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Brenner et al.

[11] **3,828,523**

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[54] **AUTOMATIC INSIDE HEAD HOLDER STRUCTURE**

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[73] Assignee: **Beloit Corporation,** Beloit, Wis.

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[52] **U.S. Cl.** **53/380,** 53/211

[51] **Int. Cl.** **B65b 7/04,** B65b 11/04

[58] **Field of Search** ..... 53/380, 210, 211; 33/182, 33/191, 192; 93/77 R

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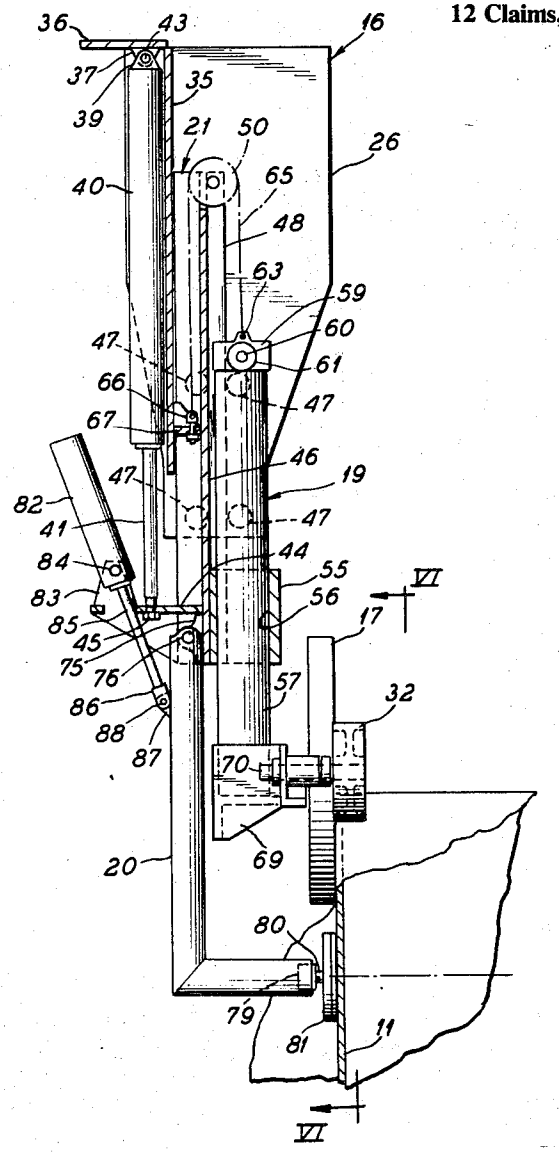
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Assistant Examiner—J. Sipos
Attorney, Agent, or Firm—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

[57] **ABSTRACT**

Inside head holder for a crimping apparatus for folding down and tucking in the ends of a wrapper extending beyond the ends of a roll of paper along an inside protective head. The wrapper is crimped by a paddle supported above the roll on a carriage. The paddle is vertically movable relative to the carriage and moves downwardly into engagement with the wrapper extending beyond the roll to crimp the projecting end of the wrapper about an inside protective head for the end of the roll. The head holder is mounted on the carriage and moves upwardly and downwardly with the crimper paddle half the distance of travel of the crimper paddle to thereby divide the diameter of the roll in half as the crimper senses the diameter of the roll. The head holder, therefore, automatically senses the center of the roll and holds a protective head in centered relation with respect thereto during the crimping operation.

12 Claims, 7 Drawing Figures



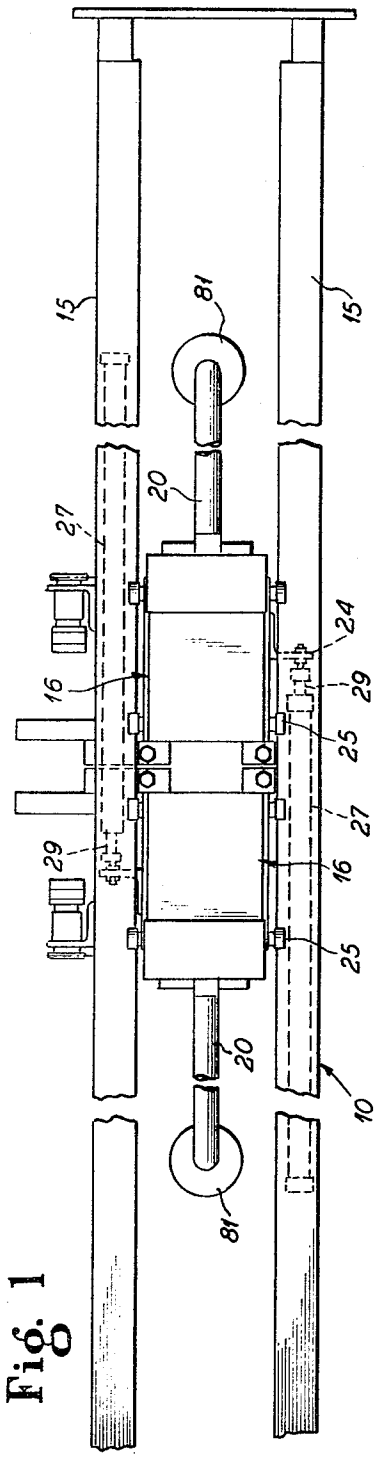


Fig. 1

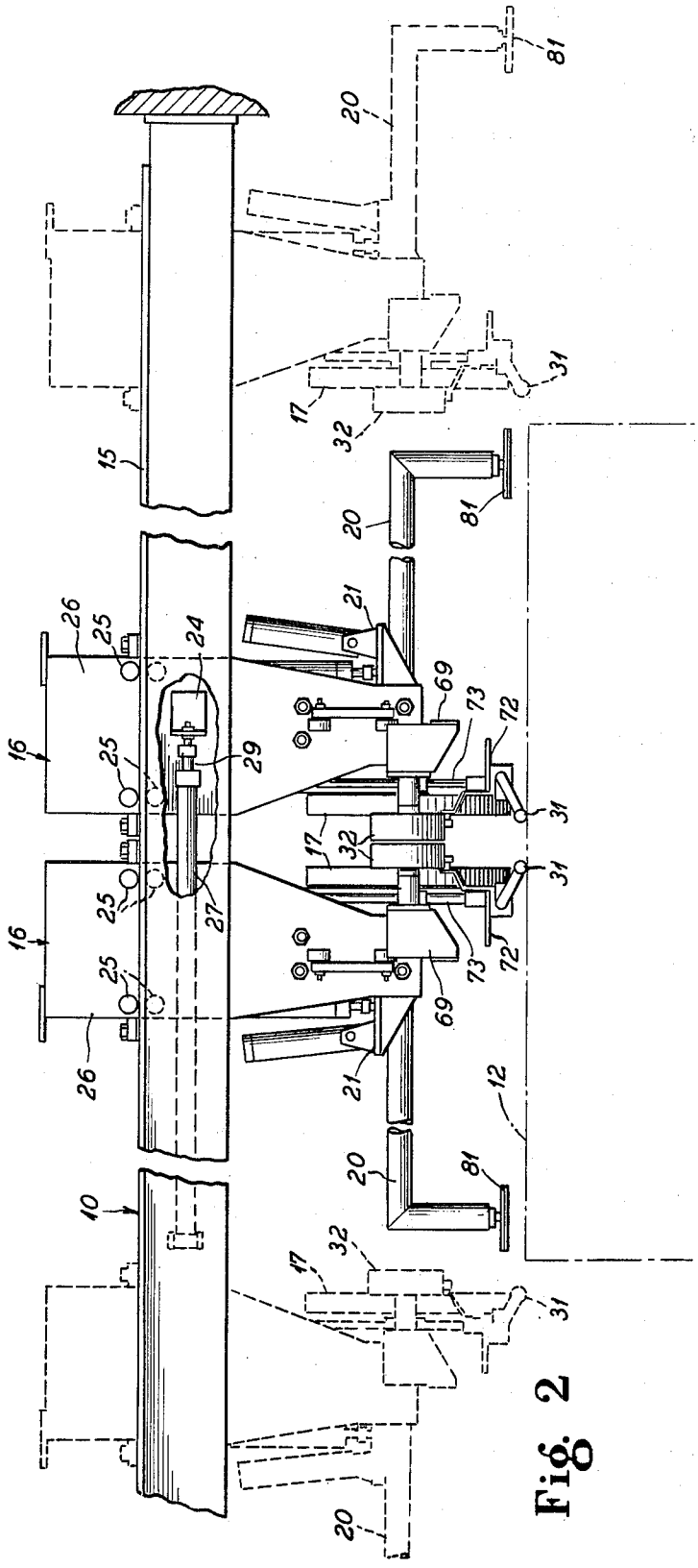


Fig. 2

Fig. 3

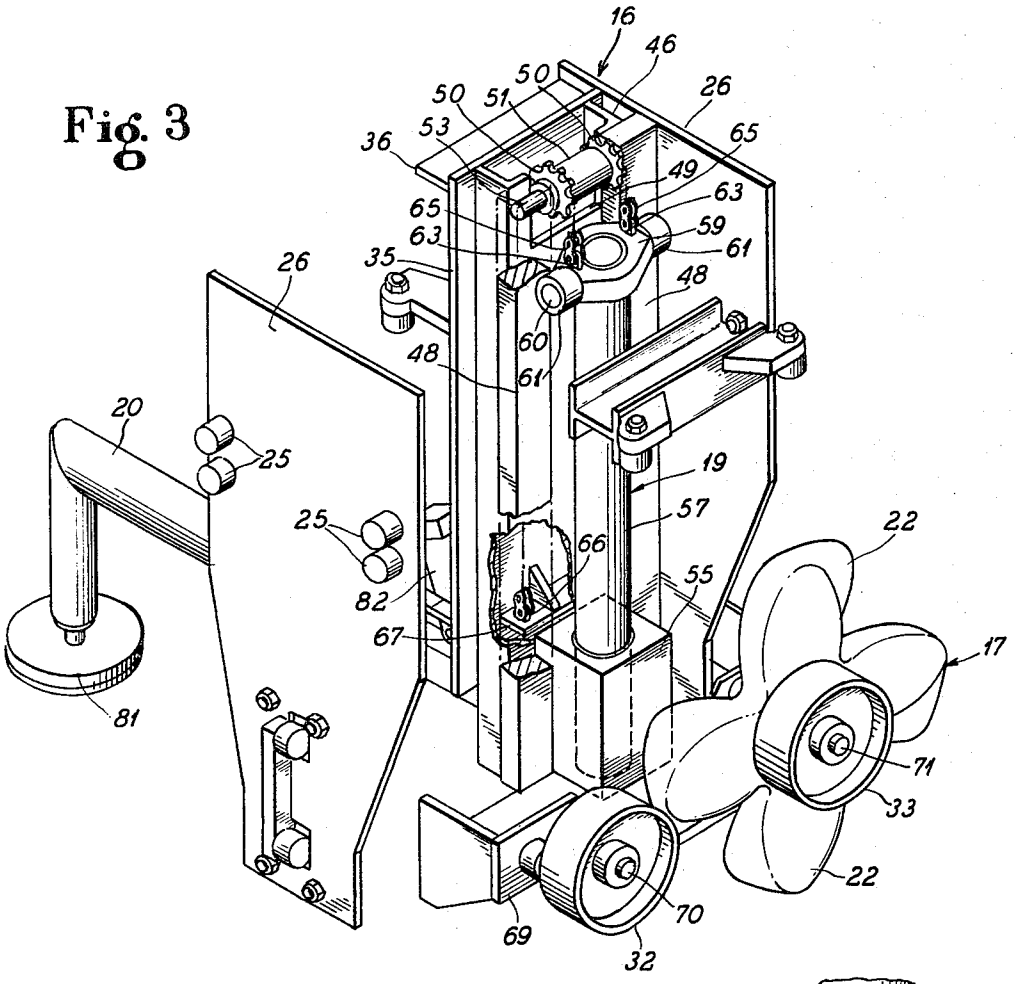
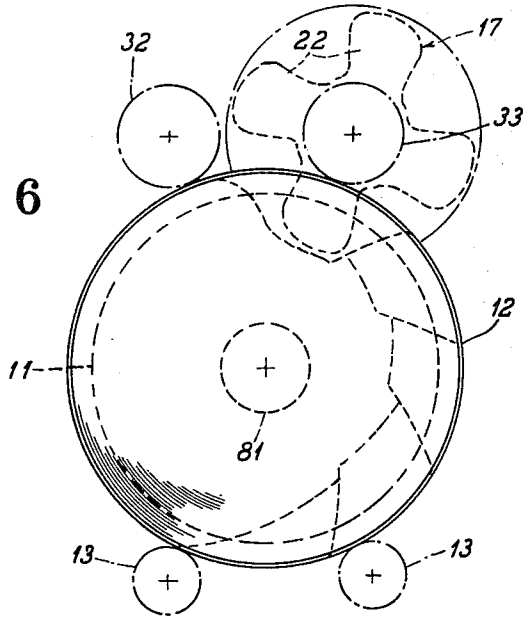


Fig. 6



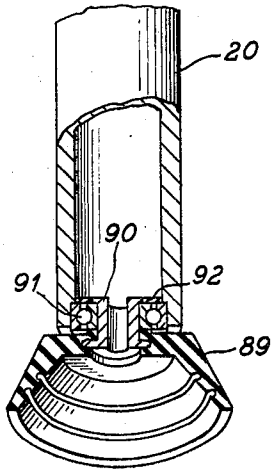


Fig. 7

Fig. 5

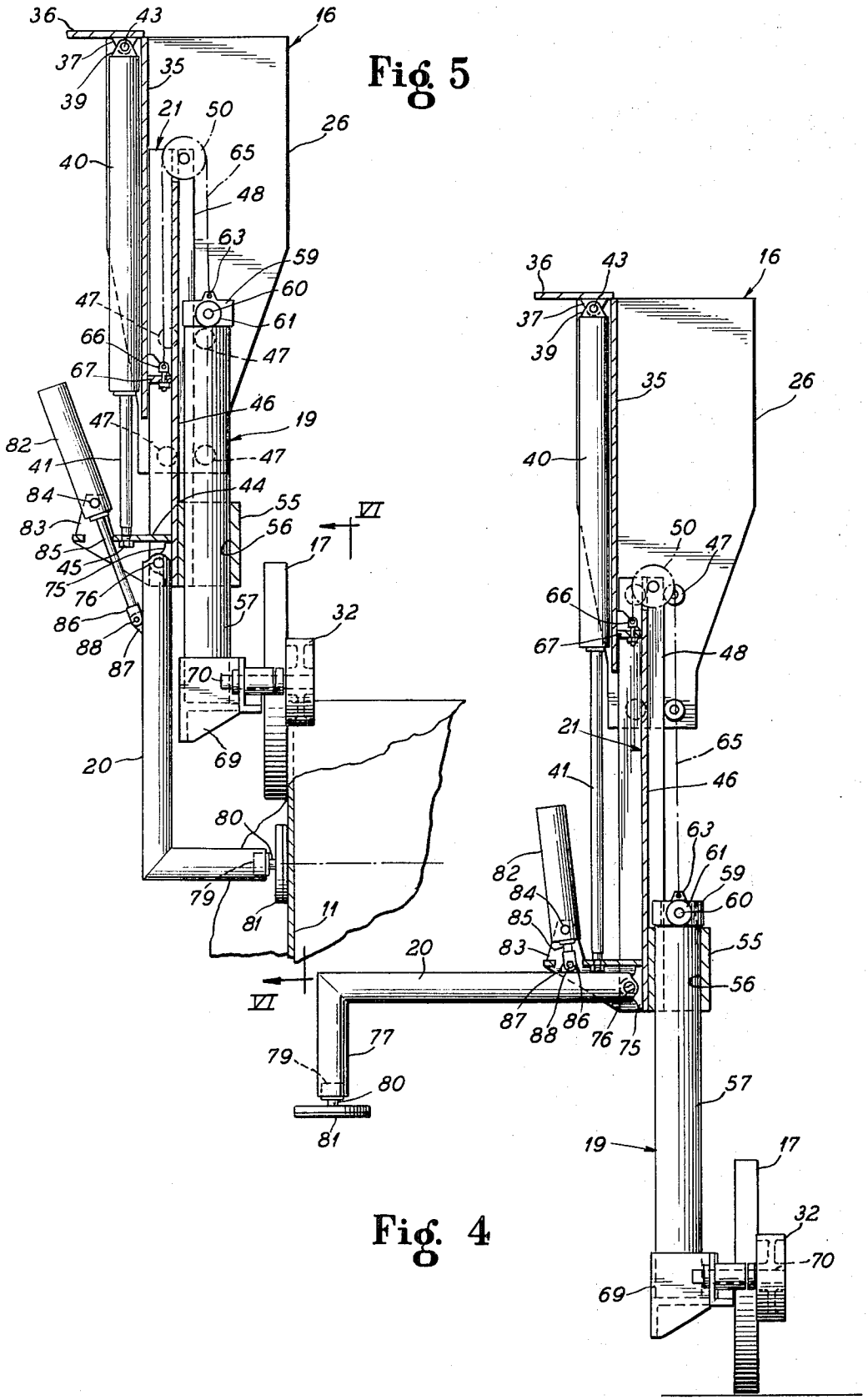

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Fig. 4

AUTOMATIC INSIDE HEAD HOLDER STRUCTURE

FIELD OF THE INVENTION

Head holder and crimper for automatically finding the center of a roll of paper and holding an inside head in centered relation with respect thereto, of the type found in Class **53.**

BACKGROUND, SUMMARY AND ADVANTAGES OF INVENTION

This invention is an improvement on the crimping apparatus disclosed in application, Ser. No. 152,744, filed June 14, 1971 now U.S. Pat. No. 3,740,924 by James F. Becker and entitled "Retractable Overhead Crimper" and assigned to the assignee of the present invention, in that it is provided with a head holder which automatically determines the center of the roll of paper to be wrapped, and holds an inside head in centered relation with respect thereto during the crimping operation. The head holder is pivotally mounted on a crimper carriage having inner and outer telescopic members vertically moved by a fluid pressure cylinder and piston, in which a motion multiplying connection is provided between the inner and outer telescopic members to move the inner telescopic member twice the distance of travel of the outer telescopic member. The overhead crimper is supported from a rail structure spaced above the roll stand in a cross machine direction as in the Becker application, Ser. No. 152,744. When a roll enters the roll stand, a switch is activated and the telescopic members start to move downwardly within a few inches of the periphery of the roll and then move outwardly beyond the end of the roll. The unit may then be fully extended. The inner telescopic member carrying the crimper paddle may be set to engage a pair of press rolls with the periphery of the roll. This movement of the inner telescopic member and press rolls moves the outer telescopic member half the distance of movement of the crimper assembly through a chain and sprocket motion multiplying connection causing a two-to-one rise of the inner telescopic member with respect to the outer telescopic member. The inside head holder, if started from a common starting position for the crimper assembly, will move only one half the distance of travel of the crimper assembly, which will equal the radius of the roll where the crimper assembly moves upwardly a distance equal to the diameter of the roll and will automatically sense the center of a rotating head holding disk on the end of the inside head holder on the center of the roll.

The advantages of the present invention are that by sensing the periphery or diameter of the roll, the inside head holder is automatically centered with respect to the axis of rotation of the roll.

A further advantage of the invention is that a simplified device has been provided which automatically locates the center of a roll to be wrapped by first sensing the diameter of the roll and then dividing the diameter in half.

Still another advantage of the invention is that the head holder may be in the form of a suction device which can place the inside head on the end of the roll and hold it thereon during the operation of crimping the ends of the roll.

A further advantage of the present invention is that wrappers on rolls of various diameters may be protected by inside heads and the wrapper may be tucked about the end of the roll and head while the head is held in centered relation with respect to the roll regardless of the diameter of the roll.

Other objects, features and advantages of the invention will be readily apparent from the following description of the preferred embodiments thereof, taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic plan view of a crimper and head holder constructed in accordance with the principles of the present invention.

FIG. **2** is a diagrammatic view of the head holder and crimper of FIG. **1** showing the head holder and crimper in side elevation.

FIG. **3** is a perspective exploded view of a head holder and crimper carriage with certain parts broken away and certain other parts shown in section.

FIG. **4** is a view in side elevation of a crimper and head holder constructed in accordance with the principles of the present invention with certain parts shown in vertical section with the two telescopic members in extreme extended positions.

FIG. **5** is a view somewhat similar to FIG. **4,** but showing the crimper in the crimping position and the head holder in position to hold a head to the end of the roll of paper.

FIG. **6** is a diagrammatic view looking substantially along line VI—VI of FIG. **5** illustrating the operation of crimping a wrapper to the end of the roll of paper and holding a protective head thereto; and

FIG. **7** is a view illustrating a modified form of head holder for picking up and holding the head to the end of a roll of paper by vacuum.

DESCRIPTION OF PREFERRED EMBODIMENTS OF INVENTION

In FIGS. **1, 2** and **6** of the drawings, we have shown a crimper and head holder **10** for holding an inside protective head **11** to each end of a roll **12,** which may be a roll of paper, to protect the ends of the roll from fraying, nicks and from glue being sprayed around the edges, gluing the crimped ends of the wrapper to encompass the outer portion of the head.

The roll **12** is shown in FIG. **6** as supported on parallel spaced wrapper drums **13** rotatably driven in the same direction at the same uniform rates of speed to rotate the roll and wrap the roll with the wrapper sheet as the wrapper sheet passes in the nips between the roll and wrapper drums and is adhered to the roll by adhesive applied to the leading end portion of the wrapper sheet, in a manner known to those skilled in the art, so not herein shown or described further. The support and drive for the drums **13** may be of any conventional form and are no part of the present invention, except insofar as the drums from a support and drive means for rotatably driving the roll of paper to wrap a wrapper thereabout, and to continue driving the roll of paper during the crimping of the projecting ends of the wrapper along the ends of the roll of paper. The crimper and head holder **10** generally includes a pair of parallel

spaced cross beams **15** suitably supported in vertically spaced relation relative to the largest diameter roll to be wrapped, and extending in a cross machine direction beyond opposite ends of the maximum width roll to be wrapped. The cross beams **15** form a supporting track for two crimper and head holder carriages **16.** The carriages **16** each carry a crimper wheel **17** on an inner telescopic arm **19,** and a head holder arm **20** on an outer telescopic arm **21** on the opposite side of the carriage from the crimper wheels **17.** The crimper wheels **17** may be like the crimper wheels shown and described in U.S. Pat. No. 3,411,269, dated Nov. 19, 1968 and include crimper blades **22** extending outwardly from the center of the wheel and formed and pitched to fold down and tuck in the protecting ends of the wrapper as the crimper wheels rotate along opposite ends of the roll in a tucking or crimping direction, opposite to the direction of rotation of the wrapped roll.

The cross beams **15** are diagrammatically shown in FIGS. **1** and **2** as having the carriages **16** for the crimper and head holder disposed therebetween and mounted for movement therealong between spaced rollers **25** extending outwardly of side plates **26** of said carriages. A fluid pressure operated cylinder **27** having a piston rod **29** extensible therefrom, extends along the inner side of each cross beam **15** and is suitably mounted thereon and has operative connection with an associated carriage **16** through an angle bracket **24** bolted or otherwise secured to the end of the piston rod **29.** The crimper carriages **16** may thus be moved to the center of the cross beams **15** and transverse center of the roll of paper to be wrapped as one roll is wrapped and crimped and another roll comes into position to be wrapped and crimped. Inner telescopic support arms **19** may then be moved downwardly to engage sensors **31** with the top of the roll of paper and bring the crimper wheels **17** within a few inches of the top of the roll. The sensors **31** may then trip limit switches supplying fluid under pressure to the head ends of the cylinders **27** and cause the carriages **23** to move outwardly relative to the roll of paper until the sensors **31** pass beyond the end of the roll as shown in FIG. **2.**

The sensors **31** may be biased to initially fold down the projecting ends of the wrapper as said sensors move beyond the end of the roll of paper. The crimper being set for the diameter of roll to be wrapped, parallel press wheels **32** and **33** may be brought into engagement with the top of the roll of paper along its edges. Said press wheels are spaced on opposite sides of an extended vertical axis extending through the center of the roll of paper and press the wrapper to the roll during the operation of crimping the wrapper about the end of the roll to encompass the inside head **11.** At this time, actuation of a limit switch (not shown) in the press wheels **32** will energize the drive to the crimper wheels **17.** The drive to the wrapper drums **13** will also be energized to rotate the roll **12** and draw a wrapper in the nips between said drums and roll. The crimper wheels **17** rotating in a direction opposite to the direction of rotation of the roll of paper will effect the crimping of the projecting ends of the wrapper to the roll and inside heads held thereto. The crimper thus far described operates on principles much like that shown in application, Ser. No. 152,744 filed by James F. Becker on June 14, 1971, so the details thereof need not herein be shown or described further.

Referring now in particular to the carriage **16** and the inside and outside telescopic arms **19** and **21,** respectively, carrying the crimper wheels **17** and inside head holder arms **20,** the carriages **16** are each of a similar construction and the crimper and head holder mechanism carried by each of said carriages is the same so one carriage and head holder and crimper assembly need only herein be shown and described in detail.

Each carriage **16** includes the parallel spaced side plates **26** connected together by a vertically extending transverse plate **35** adjacent the advance end of said carriage, when moving toward the outer end of the roll to be wrapped. A horizontal plate **36** extends across the top portion of the plate **35** and is fixedly mounted between the side plates **26** and extends forwardly or in advance of the plate **35** when the carriage is traveling toward the outer end of the roll.

The plate **36** has a connector ear **37** depending therefrom between spaced connector ears **39** extending upwardly of the head end of a fluid pressure cylinder **40** having a piston rod **41** extensible from the piston rod or lower end thereof. The cylinder **40** is suspended from the connector ear **37** as by a pivot pin **43** extending through the ears **39** and **37.** The lower end of the piston rod **41** extends through a transverse frame member **44** and is shouldered and the shouldered portion thereof abuts the top surface of said transverse frame member **44.** A nut **45** threaded on the lower end of said piston rod is provided to secure said piston rod to said frame member. The transverse frame **44** extends inwardly along the legs of a channel **46,** extending vertically along the inside of the plate **35.** Said channel **46** is guided for movement along said plate **35** on rollers **47** extending along opposite sides of guide bars **48** extending along the rear surface of said channel and outwardly therefrom to the positions closely adjacent the side plates **26** of the carriage **16.**

The upper end portion of the web of the channel **46** is recessed as indicated by reference numeral **49** in FIG. **3,** to receive coaxial sprockets **50** connected together by a sleeve **51** freely mounted on a transverse shaft **53** mounted at its opposite ends in the bars **48,** extending along and outwardly of the rear face of the web of the channel **46** and guiding the outer telescopic member for vertical movement along said channel between the plates **26** of the carriage **16.**

The lower end of the channel has a block **55** secured thereto and extending from the web thereof towards the crimper wheel **17.** Said block **55** is centrally bored to provide a cylindrical vertically extending guide **56** for a tube **57** of the inner telescopic member **19.** The tube **57** has a yoke **59** suitably mounted on its upper end having aligned stub shafts **60** extending from its opposite ends forming bearing supports for guide rollers **61,** having guiding engagement with the bars **48** during vertical movement of said inner telescopic member **19** relative to said outer telescopic member.

The yoke **59** also has diametrically opposed connectors **63** extending upwardly therefrom having lengths of chain **65** diagrammatically shown by dash-dot lines in FIG. **4,** connected thereto and extending upwardly therefrom about the sprockets **50.** The chains **65** change their direction of travel about the sprockets **50** and extend downwardly therefrom are are connected at their ends opposite the connectors **63,** to connectors **66** extending through connector lugs **67** extending from

the stationary plate **35** within the web of the channel **46,** and between the legs of said channel.

Thus, upon the admission of fluid under pressure to the piston rod end of the cylinder **40,** the channel **46** forming the outer telescopic member will move vertically along the plate **35** relative to the connectors **66.** The length of chain **65** trained about the sprockets **50** and connected at their lower ends to the connectors **66** and connected at their opposite ends with the yoke **59,** will thus move the inner telescopic member **19** twice the distance of movement of the outer telescopic member **21** in the form of the channel **46** and guide bars **48.**

The tube **57** has a transverse frame **69** suitably mounted on its lower end, and extending in opposite directions from the center of said tube **57** and forming bearing mountings for the press rolls **32** and **33** rotatable about horizontal axes disposed equal distances from opposite sides of the vertical axis of the tube **57.** The press roll **32** is freely mounted on a shaft **70** suitably mounted on the frame **69** and extending outwardly therefrom and may actuate a limit switch to start operation of the crimper wheel **17.** The press roll **33** is mounted on a drive shaft **71** forming a support and drive shaft for the crimper wheel **17.** The drive to said shaft and crimper wheel may be through a suitable motor (not shown) mounted on the frame **69** and a geared or flexible drive connection (not shown) in a manner similar to which the crimper wheel of the Becker application, Ser. No. 152,744 is driven, and no part of the present invention so not herein shown or described further.

The sensing or actuating arm **31** is shown in FIG. **2** as suspended from the frame **69** on a rod **73** adjustably carried in said frame and carrying a support **72** at its lower end which may also support limit switches (not shown) for starting the carriage to move outwardly along the beams **15** as the crimper wheel is lowered within a short distance of the top of the roll of paper, and for effecting lowering of the inner telescopic member to engage the press wheels **32** and **33** with the periphery of the roll of paper and initiate a crimping operation. The control circuit including the limit switches may control the supply of fluid under pressure to the cylinders **27** to move the carriages along the beams **15** and to the cylinders **40,** to effect lowering and raising movement of the inner and outer telescopic members. The limit switches and control circuits energized thereby may be of any well-known form and are no part of the present invention so need not herein be shown or described further. In addition, suitable manually operable valves (not shown) may be provided independently of the automatic control circuit for supplying fluid under pressure to the head or piston rod ends of the cylinders **40** to raise or lower the crimper wheels **17** as desired or required and to control operation of the head holder **20.**

The head holder arm **20** is shown in FIGS. **3, 4** and **5** as being in the form of a tube transversely pivoted to the outside telescopic member on a lug **75** extending outwardly of the web of the channel **46,** on a transverse pivot pin **76** extending through opposite sides of said tube and the lug **75.** The head holder arm **20** is shown as having a right angled outer end **77** forming a mounting for a bearing **79** for a shaft **80** mounting a head holder disk **81** to the right angled end portion of the head holder arm **20,** for free rotation with respect thereto. The head holder arm **20** is moved about the axis of the pivot pin **76** to bring the head holder disk into engagement with an inside head on the end of the roll of paper, by operation of a fluid pressure cylinder **82** trunnioned between parallel trunnion supports **83,** extending upwardly of the top surface of the frame **44,** on transverse trunnion pins **84.** A piston rod **85** on the end of a piston (not shown) within the cylinder **82** is extensible and retractably movable with respect to the cylinder **82** and has a connector yoke **86** on its end extending along opposite sides of a lug **87** extending upwardly of the head holder arm **20** and pivotally connected to said lug as by a transverse pivot pin **88.** The admission of fluid under pressure to the head end of the cylinder **82** will thus pivot the head holder arm **20** about the axis of the pivot pin **76,** and bring the disk **81** journalled on the right angled end thereof into engagement with the inside head **11** on the end of the roll of paper, with the axis of the disk **81** centered relative to the center of the roll of paper as the press wheels **32** and **33** come into engagement with the periphery of the roll of paper on opposite sides of the center thereof.

Thus, by sensing or measuring the diameter of the roll and thereby engaging the press wheels **32** and **33** with the periphery of the roll, the frame **44** and head holder arm **20** moving half the distance of movement of the inside telescopic frame **19,** crimper wheel **17** and press wheels **32** and **33** will be automatically aligned with the center of the roll **12.**

As for example, when setting up the machine to crimp a wrapper about a roll of paper, the inner telescopic frame **19** is moved into its extended position shown in FIG. **4.** The outer telescopic frame will also be in its extreme extended position as moved thereinto by the piston rod **41.** In this position, the arm **20** is of such a length that when pivoted downwardly, the axis of the disk **81** will be substantially in alignment with the frame **69** and just above the axes of the press wheels **32** and **33,** a distance determined by the curvature of the roll between said press wheels. Thus, if the inner telescopic frame **19** is moved upwardly a distance, for example, of 20 inches, the vertical movement of the outer telescopic member will be one half the movement of the inner telescopic member and will move upwardly a distance of 10 inches due to the two-to-one rise of the inner telescopic member relative to the outer telescopic member attained by the chains **65** changing their directions about the sprockets **50** and fixed to the plate **35** at one of their ends and to the yoke **59** at their opposite ends.

The inside head holder, therefore, if started from the same bottom position as the inner telescopic frame, will move upwardly one half the 20 inches diameter of the roll or 10 inches and automatically center the disk **81** with the center of the roll, and hold an inside head **11** into engagement with the end of the roll to protect the roll during crimping of the projecting ends of the wrapper thereto.

The center of the disk **81,** therefore, automatically determines the center of the roll to be wrapped by sensing the diameter of the roll by the inner telescopic frame **19** and press rolls **32** and **33** and dividing the diameter in half by the two-to-one rise of the inside telescopic frame relative to the outside telescopic frame.

In FIG. **7,** we have shown the disk **81** replaced by a vacuum cup **89** journalled on the end of the head holder arm **20** on a hollow shaft **90** mounted in an anti-

friction bearing **91** mounted in the right angled end portion of the head holder arm **20.** The hollow shaft **90** has communication with the hollow interior of the head holder arm **20.** The bearing **91** may be suitably sealed as by a sealing ring **92.** The hollow interior of the head holder arm may be connected with a source of vacuum sufficient to cause the vacuum cup to pick up a head from a stack of heads and then place the head on a roll of paper in centered relation with respect to the center thereof. This makes it unnecessary for the operator to place the head against the end of the roll prior to holding the head to the roll by the head holder disk.

We claim as our invention:

1. In a crimper and head holder for holding heads to the end of a roll of paper and crimping the wrapper thereover,

a carriage disposed above the top of the largest roll to be wrapped,

first and second telescopic members movably mounted on said carriage and connected together to effect movement of said first telescopic member twice the distance of movement of said second telescopic member,

means carried by said first telescopic member and movable to engage the periphery of the roll and thereby sense the diameter of the roll,

crimper means carried by said first telescopic member for crimping a wrapper about the end of the roll, and

a head holding arm movably carried by said second telescopic member and movable to divide the diameter of the roll in half as the diameter of the roll is sensed by said first telescopic member,

said arm having a head holder on the end thereof operable to hold a disk in centered relation with respect to the center of the roll.

2. The device of claim **1,** wherein the first and second telescopic members comprise an inner member carrying the roll diameter sensing means and crimper, an outer member carrying the head holder arm, fluid pressure means vertically moving said outer member, a motion multiplying drive connection between said outer and inner members for moving said inner member twice the distance of movement of said outer member and positioning said head holding arm to divide the diameter of the roll in half and hold a disk in centered relation with respect thereto.

3. The device of claim **2,** wherein the head holding arm is transversely pivoted to said telescopic member, and power means are provided for pivotally moving said arm and positioning the outer end of said arm in centered relation with respect to the axis of the roll of paper upon sensing the diameter of the roll by said roll diameter sensing means.

4. The device of claim **2,** wherein the motion multiplying connection comprises a direction changing member rotatably mounted on said outer telescopic member for movement therewith, and a flexible drive member trained about said direction changing member and fixedly connected to said carriage at one end and to said inner telescopic member at its opposite end.

5. The device of claim **4,**

wherein a disk is rotatably mounted on the end portion of said arm for rotation about an axis coaxial with the center of the roll of paper, and

wherein the means pivotally moving said arm comprise power means pressing said disk into engagement with a protective head on the end of a roll of paper to hold the protective head thereto during a wrapping operation.

6. The device of claim **4,** wherein the power means comprise fluid pressure cylinder and piston means for pivoting said arm and disk and holding said disk in engagement with the head on the end of a roll of paper to be wrapped.

7. The device of claim **3,** wherein the sensing means sensing the periphery of the roll of paper comprise two spaced press rolls rotatable about horizontally aligned axes parallel to the axis of rotation of the roll of paper, and a crimper wheel coaxial with one of said press wheel crimping the projecting end of the wrapper about the end of the roll of paper and the head held thereto.

8. The device of claim **5,** wherein the head holder disk is a vacuum cup rotatably mounted on said arm and connected with a source of vacuum through said arm to pick up and place a head on the end of a roll of paper and hold the head thereon during a wrapping operation.

9. In a head holder determining the center of a roll of paper and holding a head in centered relation relative to the roll of paper during the operation of crimping a wrapper about the end of a roll of paper, and in combination with a roll stand supporting and driving the roll of paper,

a cross beam supported above the roll stand and extending in a cross machine direction,

a separate carriage for each end of the roll movably mounted on said cross beam,

a crimping assembly carried by said carriage and mounted for vertical movement relative thereto and including a crimper arm guided for telescopic movement relative to said carriage in a vertical direction,

a crimper paddle mounted on each crimper arm for rotation about an axis parallel to the axis of the roll and facing the end of the roll of paper,

power means for moving said carriages inwardly toward the center of the roll at the termination of a crimping operation and outwardly beyond the ends of the roll to initiate the next succeeding crimping operation,

other power means raising said arms and crimper paddles above the top of the roll and accommodating lowering of said arms to bring the crimper paddles along opposite ends of the roll to crimp the projecting ends of the wrapper to the roll,

said other power means including a telescopic member guided in said carriage for movement relative to said crimper arm,

power means telescopically moving said telescopic member relative to said carriage,

a motion multiplying drive connection between said telescopic member and said crimper arm moving said crimper arm twice the distance of movement of said telescopic member,

a head holder arm transversely pivoted to said telescopic member and having an end in centered relation with respect to the arm of said crimper paddle when in an extreme downward position of movement, and moving vertically at half the distance of travel of said crimper paddle to be in centered relation with respect to the roll of paper when said

crimper paddle is in position to crimp the wrapper downwardly about the roll of paper, and

a head holder disk rotatably mounted on said arm to be in centered relation with respect to the roll of paper as said crimper paddle is in a crimping position, to hold a head to the end of the roll of paper during crimping of the wrapper about the end of the roll of paper.

10. The crimping apparatus of claim **9,**

wherein the means moving the first telescopic member is a fluid pressure operated cylinder and piston, and

wherein the motion multiplying connection comprises at least one direction changing member rotatably journalled on said first telescopic member adjacent the top thereof, a direction device fixed at one end to said carriage and extending about said direction changing member and fixed at its opposite end to said crimper arm to move said crimper arm and wheel twice the distance of movement of said first telescopic member.

11. The crimping apparatus of claim **10,** including a fluid pressure operated cylinder and piston pivotally mounted on said telescopic member and having pivotal connection with said head holder arm for moving said head holder arm toward and from the end of a roll of paper, and holding said arm to center the head holder disk relative to the center of the roll of paper, and hold an inside head thereto.

12. The head holder of claim **9,** wherein the head holder disc is in the form of a vacuum cup rotatably journalled on the end of said head holder arm and connected with a source of vacuum, to be moved by said arm to pick up a head and apply and hold a head to the end of the roll of paper.

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