United States Patent [19]

Van Doorn et al.

[11] **3,816,970**

[45] **June 18, 1974**

[54] **APPARATUS FOR WRAPPING BAGGING AND THE LIKE ABOUT BALES OF FIBERS**

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[73] Assignee: **Lummus Industries, Inc.,** Columbus, Ga.

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[21] Appl. No.: **261,294**

[52] **U.S. Cl.** ..... **53/124 C**

[51] **Int. Cl.** **B65b 11/02**

[58] **Field of Search** ..... 53/124 C, 124 D, 218, 226, 53/221

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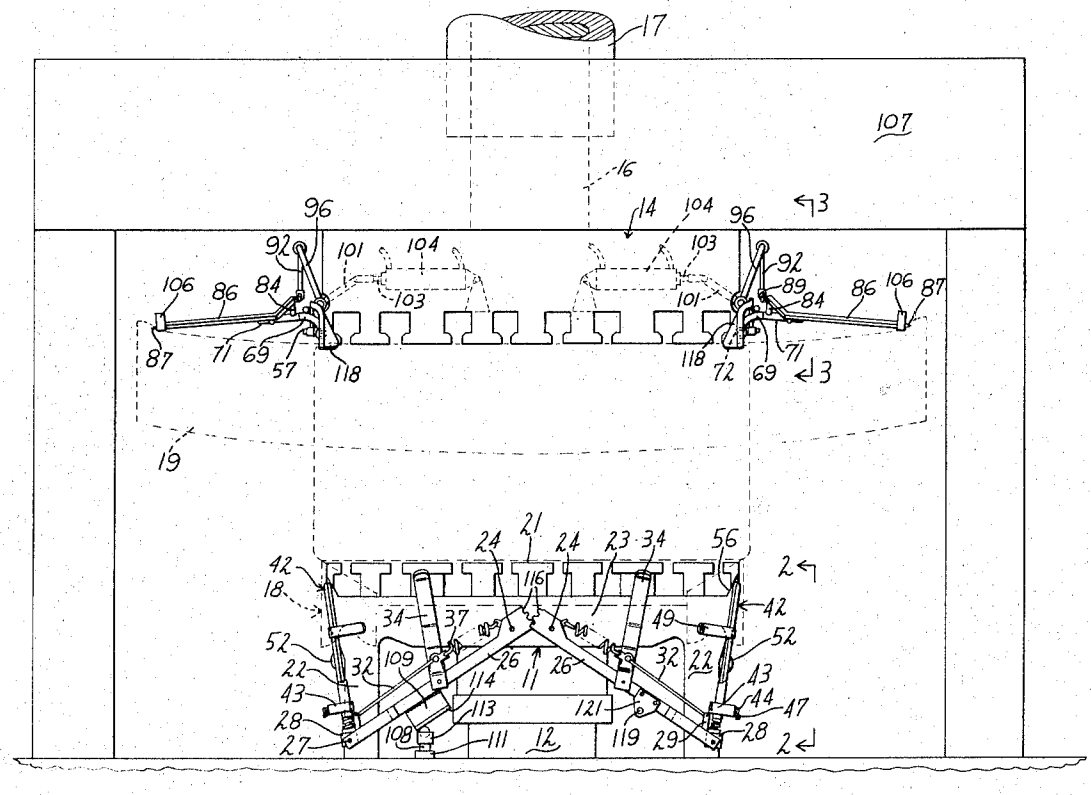
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Assistant Examiner—J. Sipos
Attorney, Agent, or Firm—Jennings, Carter & Thompson

[57] **ABSTRACT**

Apparatus adapted for association with the upper and lower platens of a baling press or the like and effective to wrap sheets of material about portions of a bale while under compression between the platens. The wrapping mechanism on the platen which passes into and through the fiber collection box or chamber of the press mechanism is designed to retract behind the fiber engaging surface of such platen and to lie within the vertically projected confines thereof, permitting such platen to traverse the box without interference by such mechanism. The mechanism comprises sheet engaging arms disposed when actuated to crease and fold the sheets about the ends and sides of the bale while the bale is under compression between the platens, and to hold the sheets folded, permitting the thus wrapped bale to be strapped prior to releasing the pressure therefrom.

6 Claims, 12 Drawing Figures



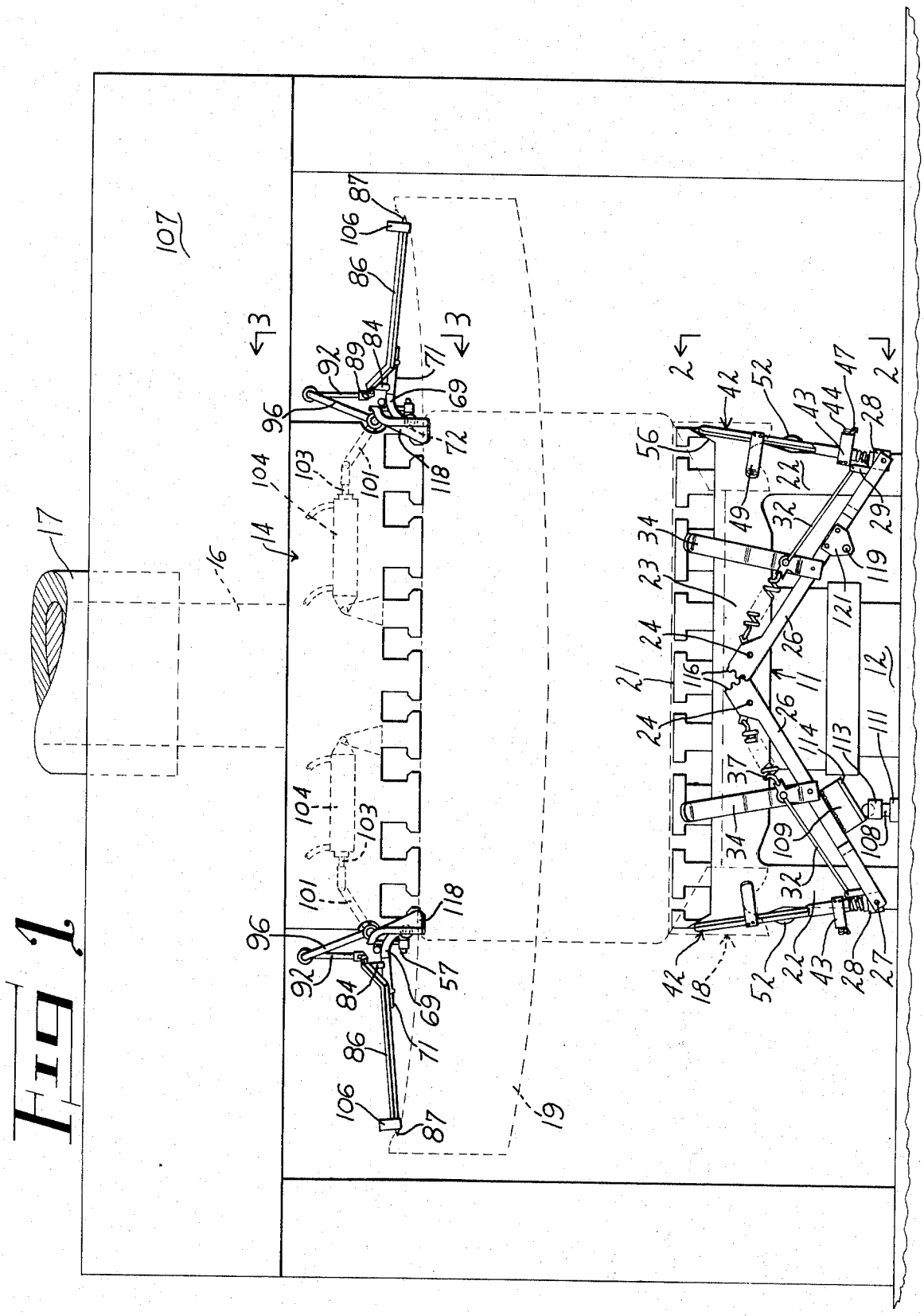
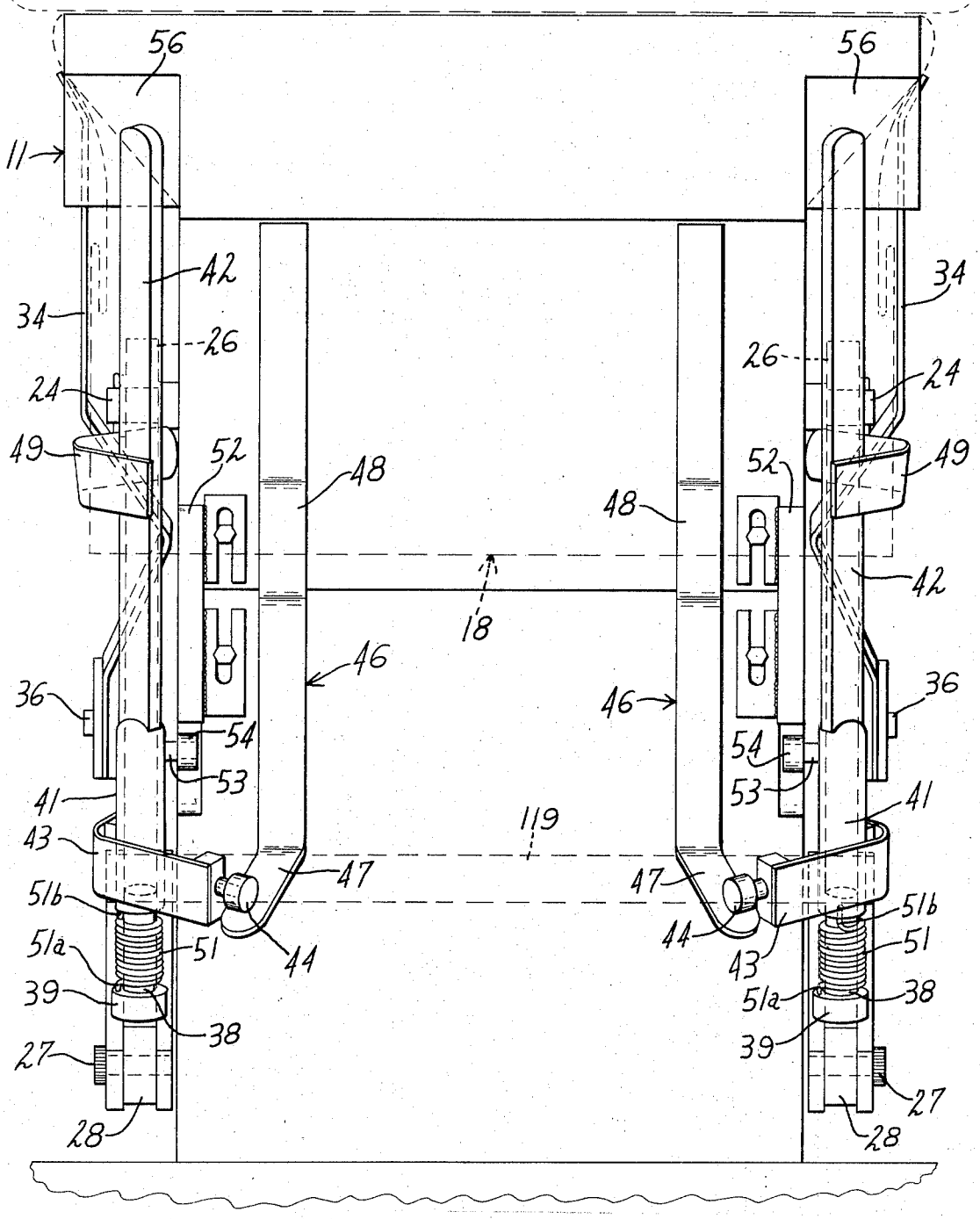

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FIG 1

Fig 2


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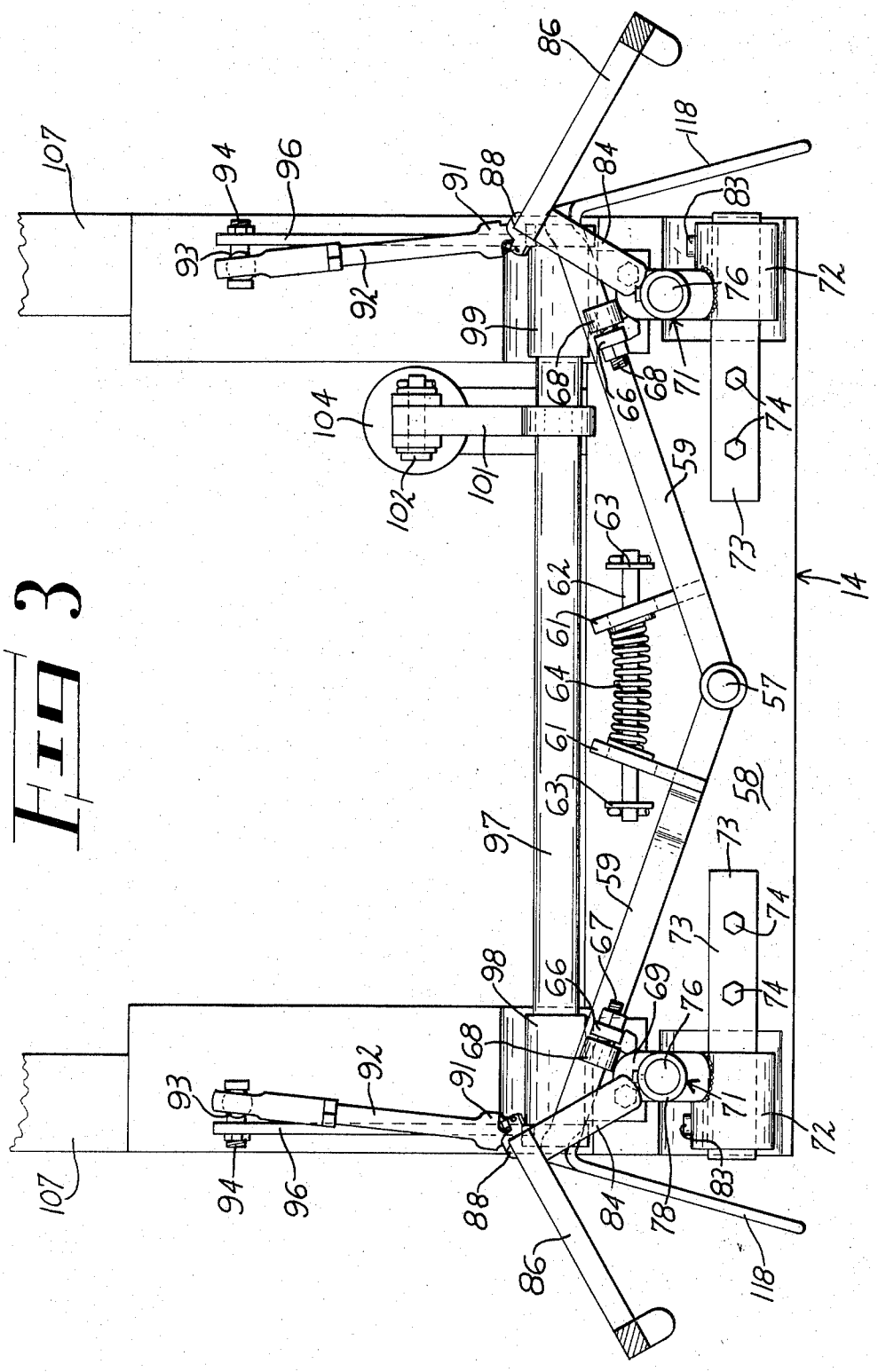
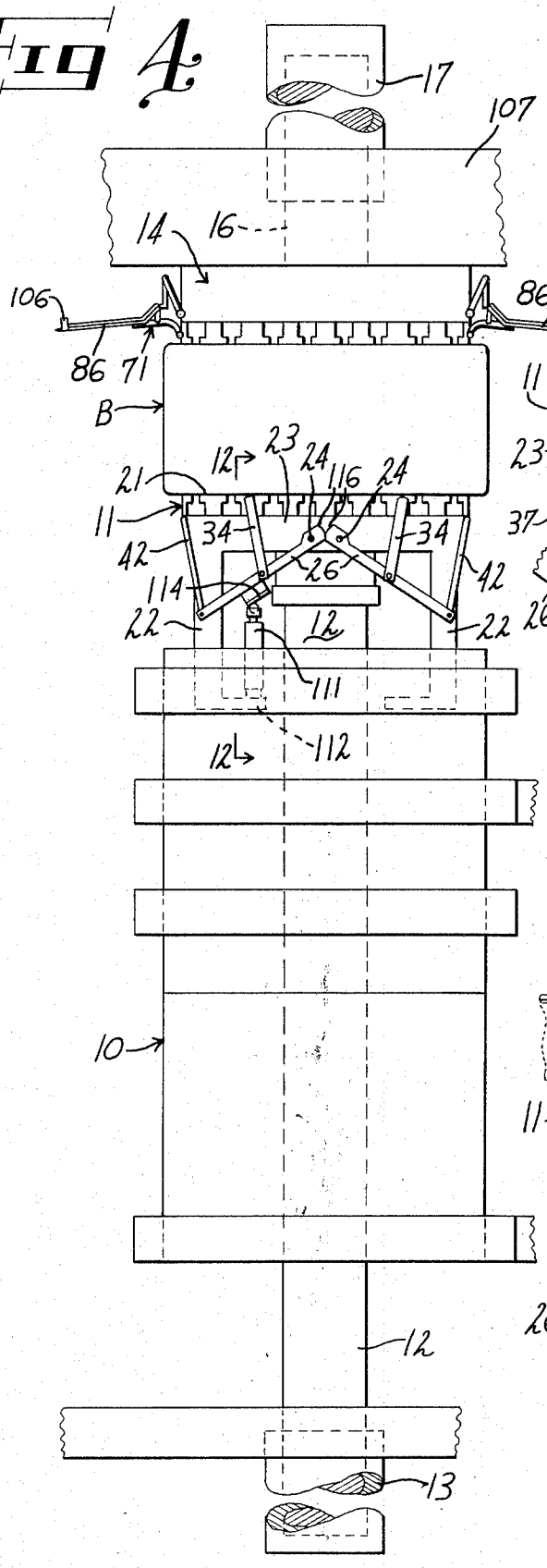

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FIG 3

FIG 4



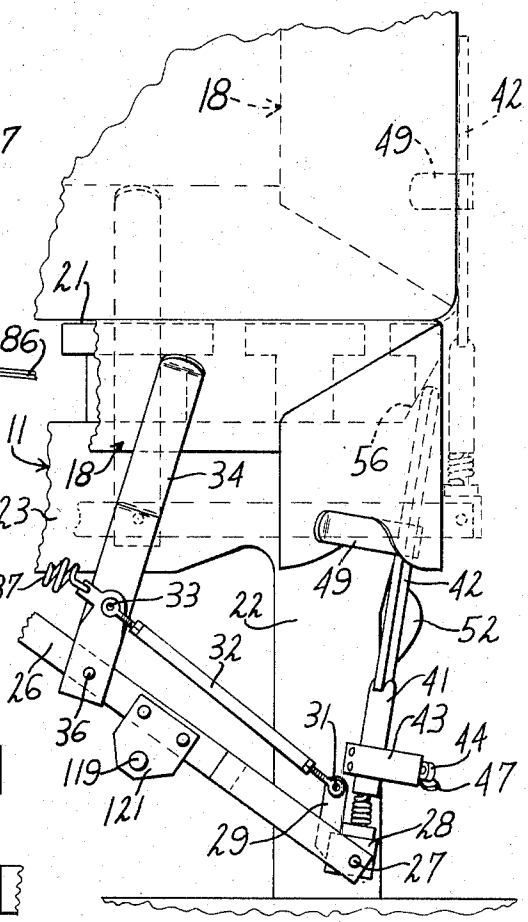


FIG 6

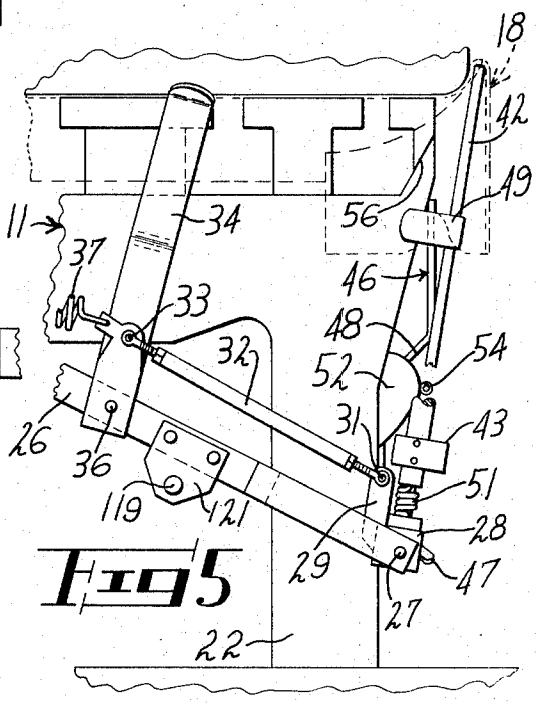


FIG 5

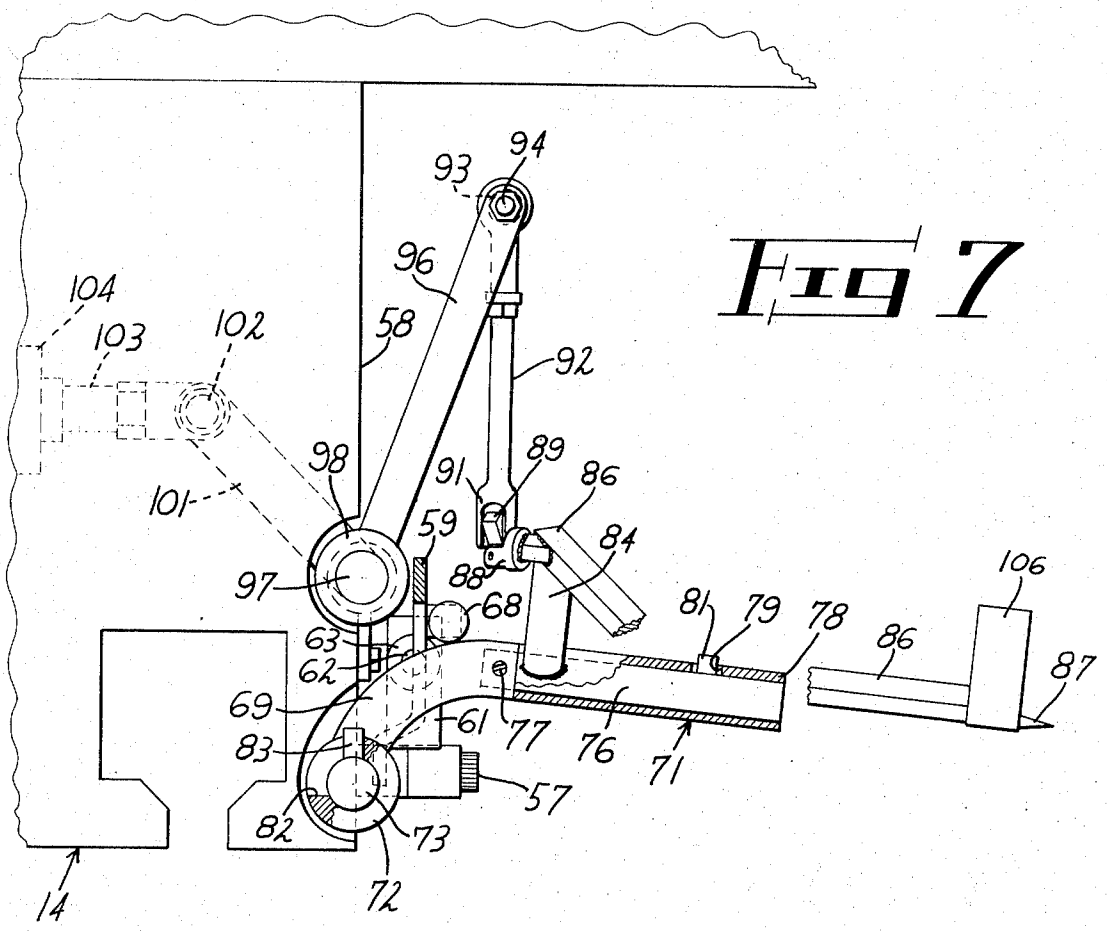

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FIG 7

FIG 12

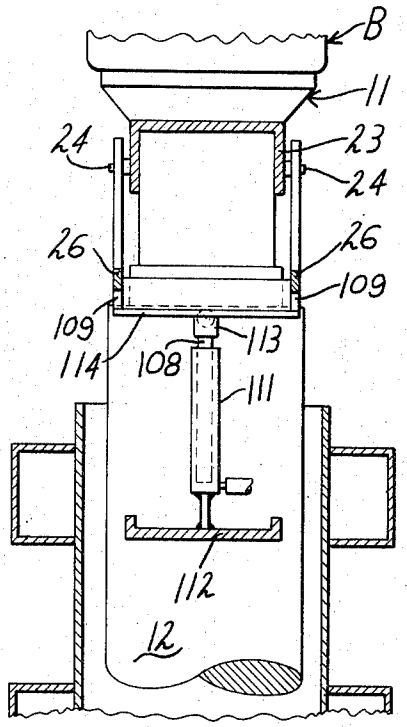

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Fig 8

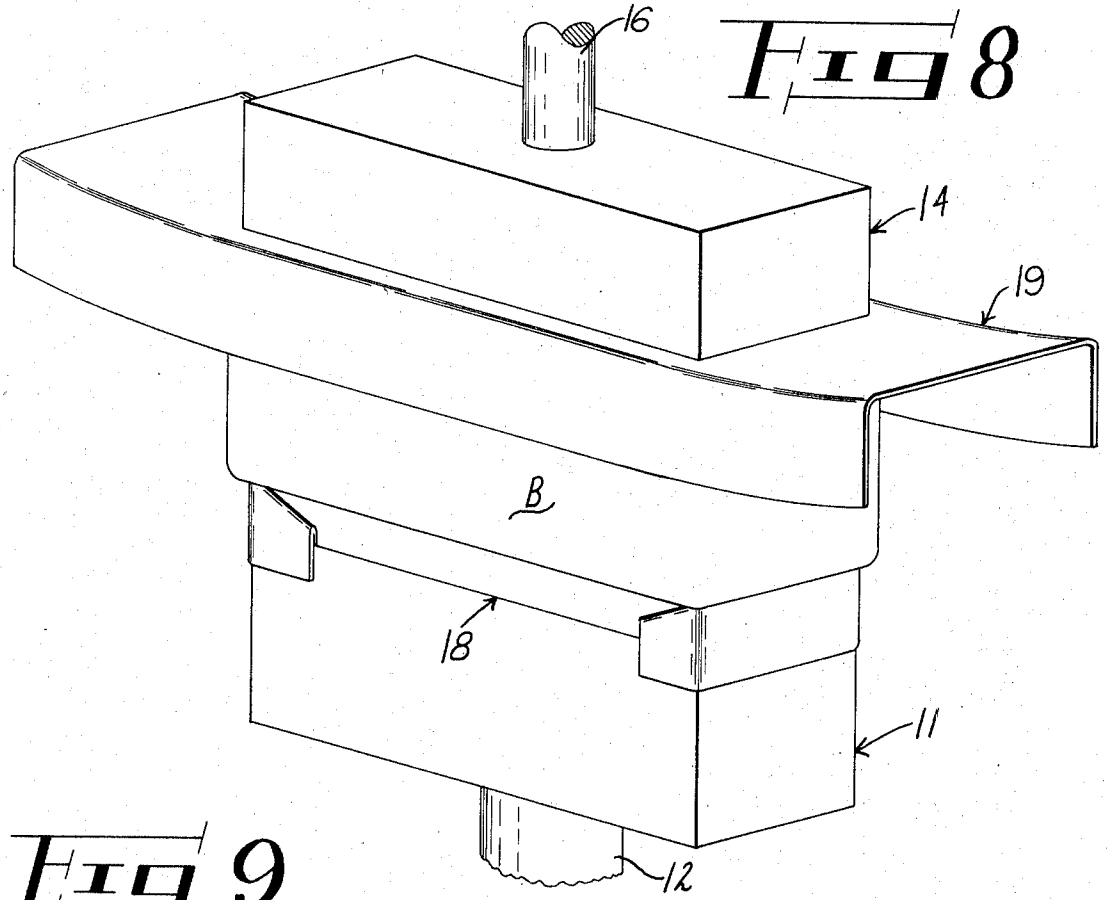
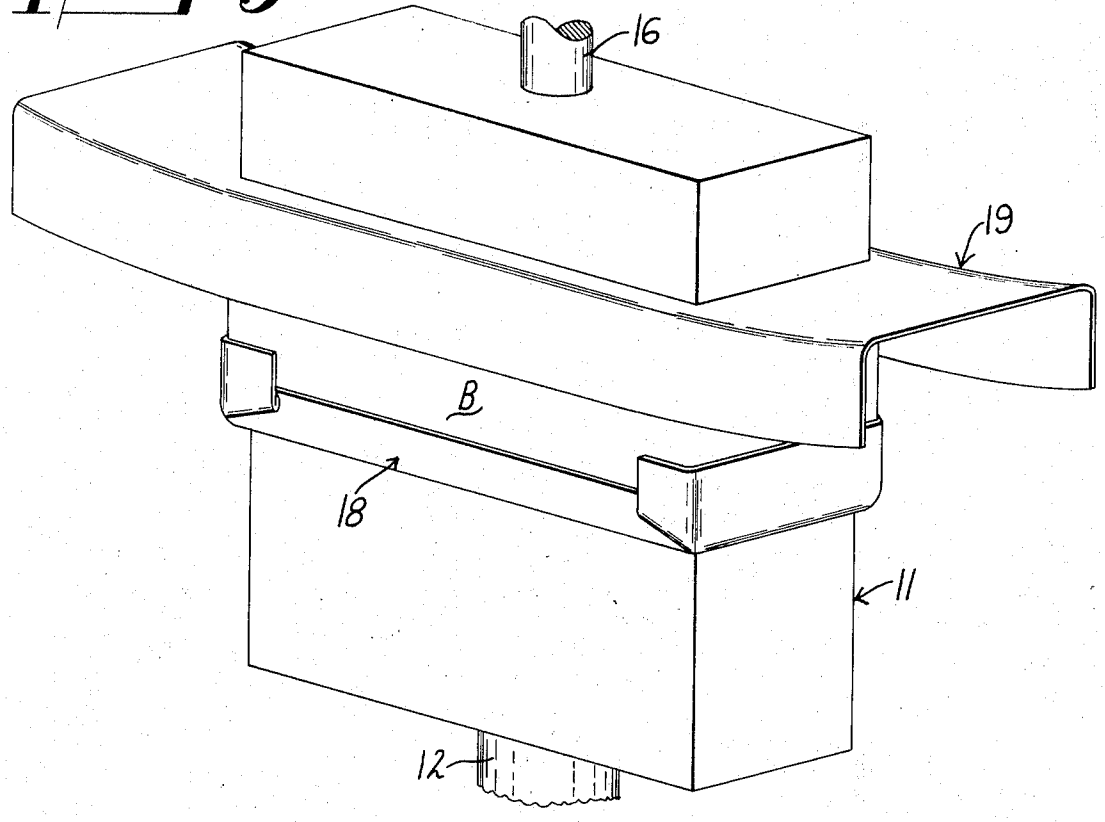


Fig 9



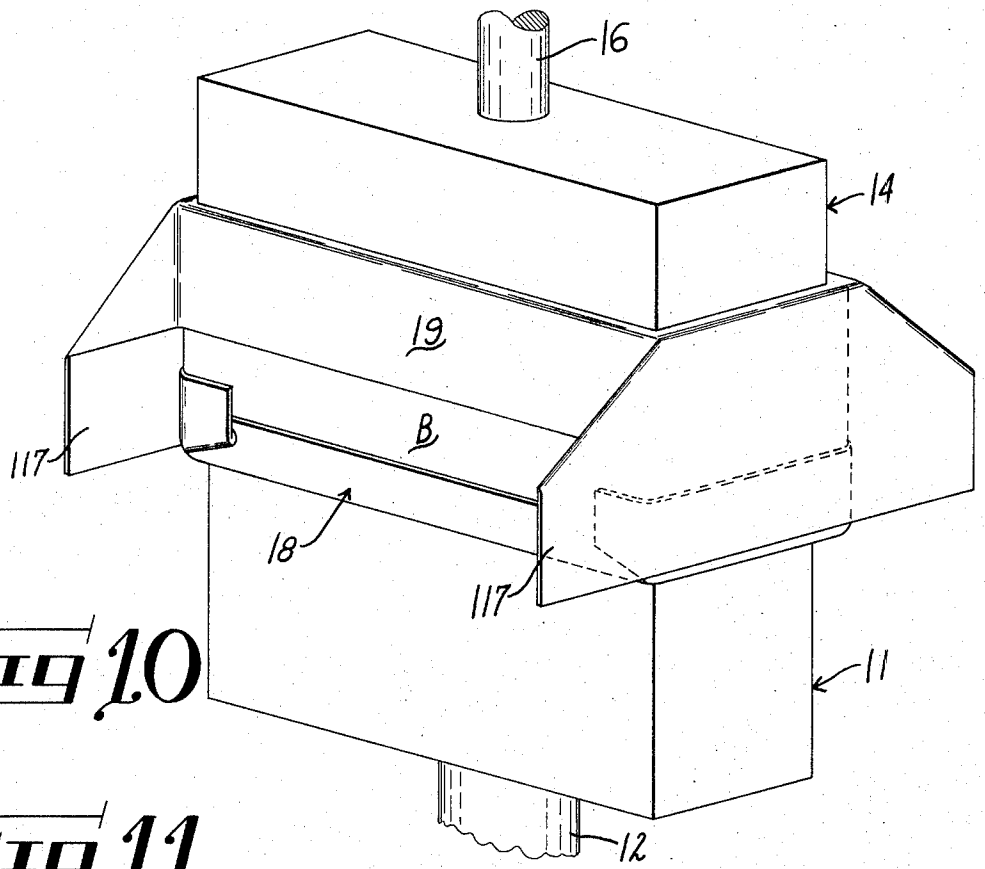


FIG 10

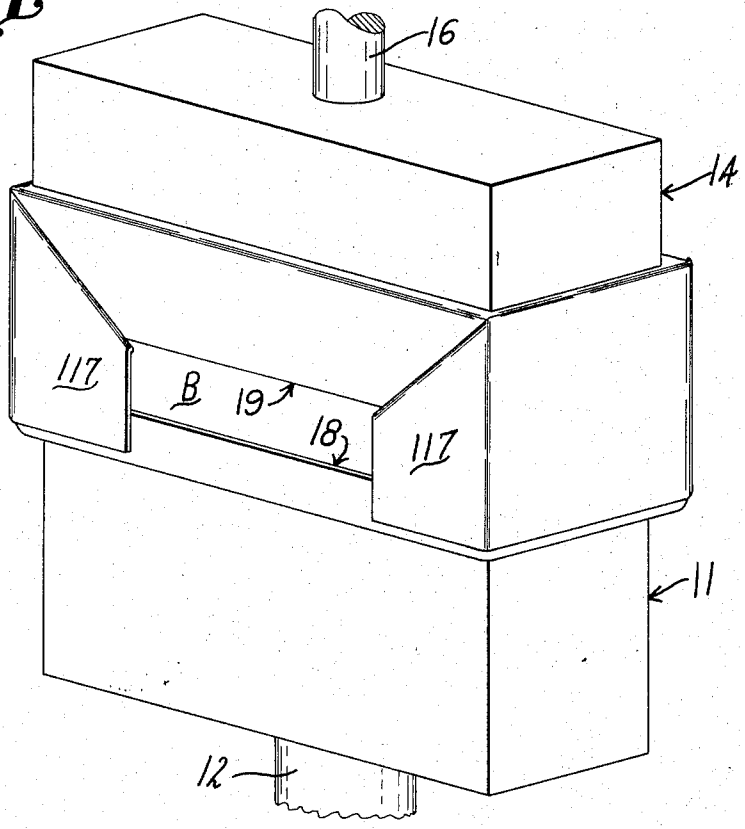


FIG 11

APPARATUS FOR WRAPPING BAGGING AND THE LIKE ABOUT BALES OF FIBERS

Our invention relates to apparatus for wrapping sheets of material about a bale of fiber while the same is held under compression between the platens of a baling press.

In this art it is customary in the baling of natural fibers such as cotton as well as many of the man-made fibers to cover all or most of the area of such bales with flexible sheet material such as jute bagging and, more recently, with certain types of sheet plastic material as well as relatively rigid sheets such as pre-scored kraft board. Heretofore, the upper and lower platens have been "dressed" with the wrapping material and then, while the bale was under pressure between the platens, the ends and sides of the sheet were pulled about the bale by hand. With the bagging thus in place straps have been placed about the bale either manually or by automatic machinery. Securing the wrapping about the bale manually is time consuming and hence expensive. Further, manual application of the wrapping requires that it be supported out of alignment with the strapping mechanism while the straps are being applied, this again increasing the overall time required to wrap and tie out a bale.

In view of the foregoing our invention contemplates the provision of apparatus carried by the opposed platens of a baling press which shall be effective after being "dressed" with the sheets of bagging or kraft board and while the bale is held compressed between the platens, to wrap the sheet about the ends and side portions of the bale and hold the same so positioned, awaiting the placement of securing straps or bands about the bale.

Our invention has for another object the provision of apparatus of the character designated so constructed and arranged that it may be associated with the one of the platens which traverses the usual fiber collection box or chamber without interfering with the normal fiber collection or bale compaction processes.

More in detail, our invention has for an object the provision of a plurality of sheet engaging fingers or arms which, in the case of the platen which traverses the fiber collection chamber, move from retracted, "dressed" positions to positions alongside the ends and sides of the bale, such movement resulting in placing the end and side portions of the sheet about the bale and in folding portions of the ends of the sheet around the corners of the bale.

Another object is to provide sheet supporting, folding and holding arms and operating mechanisms therefor disposed for association with the other platen of the press and effective to place the other sheet of wrapping material about the bale after the first named sheet has been so placed, whereby the sheets may be overlapped, thus completely to cover the ends and at least the major portions of the side areas of the bale.

A further object is to provide bale wrapping apparatus which may be readily adapted to the platens of existing presses and which shall be simple of construction and reliable in operation.

Apparatus illustrating features of our invention is shown in the accompanying drawings forming a part of this application, in which:

FIG. 1 is a fragmental side elevational view of our improved apparatus shown in the position that the parts occupy while holding the bale under pressure between the upper and lower platens and with the parts in the position just prior to moving upwardly and downwardly about the bale, to wrap the sheets about the bale;

FIG. 1 is an enlarged detail end elevational view of the mechanism carried by the lower platen, in the lowered position, prior to moving upwardly to wrap the sheet carried thereby around the bale, as viewed in direction of arrows 2—2 of FIG. 1;

FIG. 3 is an enlarged detail view, partly in section and broken away and taken generally along line 3—3 of FIG. 1;

FIG. 4 is a wholly diagrammatic side elevational view showing the position that the parts occupy immediately after the lower platen has removed the fiber from the fiber collection chamber, while the bale is under compression and prior to wrapping the sheets about the bale, the sheets of wrapping material being omitted for the sake of clarity;

FIG. 5 is an enlarged detail fragmental view of one side of the apparatus carried by the lower platen, in slightly raised position, the sheet carried thereby being shown in dotted lines;

FIG. 6 is a view corresponding to FIG. 5 with the sheet "dressed" over the mechanism carried by the lower platen and showing in dotted lines the position occupied by the apparatus and assumed by the lower sheet when the mechanism moves upwardly to sheet wrapping position;

FIG. 7 is an enlarged, detail fragmental view of one corner of the upper wrapping mechanism in raised position;

FIGS. 8 to 11 inclusive are diagrammatic views illustrating the steps in securing the sheets about the bale by our improved apparatus; and

FIG. 12 is an enlarged view taken generally along line 12—12 of FIG. 4.

Referring now to the drawings for a better understanding of our invention we illustrate the same, as best shown in FIG. 4, in association with a baling press which may include a fiber collection chamber or box 10. In the form illustrated we show what is known as an up packing press, namely, one in which the platen 11 is adapted to move upwardly from generally the bottom portion of the fiber collection chamber 10 to the position illustrated in FIG. 4. Thus, with the platen 11 mounted on the piston 12 of the ram 13 and withdrawn to the bottom of the charging box, fiber may be placed in the box in the manner well understood in the art. The press also comprises the upper platen 14 which is mounted on the piston rod 16 of an upper ram 17. The platens are adapted to be moved to the position shown in FIG. 4, whereby the relatively loosely packed fiber in the charging chamber 10 is compacted outside of that chamber into a bale indicated generally by the letter B.

As stated, the object of our invention is to wrap about the bale B, in the manner to be described, the overhanging sides and ends of a bottom 18 of material and the similar portions of a top sheet 19 of material thus, in effect, to wrap the bale firmly with the said two sheets as illustrated in FIG. 11 of the drawings. Still further, and also as has been mentioned, our invention contemplates holding the bale wrapped as illustrated in FIG. 11 in that position until strapping can be placed about the bale either manually or by mechanical strapping devices such for instance as that shown, described

and claimed in United States Letters Patent No. 3,521,550 dated July 21, 1970.

Referring now particularly to FIG. 1 it will be seen that the lower platen 11 comprises the slotted upper fiber engaging surface 21 and the depending end skirt sections 22.

Pivotally mounted on each vertically disposed side surface 23 of the lower platen 11, generally at positions 24 are pairs of arms 26. In view of the fact that the arms 26 themselves are identical and also because the structure carried by the opposite disposed ones of these arms, that is at each end of the platen 11, is identical, a description of one such assembly will suffice for all.

The arm 26, at its lower end is bifurcated and at 27 pivotally receives a block 28. Welded to the side of the block 28 is an upstanding arm 29. Pivotally connected at 31 to the upper end of the arm 29 is a link 32, the other end of which is pivotally mounted at 33 to the side of an upstanding sheet engaging finger 34, the latter being pivoted at 36 to the side of the arm 26. A tension spring 37 urges the upper end of the finger 34 toward the center of the platen as viewed in FIG. 1, that is, to the left as viewed in FIGS. 5 and 6.

The block 28 has an upstanding rod 38 secured non-rotatably thereto. A collar 39 is secured to the rod 38 just above the block 28. See particularly FIG. 2. Rotatably received about the upper end of the rod 38 is a tubular lower end section 41 of a lower sheet engaging finger 42.

From what has been thus far described concerning the arm 26 and its attachments, as well as the finger 34, it will be seen that the fingers 34 and 42 are pivotally mounted on the arm 26 at the points 36 and 27, respectively, and the same are tied together by the tie rod or link 32. Furthermore, the finger 42 is capable of rotational movement about the upstanding rod 38 carried by the pivotally mounted block 28.

Secured to the tubular portion 41, adjacent its lower end, is a bracket member 43 carrying a roller 44 on its inner end. The roller 44 is adapted to engage a track member 46 having an outturned lower end 47. For a purpose later to appear it will also be seen that the track member 46 is provided with an outwardly bent section 48 over which the roller 44 rides as the arms 26 move upwardly, to wrap the sheet dressed thereover about the lower part of the bale.

Secured to the finger 42, intermediate its ends is an auxiliary sheet engaging finger 49, which is curved more particularly as illustrated in FIGS. 2, 5 and 6.

Wrapped about the lower end of the rod 38 is a coil spring 51. One end 51*a* of the spring is secured to the coller 39 while the other end 51*b* is anchored in the lower end of the tubular section 41. The spring 51 is wound under tension so as always to urge the roller 44 into contact with its track 46. When the roller rides into the section 48 of the track, finger 42 is rotated to press the auxiliary finger 49 against the side of the bale, as will appear.

Secured to the end of the lower portion of the platen 11 is a cam member 52. Projecting from the tubular section 41 is a stub shaft 53 which carries a roller 54 adapted to engage the contoured surface of the cam 52. Thus, as the parts move from the lower position of FIG. 6 to the partially raised full line position to FIG. 5 it will be seen that the roller 54 moves upwardly on the divergent surface of the cam member 52, causing the finger 42 and of course the auxiliary finger 49 to move outwardly of the end of the platen from the position shown in full lines, FIG. 6, to the position shown in full lines, FIG. 5. That is to say, because the bale when finally compressed is slightly larger than the surface of the platen, the finger 42 must be moved endwise of the bale in order to place the sheet which has been wrapped thereover about the bale in its subsequent upward movement.

In brief summary of the description of the mechanism so far described in the fully lowered position the upper end of the finger 42 rests against the end of the lower platen 11, and this end preferably is undercut as indicated at 56, FIGS. 1 and 6. When the arms 26 move upwardly as presently will appear, the fingers 42 of course move upwardly, but they also move outwardly and rotate in directions to bring the auxiliary fingers closer to the sides of the bale, all as will be explained more in detail later.

Referring now particularly to FIGS. 1 and 3 the mechanism associated with the upper platen 14 and which is adapted to wrap the ends and sides of the upper sheet 19 about the ends and sides of the bale will now be described. Pivotally connected as at 57 to the end surface 58 of the platen 14 are pairs of arms 59. In view of the fact that the pairs of arms at both ends of the platen 14 are identical, as well as the mechanisms carried thereby, and because the mechanisms carried by the arms 59 are identical, a description of one side will suffice for all.

Secured to the arms 59 are brackets 61 and passing loosely through these brackets is a pin 62 which carries washers 63 at each end. A compression spring 64 between the brackets presses the arms 59 downwardly at all times, as shown in FIG. 3.

Further outwardly along the arms 59 are outstanding lugs 66. Secured to the lugs by a threaded bolt member 67 is a roller 68. The roller 68 bears against the curved section 69 of a tubular arm 71. The tubular arm 71 is welded or otherwise affixed to a sleeve member 72 carried on the outer rounded end of a rod-like member 73 which is secured to the platen by means of studs or the like 74. The tubular arm 71 thus includes the rounded section 69 and an inner section 76 which is secured non-rotatably to the outer end of the section 69 as by means of a pin 77.

Mounted for limited rotation about the inner member 76 is an outer tubular section 78. The tubular section 78 is provided with a slot 79 through which projects a pin 81 carried by the portion 76.

As best shown in FIG. 7, the tubular member 72 is provided with the slot 82 through which projects a pin 83 carried by the rod 73. The slot 82 extends for about one-fourth of the diameter of the sleeve 72 and thus limits rotation of the sleeve relative to the rod 73.

Power means is employed to raise and lower the arm 71 by pivoting the tubular section thereof about the pin 73 and also for rotating the sleeve 78 about the inner section 76 of the arm 71. Secured to the outer surface of the sleeve 78 is an upstanding pin 84. Carried by the upper end of the pin 84 is an arm 86, the end secured to the pin 84 sloping somewhat downwardly when the parts are in the position of FIG. 7 and then turning outwardly as shown. At the outer end of the arm 86 is a pin 87 on which the upper sheet of material is impaled, as will appear.

Secured to the side of the arm **86** as shown in FIG. **7** is one-half **88** of a universal joint. The other half **89** of the universal joint is carried in the forked end **91** of a tie rod **92.** The tie rod **92** carries at its upper end the ball of a ball joint **93.** Passing through the ball of the joint **93** is a bolt **94** which in turn passes through the upper end of a link **96.** The link **96** is made fast at its lower end to a shaft **97,** the shaft being journaled in bearings **98** and **99.** See FIG. **3.** An arm **101** is connected at **102** to the piston rod **103** of a double action fluid pressure cylinder **104.** Pressure from any suitable source may be applied selectively to the ends of the cylinder **104** thus to move the piston rod **103** in and out, thereby to rock the shaft **97** and to move the parts as presently will be explained.

With the parts in the position shown in FIG. **1,** that is to say, with all four of the arms **86** in the extended position, the upper platen **14** is "dressed" by stretching the sheet beneath the working surface of the platen **14** and impaling it at four points on pins **87** carried by each of the arms **86.** To prevent the material from sliding up onto the arms **86** stop members **106** may be provided adjacent the pins. When impaled on the pins **87** it will be seen that the sides of the sheet are hanging downwardly as shown in dotted lines in FIG. **1.**

With the upper platen dressed as just shown, it will be understood that the cylinder **17** is, at this time, holding the upper platen in the raised position.

With the lower platen **11** in the position shown in FIGS. **1** and **4,** that is, raised with its upper portion outside of the charging chamber **10,** the lower sheet of material is "dressed" by laying the same over the upper, working surface **21** of the lower platen and by draping it over the finger **49,** behind the finger **34** and over the upper ends of the fingers **42,** as illustrated particularly in FIG. **6.** The lower platen is now "dressed" and it will be noted that when so "dressed" the lower sheet as well as all of the mechanism carried by the lower platen lie well within the vertically projected confines of the working surface of the platen. The lower platen **11** carrying the lower sheet which has been placed about it as described now is lowered into the charging box. The fiber is delivered through the open upper end of the box, enough of the same being placed therein to form a bale of the desired finished weight. The upper platen **14** is now lowered by means of the cylinder **17** substantially to the top of the charging box. Cylinder **13** is now energized bringing the lower platen **11** upwardly through the charging box. By means of suitable pressure control mechanisms, when the pressure of the bale between the two platens exceeds a certain amount the upper platen **14** retracts until it comes chuck-a-block with the upper sills **107** of the press frame. Continued upward movement of the lower platen finally compacts the bale B to the desired density, between the platens **11** and **14,** forming the bale outside of the charging box **10.**

After proper compaction of the bale B is achieved, pressur3e is supplied to the lower end of a hydrualic cylinder **111** rigidly mounted on an inwardly directed bracket **112** carried by the depending portions **22** of the lower platen **11.** The upper end **113** of the piston rod **108** of the cylinder **111** is adapted to engage a cross plate **114** which is connected along the bottoms of the arms **26,** on opposite sides of the platen, by depending plates **109.** In view of the fact that the arms **26** are geared together by means of gear teeth **116,** moving the pair connected by the plate **114** also moves the other pair of arms **26.** The other said pair of arms **26** are secured to each other by means of a rod **119** connected at each end to brackets **121** carried by said arms to facilitate unison of movement.

From what has been described it is now possible to go through a complete cycle and to explain how the two mechanisms, that is, the upper and lower mechanisms wrap the flexible sheets of materials carried thereby about the bale, after the bale is compressed to the position shown in FIG. **4.**

As before stated, after the bale is compressed it is understood that strapping or other binding material is placed about the bale, while it is held between the platens **11** and **14** as shown in FIG. **4.** When this is done the lower platen is moved down very slightly, just enough to permit removal of the bale and is held in that position. While in that position the lower sheet **18** is "dressed" about the mechanisms forming the lower platen folding means, namely, is draped over the fingers **42,** over the inner end of the fingers **49,** leaving their outer ends exposed, between the sides of the platen and the fingers or arms **34.** This then provides the upper working surface of the lower platen with the sheet of material, the end and sides of which are now positioned to be pushed up about the ends and sides of the bale, when the lower mechanism is operated as will be explained.

With the parts positioned as just stated the upper sheet **19** is impaled at four points on the pins **87,** whereby the end portions of the sheet are held substantially horizontally while the side portions simply drap or fall downwardly generally in the position shown in FIG. **1.**

As soon as the bale is compressed to the proper extent between the platens and the platens have moved to the position shown in FIG. **4** the cylinder **111** is energized. This causes the upper end **113** of the piston rod **108** to engage the cross plate **114** moving the sets of arms to the left as shown in FIG. **4** upwardly and correspondingly, through the gearing **116** moving the right hand set of arms upwardly. This action causes the upper ends of the fingers **42,** which as will be remembered, lie between the ends of the platen and the sheet of material **18,** to move upwardly. At the same time, the roller **54** engages the surface of the cam **52** causing both of the arms to pivot outwardly, thus to move away from the ends of the platen **11,** thereby to move out far enough thence to move upwardly, past the ends of the bale between the platens. This is illustrated particularly in FIG. **5** where the upper end of the finger **42** is shown pushing the sheet **18** upwardly about the end of the bale. Continued upward movement of the arm **26** brings the finger **34** upwardly, to lie alongside the then folded side portion of the sheet **18.** Also, due to the provision of the roller **44** and spring **51** together with the track **47** on which the roller travels, the finger **49** moves outwardly, thus to clear the side of the bale, while the arm is moving upwardly. Therefore, in the final, raised position the finger **42** has pushed the end portion of the sheet upwardly about the end of the bale; the fingers **49** and **34** are holding the same against the side of the bale, and the entire mechanism thus is clear of automatic strapping means which may be used to place strapping about the bale.

With the lower sheet folded about the lower extent of the bale as described, cylinder **104** is actuated rock-

ing shaft **97** and the arms **96** carried thereby to the right as shown in FIG. **7**. This action causes the arms **86** to move upwardly about the bale and at the same time, these arms move inwardly of the bale to make the end fold which is illustrated and numbered in FIGS. **10** and **11** as **117**. In other words, downward movement of the arms **86** carrying the pins **87** on which the sheet is impaled, causes rotational movement of the outer sleeve **78** on the inner pin portion **76**, through the universal joints and the link **92**, thus not only folding the end portion of the sheet downwardly, but also folding the end portion and a part of the sides adjacent thereto inwardly about the bale. The side portions of the upper sheet simply fall by gravity to the general position shown in FIGS. **10** and **11**. To aid in holding these side portions flat against the bale the outer ends of the arms **59** may carry plate-like members **118** which, when the arms are lowered, assume a position substantially in the corner of the fold about which the section **117** itself is folded. In other words, the plate members **118** move downwardly into the corners and aid in "breaking" the fold which is to form the overlapping portions **117**.

From the foregoing it will be seen that we have devised an improved, completely self contained mechanism for placing the upper and lower sheets of wrapping material or bagging about a bale of fibers while the bale is held under compression between a pair of platens. Our apparatus is characterized by the fact that both principal portions of the same are carried by the respective platens and yet, they are so arranged that they do not interfere with the normal operation of the platens nor do they interfere with the placing of the strapping about the bale, after the bagging is wrapped about it and while it is held thereabout.

In actual practice our invention has proven to be extremely practical and satisfactory and further lends itself to installation on existing presses without undue difficulty.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof.

What we claim is:

1. In apparatus for wrapping the side and end portions of sheets about a bale of fibers while under compression between a pair of platens of a press,

a. means associated with one of the platens effective to fold the side and end portions of a first sheet about portions of the sides and ends of the bale, comprising

a. **1.** sheet engaging fingers adjacent the ends of the bale,

a. **2.** other sheet engaging fingers located adjacent the sides of the bale,

a. **3.** said sheet of material being disposed to be folded over said fingers located adjacent the ends of the bale prior to wrapping the bale,

a. **4.** means to move all of said fingers from a position inwardly of the top of said platen to a position alongside the respective ends and sides of the bale, whereby the material is wrapped about and held against the adjacent portions of the sides and ends of the bale, and

b. means associated with the other platen effective to fold the side and end portions of a second sheet about portions of the sides and ends of the bale.

2. Apparatus as defined in claim **1** in which all of said sheet engaging fingers are retractable from said sheet folding position to a position to and within the vertically projected confines of the said platen, whereby the platen may be "dressed" with the sheet and then withdrawn into a fiber charging box or the like.

3. Apparatus as defined in claim **1** in which said means associated with one of the platens effective to fold the side and end portions of said first named sheet about portions of the sides and ends of the bale comprises arms pivoted adjacent the sides of the platen near their inner ends and extending outwardly and downwardly for the outer ends thereof to lie alongside the sides of the platen, generally vertically disposed sheet engaging and folding arms pivotally mounted adjacent the outer ends of said arms, means to move the outer ends of said arms upwardly substantially in unison, whereby said pivoted arms move upwardly to press the sheet previously draped thereover about the ends of the bale, and means carried by the pivoted arms to engage and fold along the sides of the bale portions of the sheet joined to the vertically moved, bale end sections thereof.

4. Apparatus as defined in claim **3** in which there are outstanding sheet engaging fingers carried by the pivoted arms, means to rotate the pivoted arms in directions to cause such sheet engaging fingers carried thereby to engage and fold said sheet portions against the sides of the bale, and other generally vertically disposed sheet engaging fingers carried by the pivoted arms and located intermediate the ends thereof and disposed upon vertical movement of the pivoted arms to engage the side portions of the sheet after the same are folded vertically, thereby to hold the side portions in folded position, awaiting downfolding of the sheet associated with the other of said platens.

5. In apparatus for wrapping the side and end portions of sheets about a bale of fibers while under compression between a pair of platens of a press,

a. means associated with one of the platens effective to fold the side and end portions of a first sheet about portions of the sides and ends of the bale, and

b. means associated with the other platen effective to fold the side and end portions of a second sheet about portions of the sides and ends of the bale comprising

1. arms pivotally mounted adjacent the ends of said platen for swinging movement from generally horizontal to generally vertical positions, said arms also being mounted for rotational movement about centers offset from the longitudinal axes thereof,

2. means operable when the arms are in generally horizontal position to attach the end corner portions of a sheet of wrapping material lying between said platen and the top of the bale to the outer ends of the arms, whereby the vertical and offset pivotal movement of the arm wraps the end portions of the sheet about the ends of the bale and around portions of the side of the bale adjacent its ends.

6. Apparatus as defined in claim **5** in which there are pairs of sheet engaging fingers associated with said other platen adjacent the corners thereof and disposed, upon vertical movement of said pairs of arms, to engage the sheet being folded, adjacent the fold lines at the corners thereof, aiding in folding the sheet alongside the sides of the bale in response to vertical and pivotal movement of said pairs of arms.

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