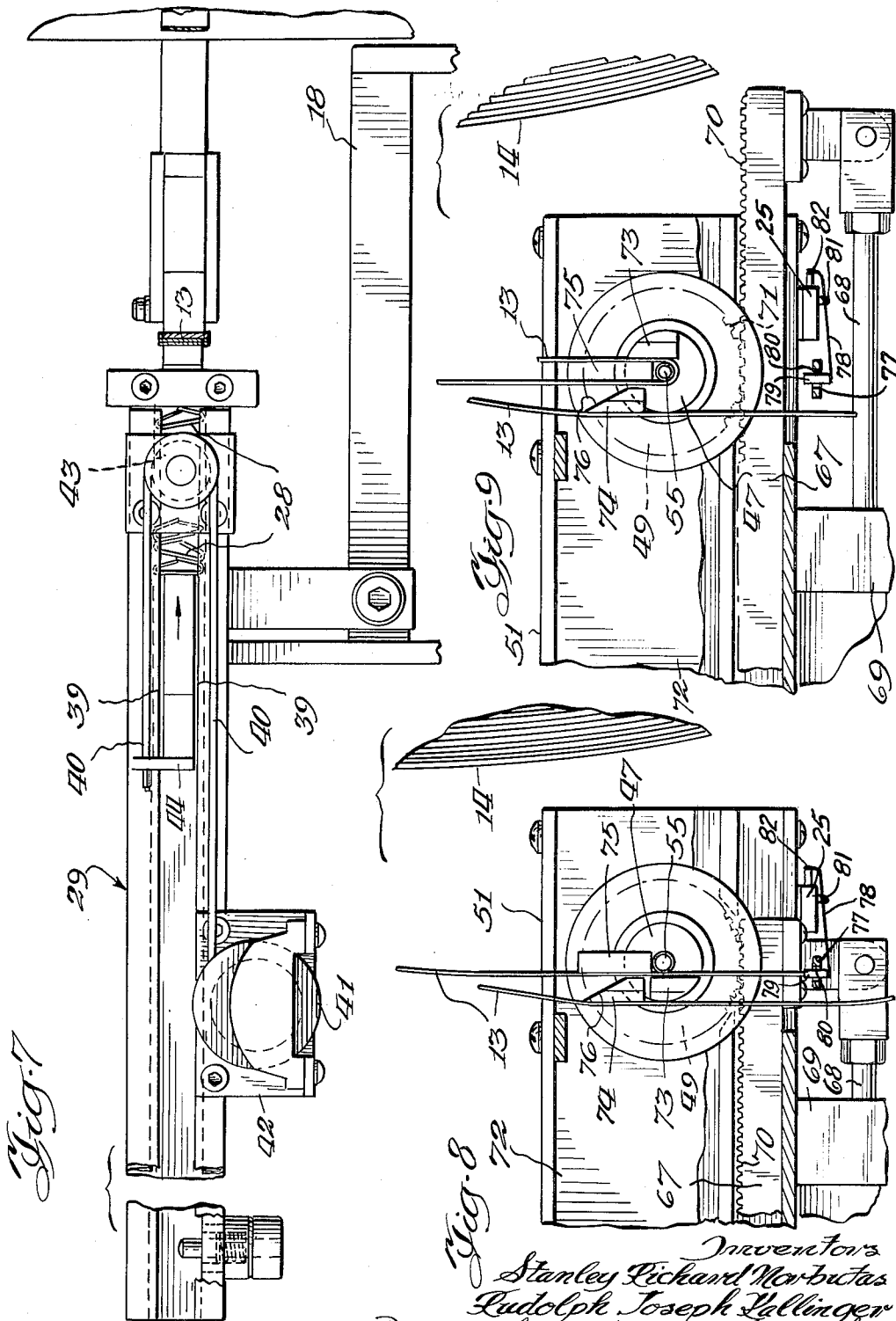
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PACKAGE BINDING SYSTEM

Filed May 1, 1964

6 Sheets-Sheet 5



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PACKAGE BINDING SYSTEM

Filed May 1, 1964

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Fig. 12

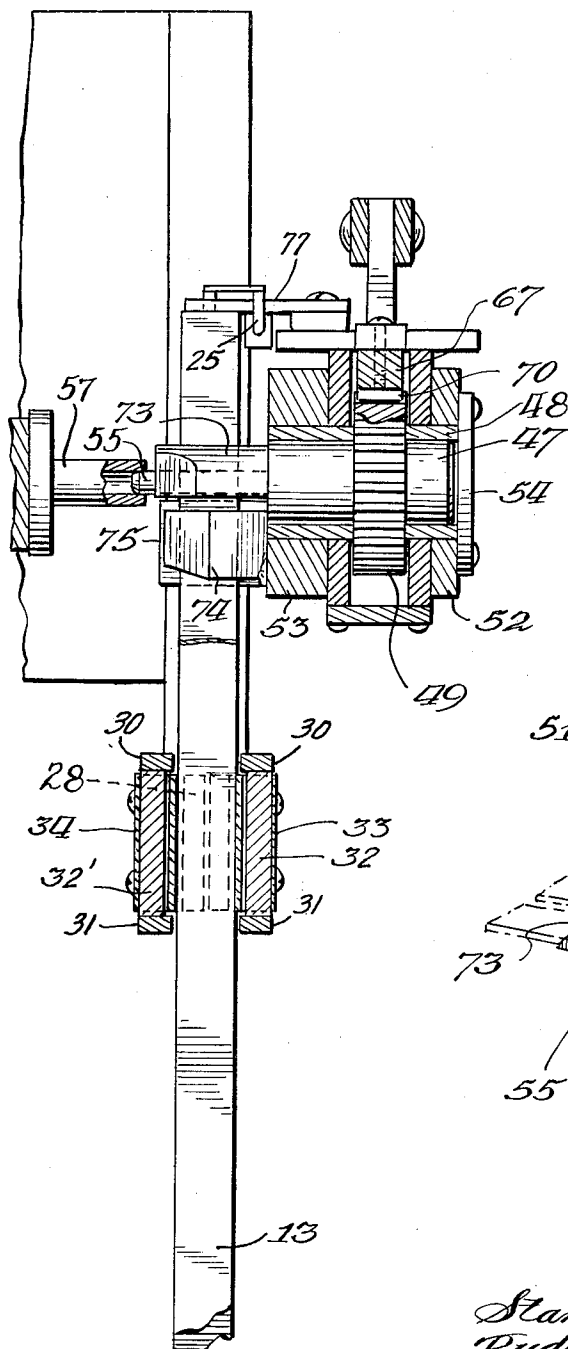


Fig. 13

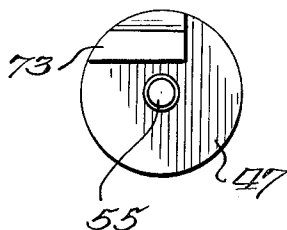
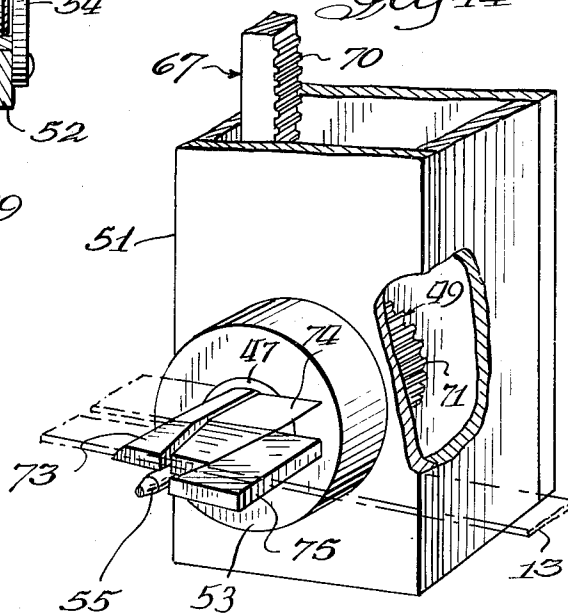


Fig. 14



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PACKAGE BINDING SYSTEM

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Filed May 1, 1964, Ser. No. 364,188

7 Claims. (Cl. 100—30)

This invention relates to a package binding system, and is particularly concerned with means for feeding metal seals into position for engagement with a metal strap looped around an article to be bound, and with means for loosely securing the free end of the strap to the partially open metal seal.

It is customary to roll long strips of steel into coils and then apply one or more metal straps around each coil of steel to facilitate handling of the coils. Each coil of steel is brought into position to be bound with metal strap to form a package. When utilizing systems embodying the present invention, the binding strap is fed through a seal member, around the coil and then through the seal member again. Then the free end of the strap is bent inward in a reverse bend that forms a stop as the strap is tensioned and pulled taut about the coil. The seal member is crimped while the strap is held in tension to complete the binding operation. Of course, if the strap is fed from a supply reel, rather than a pre-cut length, it is cut free at or near the seal member.

To effect the foregoing with an illustrative embodiment of the present invention, the free end of a metal strap is pulled forwardly from a supply roll, and is directed through a chute which directs the free end of the strap around a portion of the periphery of the coil. A partially closed metal seal is fed through a hopper into position to have the free end of the strap pass through the loop of the partially closed seal as it is fed around the periphery of the coil being strapped. A stop member is so positioned as to engage the free end of the strap being fed around the periphery of the coil after said free end passes through the loop of the metal seal the second time. After the free end of the strap reaches a predetermined position, a bending mechanism, mounted on a pivotally mounted block and located between the partially closed seal and the stop member, is automatically swung into position adjacent one surface of the strap so as to guide the strap between a bending arm and a centering pin on its second pass. When the free end of the strap engages the stop member, the bending arm is rotated around the centering pin to bend the free end of the strap around the centering pin through about 180°.

The reversely bent end of the strap is spaced from the body portion of the strap a distance greater than the thickness of the metal of which the seal is made. After the free end of the metal strap is bent, the bending mechanism is moved pivotally out of the way of the reversely bent end of the strap. The free end of the coil is kept from unwinding by the frame of the machine. A pivotally supported tension tool is moved into position adjacent to the coil to tension the metal strap about the coil. The reversely bent portion of the strap engages one edge of the partially closed seal to hold one end of the strap during the tensioning operation. After the metal strap is tensioned around the periphery of the steel coil, the partially closed metal seal is clamped into closed position to hold the strap in tight engagement with the steel coil to keep the coil from unwinding.

The structure by means of which the above mentioned and other advantages of the invention are attained will be described in detail in the following specification, taken in conjunction with the accompanying drawings, showing a preferred illustrative embodiment of the invention, in which:

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FIGURE 1 is a top plan view of the apparatus, showing a coil of steel in position for the strapping operation;

FIGURE 2 is an enlarged cross-sectional view, taken along the line 2—2 of FIGURE 1, and showing the strap bending mechanism;

FIGURE 3 is a fragmentary side elevational view of the structure of FIGURE 2 in a changed position, with the strap bending mechanism in inoperative position;

FIGURE 4 is an enlarged top plan view of the strap bending mechanism and the seal feeding mechanism with portions thereof broken away to facilitate illustration;

FIGURE 5 is a cross-sectional view of the mechanism shown in FIGURE 4;

FIGURE 6 is a fragmentary view, on a reduced scale, of a portion of the structure shown in FIGURE 5, with the strap bending mechanism in changed position, the free end of the strapping being bent back substantially on itself;

FIGURE 7 is a fragmentary side elevational view of the seal feeding means, taken along the line 7—7 of FIGURE 1;

FIGURE 8 is a cross-sectional view, taken along the line 8—8 of FIGURE 2;

FIGURE 9 is a cross-sectional view, similar to FIGURE 8, showing the same structure in changed position, with the metal strap in bent position;

FIGURE 10 is an enlarged cross-sectional view, taken along the line 10—10 of FIGURE 5;

FIGURE 11 is a fragmentary sectional view showing the free end of the metal strap bent over the edge of the partially open metal seal;

FIGURE 12 is a longitudinal sectional view, taken along the line 12—12 of FIGURE 4;

FIGURE 13 is a plan view of the bending plug; and

FIGURE 14 is a perspective view of the strap bending mechanism.

Referring to FIGURE 1, the apparatus includes a frame 11 and a chute 12 mounted on the frame for guiding a metal strap 13 around the coil 14 of steel. The steel wound in the coil 14 may have the strap applied thereto while it is still hot, or after it has cooled. A seal feeding mechanism 15 and a strap bending mechanism 16 are mounted on one end of the chute 12, and a sealing mechanism 17 and a tension tool 17' are supported by said chute in spaced relationship to said seal feeding mechanism. The present invention is concerned only with the seal feeding mechanism and the strap bending mechanism. Accordingly, the detailed description will be limited to this portion of the apparatus.

A frame 18 is mounted on one end of the chute 12 for supporting the seal feeding mechanism and the strap bending mechanism. The strap bending mechanism is pivoted to swing into and out of position between the seal feeding and the stop member 77, hereinafter described. The free end of the metal strap is manually fed from the supply roll through the loop of a partially closed metal seal 28, through the chute 12 and then through said loop of seal 28 a second time. As the strap is fed through the chute the strap bending mechanism 16 is swung into position in a manner hereinafter described. The free end of the metal strap is guided around the periphery of the coil 14, and is guided through the strap bending mechanism on its second pass.

The seals are stacked in a hopper 29 comprising two side walls 30, 31, a back wall 32, and a short top wall 32' adjacent the discharge end of the hopper. The hopper has an open discharge end, but the seals are retained against accidental discharge by springs 33, 34 secured to walls 32, 32' by screws 35, 36. The springs 33 and 34 are provided, respectively, with flanges 37, 38 which extend inwardly beyond the inner surfaces of walls 32, 32'

as shown in FIGURE 10, to engage the outer edge portions of the outmost seal in the hopper.

A weight 39, mounted in the hopper 29, engages the seal 28 farthest from the discharge end of the hopper and is pressed thereagainst by a bar 44, as shown in FIGURES 4 and 7. The bar is secured to one end of a cable 40. The other end of the cable is attached to a spring loaded reel 41 that is rotatably mounted in a housing 42 secured to the hopper. The reel tends to retract the cable and pulls it with a constant force. The cable is looped around a pulley 43, also mounted on the hopper, and its free end is secured, in any suitable manner, to the bar 44. The cable pulls the bar 44 against the weight 39 to exert pressure against the seals in the hopper and to push them toward the open discharge end of the hopper.

The strap bending mechanism includes a bending plug 47 rotatably mounted in a bushing 43 and fixed to a pinion gear 49 by a key 50, as shown in FIGURE 2. The bushing is fixed in a housing 51 and is cut away intermediate its ends to provide clearance for the pinion gear 49 and the key 50. Annular collars 52, 53, secured to the housing 51, support the opposite ends of the bushing 48. A plate 54 is secured to the collar 52 to retain the bending plug 47 in place. A centering pin 55, depending from the collar 53, fits into a recess 56 in a pin retainer 57 when the bending mechanism is in its operative position. The pin retainer 57 is mounted on the frame 18 and provides an outboard support for the centering pin 55.

The housing 51 is pivotally supported, as shown in FIGURE 2, by the pivotal joint 53 which connects a bracket 59, extending from the housing 51, to an arm 60 secured to the frame 18. A bracket 62 is pivotally connected, as shown at 63, to a fitting 64 secured to the outer end of a piston rod 65 projecting from a cylinder 66. The cylinder 66, which is mounted on the frame 18, is actuated by a switch 24 and may be operated by air or by any suitable fluid. The switch for actuating the cylinder 66 is turned on by the free end of the strap after the strap passes the area of the bending mechanism on the first pass of the strap. The piston rod 65 moves the housing 51 and the bending mechanism between the operative position, shown in FIGURE 2, and the inoperative position shown in FIGURE 3.

A rack 67, mounted in housing 51, and reciprocated by the piston rod 68 of a cylinder 69, has its teeth 70 meshed with the teeth 71 of the pinion gear 49. A cover plate 72 is secured to the housing 51 to enclose the rack. As the rack is reciprocated, it rotates the pinion gear 49 and the bending plug 47, first in one direction, and then in the opposite direction. The length of the stroke of the piston rod 68 determines the extent of the rotational movement of the bending plug.

As shown in FIGURES 5 and 12, a bending arm 73 projects from the bending plug 47, and two arms 74 and 75, extending parallel to arm 73, are fixed to the stationary collar 53. The arm 74 has one face 76 inclined away from the adjacent side of arm 75 so as to provide a wide gap between the ends of arms 74 and 75 closest to the strap supply roll. The free end of the strap 13 is fed around the coil 14. As the free end of the strap passes through the chute 12, it engages a switch 24 and turns it on to actuate the cylinder 66 to swing the bending mechanism into its operative position. It will be noted that on the second pass of the strap its free end engages the inclined face of the arm 74. The inclined face 76 directs the free end of the strap to the space between the arms 74 and 75 and then between the arm 73 and the centering pin 55. A stop member 77 is mounted rearwardly of the bending mechanism 16 in position to engage the free end of the strap on its second pass through the apparatus. An arm 78, pivotally mounted on a conventional switch 25, has a stud extending through an aperture 80 in the stop member 77. The free end of the strap 13 engages the stud 79 and moves the arm 78 about its pivot 81. The free end of the strap 13 is wider than the aperture 80 and therefore cannot enter it.

When the free end of the strap engages the stop member, the pivotal movement of the arm 78 causes its end 82 to close the switch 25. Closing the switch 25 actuates the system of the cylinder 69 and causes the piston rod 68 to move the rack 67 toward the right, as viewed in FIGURE 8. The movement of rack 67 rotates the bending plug 47 in counterclockwise direction, as viewed in FIGURES 8 and 9. The arms 74 and 75 are stationary, while the centering pin 55 and the bending arm 73 are rotated with the bending plug around the axis of the centering pin. As the bending arm is moved around the axis of pin 55, it pushes the free end of the metal strap, which lies between the bending arm 73 and the centering pin, around the centering pin through approximately 180° until it lies against the opposite side of the arm 75. This bending operation moves the free end of the strap outwardly beyond one edge of the partially closed seal 28 through which the strap extends.

Upon completion of the strap bending operation, the piston rod 65 moves the housing 51 pivotally outwardly about the pivotal joint 58, thus removing both the centering pin 55 and the arm 75 from engagement with the bent over end of the metal strap. The sealing mechanism 17 and the tension tool 17', which are pivotally mounted, are swung into the coil, and the tensioning tool engages the strap to tension it. The reversely bent end of the strap engages the seal to cooperate with the tensioning tool during the tensioning operation. As the tensioning tool pulls the strap into tighter engagement with the coil, the strap pulls the partially closed seal out of the hopper. When the strap has been tensioned to the desired extent, the partially closed metal seal is clamped into closed position to hold the coil 14 in tightly strapped condition.

Although we have described a preferred embodiment of the invention in considerable detail. It will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of the structure may be modified or changed without departing from the spirit or scope of the invention. Accordingly, we do not desire to be restricted to the exact construction described.

We claim:

1. In a strapping machine of the type in which a strap is fed loosely around the perimeter of an article to be bound, a hopper for feeding partially closed metal seals toward said strap, said partially closed metal seals each being of the type which has a loop which is adapted to extend transversely of said strap, the discharge end of said hopper being positioned to hold a partially closed metal seal with its loop in alignment with the strap fed through said machine, whereby said strap passes through the loop of said partially closed seal, stop means for engaging the free end of said strap after it passes through said loop a second time, means for bending the free end of said strap to form a reverse bend adjacent said free end, and means moving said bending means pivotally about an axis parallel to the length of said strap for releasing the bending means from the free end of said strap to prepare said strap for a subsequent tensioning operation.

2. In a strapping machine of the type in which a strap is fed loosely around the perimeter of an article to be bound, a hopper for feeding partially closed metal seals toward said strap, said partially closed metal seals each being of the type which has a loop which is adapted to extend transversely of said strap, the discharge end of said hopper being positioned to hold a partially closed metal seal with its loop in alignment with the strap fed through said machine, whereby said strap passes through the loop of said partially closed seal, resilient means at the discharge end of said hopper to prevent accidental discharge of said partially closed metal seals, stop means for engaging the free end of said strap after it passes through said loop a second time, means for bending the free end of said strap to form a reverse bend adjacent said free end, means for releasing the bending means from the free end

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of said strap, and means to tighten said strap about the perimeter of the article to be bound, the movement of said strap as it is being tightened about said article being effective to pull said partially closed metal seal from the discharge end of said hopper against the action of said resilient means.

3. In a strapping machine of the type which a strap is fed loosely around the perimeter of an article to be bound, a hopper for feeding partially closed metal seals toward said strap, said partially closed metal seals each being of the type which has a loop which is adapted to extend transversely of said strap, the discharge end of said hopper being positioned to hold a partially closed metal seal with its loop in alignment with the strap fed through said machine, whereby said strap passes through the loop of said partially closed seal, stop means for engaging the free end of said strap after it passes through said loop a second time, strap bending mechanism pivotally mounted in said machine for movement into engagement with said strap adjacent its free end, said bending mechanism comprising a fixed arm and a movable arm adapted to bend the free end of said strap about one end of said fixed arm, and means for pivotally moving said bending mechanism out of engagement with said strap.

4. In a package binding system, a frame, a strap bending mechanism pivotally mounted on said frame, said strap bending mechanism comprising a pair of fixed arms and a movable arm in closely spaced relationship, means to move said movable arm about a center adjacent one end of one of said fixed arms to bend the free end of a strap approximately 180° about said one end of said one fixed arm, and means for pivotally moving said strap bending mechanism out of engagement with said strap.

5. In a package binding system, a strap bending mechanism comprising a pair of fixed arms in closely spaced relationship for receiving a strap extending in the form of a loop and having one end thereof fed between said fixed arms, a rotatable bending plug having one end adjacent one edge of the strap fed between said fixed arms, a pinion gear fixed to said rotatable plug, a rack engaged with said pinion gear, means to reciprocate said rack for rotating said plug, and a bending arm mounted eccentrically of said plug and projecting from said one end of said plug into engagement with one face of said strap at a point beyond the ends of said fixed arms, whereby rotation of said plug in one direction causes said bending arm to bend said strap around one end of one of said fixed arms inwardly of said loop.

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6. In a package binding system, a strap bending mechanism comprising a pair of fixed arms in closely spaced relationship for receiving a strap having one end thereof fed between said fixed arms, a rotatable bending plug having one end adjacent one edge of the strap fed between said fixed arms, means for rotating said plug, a bending arm mounted eccentrically of said plug and projecting from said one end of said plug into engagement with one face of said strap at a point beyond the ends of said fixed arms, whereby rotation of said plug in one direction causes said bending arm to bend said strap around one end of one of said fixed arms, and means for moving said bending mechanism out of engagement with said strap.

7. In a package binding system, a frame, a strap bending mechanism pivotally mounted on said frame, said bending mechanism comprising a pair of fixed arms in closely spaced relationship for receiving a strap having one end thereof fed between said fixed arms, a rotatable bending plug having one end adjacent one edge of the strap fed between said fixed arms, means for rotating said plug, a bending arm mounted eccentrically of said plug and projecting from said one end of said plug into engagement with one face of said strap at a point beyond the ends of said fixed arms, whereby rotation of said plug in one direction causes said bending arm to bend said strap around one end of one of said fixed arms, and means for moving said strap bending mechanism pivotally out of engagement with said strap.

References Cited by the Examiner

UNITED STATES PATENTS

927,033	7/1909	Flora	100—31
1,174,143	3/1916	Heinen	153—15
2,055,257	9/1936	Maynard et al.	81—9.11
2,610,666	9/1952	Thompson	153—15
2,707,430	5/1955	Leslie et al.	100—30 X
3,098,232	7/1963	Brown	1—349
3,126,686	3/1964	Kobylanski et al.	53—198
3,139,813	10/1964	Hall et al.	100—30 X

FOREIGN PATENTS

1,059,784	11/1953	France.
725,603	3/1955	Great Britain.

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