Feb. 7, 1967 C. L. BRINKMAN 3,302,902

REEL DEVICE

Filed Dec. 20, 1965 5 Sheets-Sheet 1

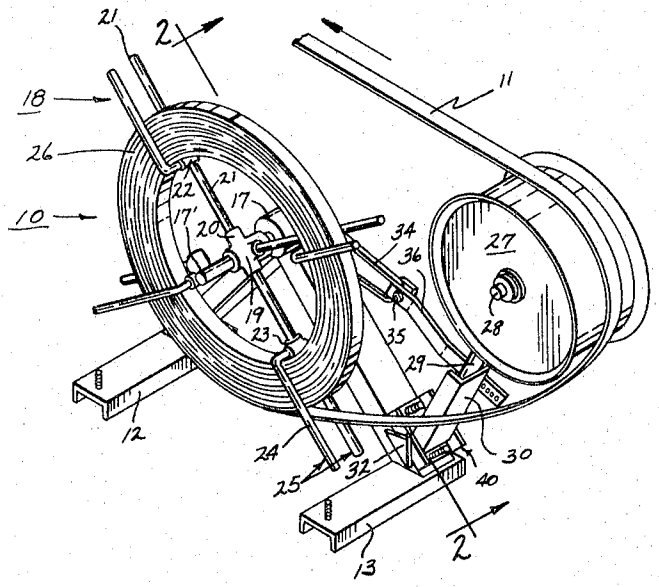

FIG. 1

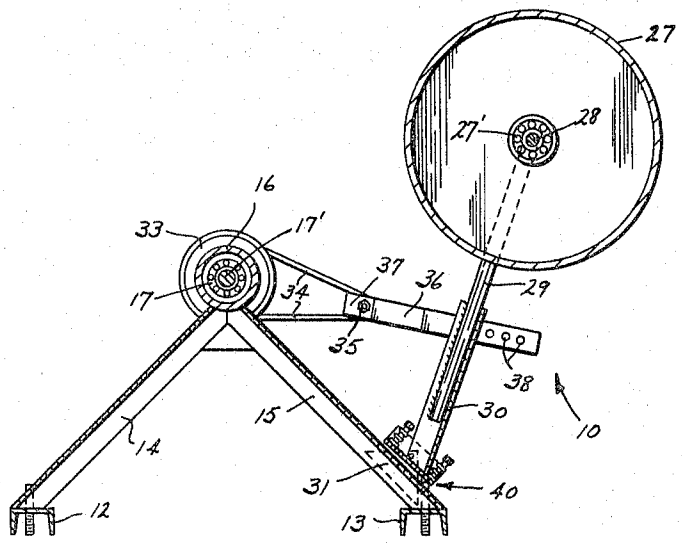

FIG. 2

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REEL DEVICE

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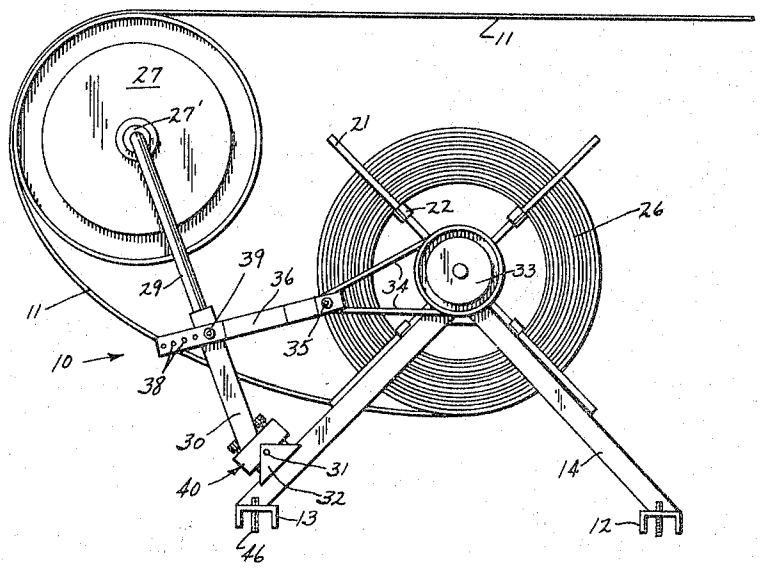

FIG. 3

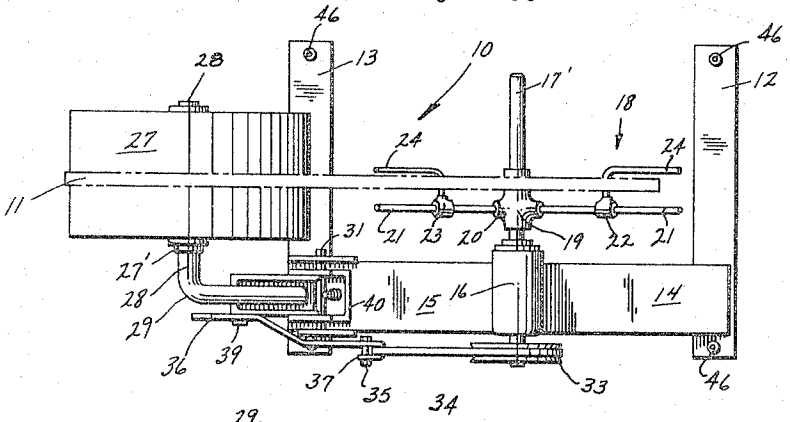

FIG. 4

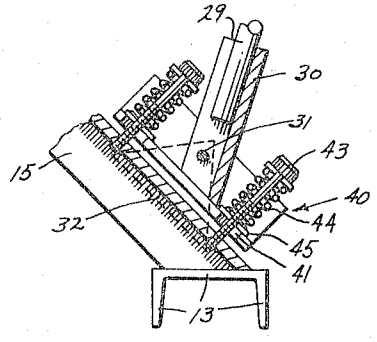

FIG. 5

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REEL DEVICE

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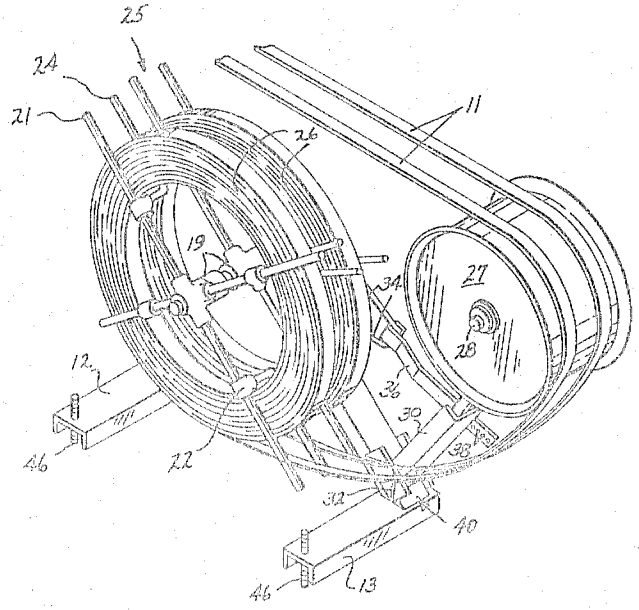

FIG. 6

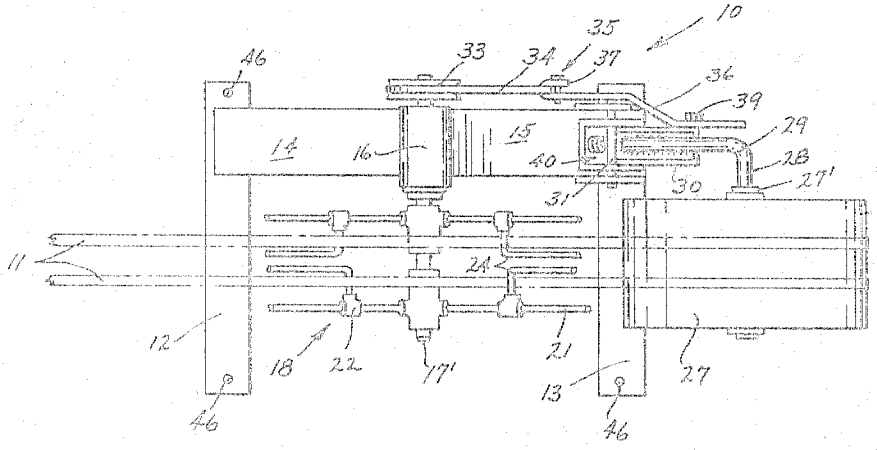

FIG. 7

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REEL DEVICE

Filed Dec. 20, 1965 5 Sheets-Sheet 4

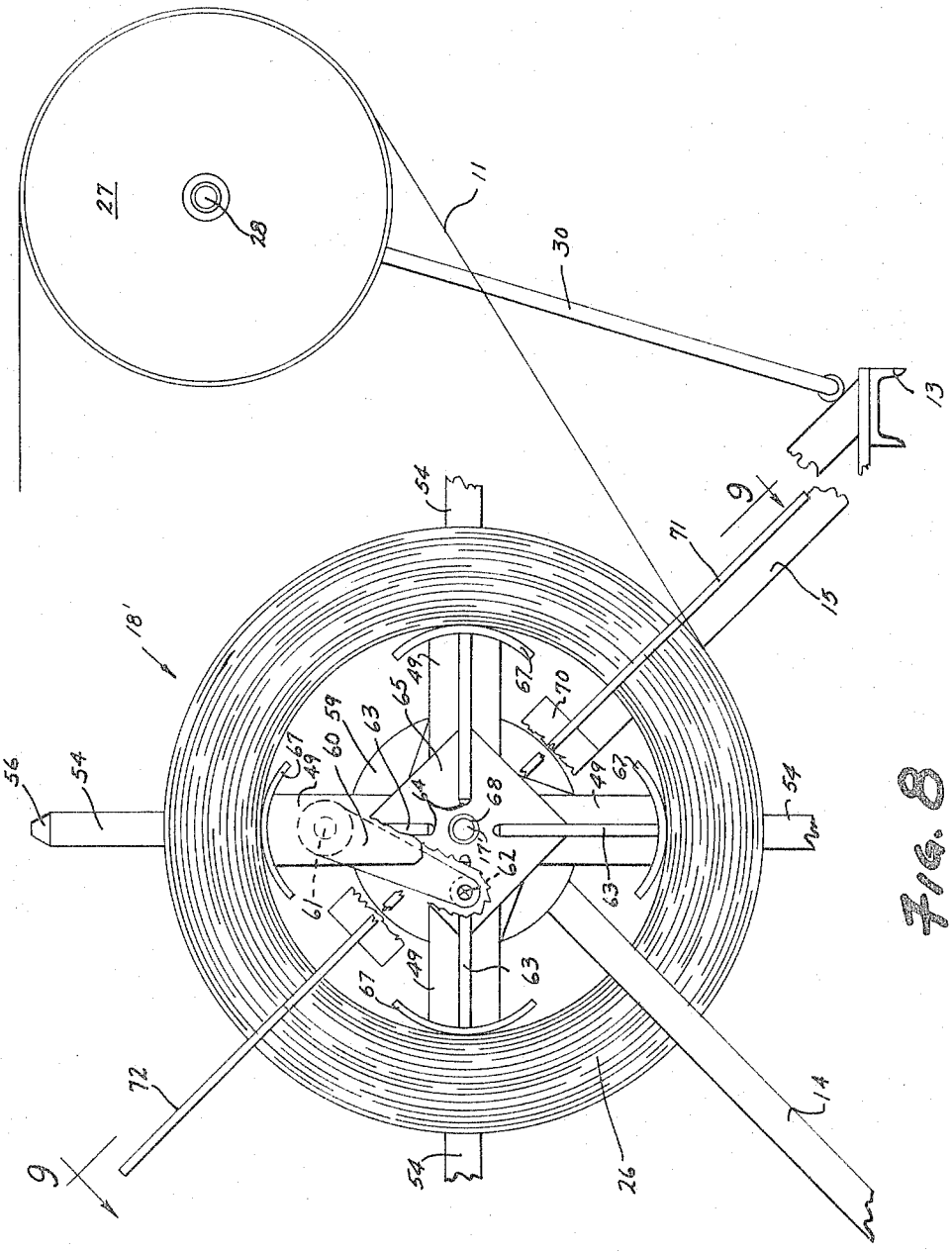

FIG. 8

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REEL DEVICE

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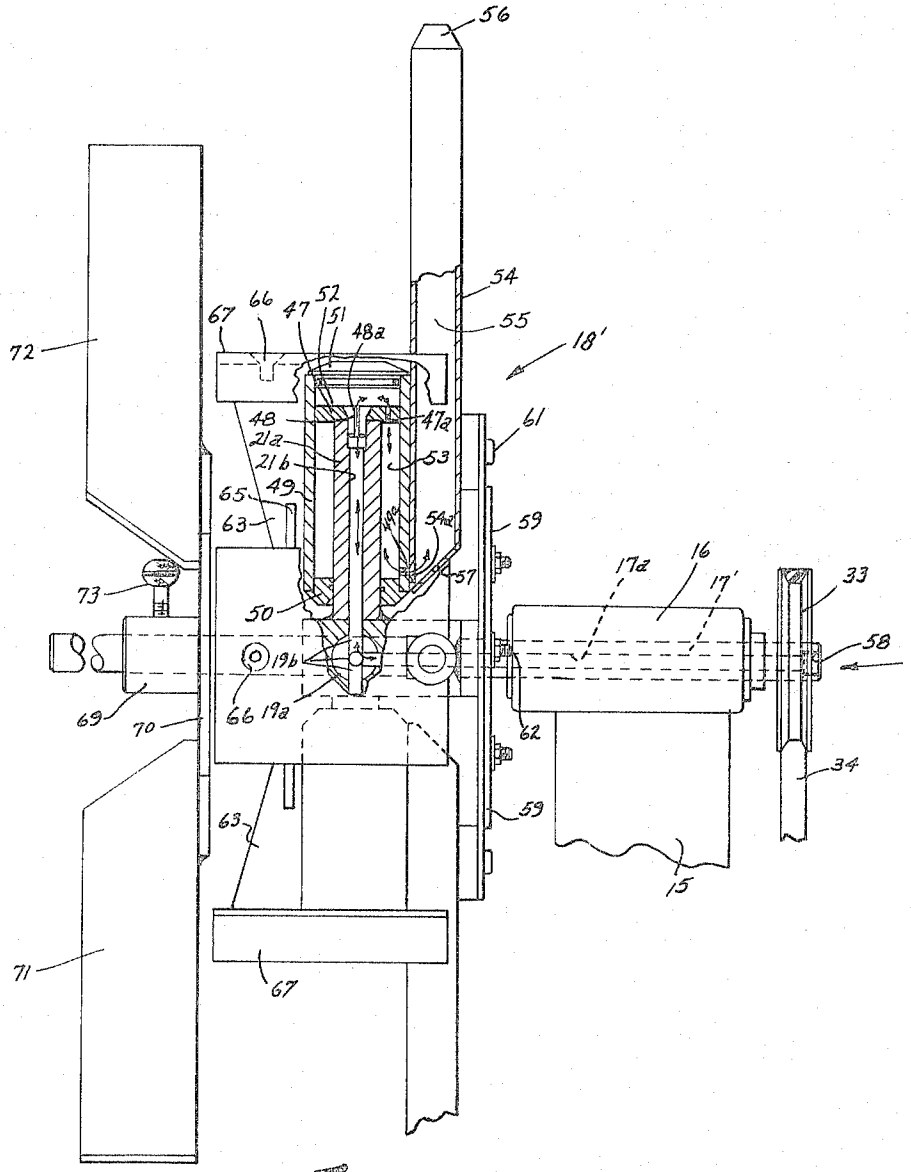

FIG. 9

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United States Patent Office 3,302,902 Patented Feb. 7, 1967

3,302,902

REEL DEVICE

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Filed Dec. 20, 1965, Ser. No. 515,260
5 Claims. (Cl. 242—110.1)

This is a continuation-in-part of application Serial Number 228,866, filed October 8, 1962, now U.S. Patent 3,228,624 issued January 11, 1966.

The present invention relates to material feeding and/or storage, and more particularly to an improved stock reel device having adjustable and yielding elements.

The present invention relates particularly to the art of forming or shaping metallic objects by a suitable machine, for example, a punch press or other press, wherein stock is fed to the machine continuously and/or intermittently at a desired rate from a reel device upon which the stock previously has been wound. However, it will be understood that the invention is not necessarily limited thereto and that it is applicable in any industry in which a web of any desired material is carried by a reel device or the like and is fed therefrom at a desired rate, either continuously and/or intermittently, as needed to a desired location for any desired purpose.

In general, reel devices are known and heretofore have been employed in industry with varying degrees of success. However, prior to the present invention, such prior known devices generally were subject to the disadvantage that they required and occupied very substantial and considerable amounts of valuable floor space which is expensive not only from a cost viewpoint but also from the viewpoint that such space could be employed for other productive purposes. Also, in many industrial operations, it is highly desirable that stock be fed from a reel device to a desired location under controlled tension without kinking of the stock and at the same time avoiding uneven feeding thereof.

Generally, the above-mentioned difficulties are overcome and the desirable features are achieved by the embodiment of the present invention in a reel device provided with braking means adjustably controlled in response to variations in stock feeding tension together with means for exerting a controllable force between the reel device and the stock carried thereon to assure even feeding thereof.

Thus, it is an object of the present invention to provide means for obviating the above mentioned difficulties.

Another object of the invention is to provide a space saving reel device of simple, sturdy and compact construction having braking means automatically controlled in response to variations in stock feeding tension.

Another object is in the provision of an improved stock reel device having guide means to prevent kinking of material fed from the device to greatly reduce the space requirements thereof, and braking means cooperatively associated with the guide means to provide braking action that is automatically controlled in response to variations in stock feeding tension.

A further object of the invention is to provide a stock reel device including braking means of the character set forth and having both coarse and fine adjusting means for handling a wide range of materials of various widths.

It is another object of the invention to provide an improved reel device where certain elements thereof selectively exert a controllable force against stock carried thereby.

Still another object is in the provision of fluid actuated means for selectively and releasably exerting force on stock carried by the reel device to assure even feeding of the stock.

Other objects and advantages will become apparent

from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of a reel device embodying the improved braking and guiding means in accordance with the invention;

FIGURE 2 is a side elevational view of the device of FIGURE 1 in vertical section taken on line 2—2 of FIGURE 1;

FIGURE 3 is a side elevational view of the assemblage of FIGURE 2 from the far side thereof;

FIGURE 4 is a plan view of the showing of FIGURE 3;

FIGURE 5 is an enlarged fragmentary view of the vernier adjustment structure of FIGURE 2;

FIGURE 6 is a perspective view of a modified (plural reel) form of the invention;

FIGURE 7 is a plan view of the species of FIGURE 6;

FIGURE 8 is a view similar to that of FIGURE 1 but differing in the provision of the improved means for exerting a controllable pressure or force between the reel structure and the stock carried thereby; and,

FIGURE 9 is a fragmentary sectional view of the embodiment of FIGURE 8 looking in the direction of arrows 9—9.

With reference to FIGURES 1 to 5 inclusive of the drawings, the numeral **10** generally designates the reel support and brake assemblage while numeral **11** designates the relatively stiff strip material held thereby and supplied under constant tension to a machine, not shown, positioned immediately to the left of the assemblage of FIGURE 1. The assemblage **10** comprises a frame formed of two parallel inverted base channel bars **12** and **13** to which are welded a pair of inclined channel bars **14** and **15** welded at their lower ends to bars **12** and **13** and at their upper ends to a tubular member **16**.

Tubular member **16** has fixed therein a horizontal-axis ball or roller bearing **17** in which is journaled a reel-supporting shaft **17'**. A reel generally designated **18** is removably fastened to shaft **17'** and comprises a hub member **19** having four radially extending bosses **20** axially bored to form sockets for four rod spokes **21** spaced 90° apart. Each spoke **21** carries a sleeve **22** adjustable therealong and provided with a laterally extending boss **23**. Each boss **23** is bored and threaded to receive the threaded short leg of an L-shaped arm **24** which (together with the outer extremity of the spoke **21** to which it is attached by its supporting sleeve **22**) form bifurcated holders generally designated **25** for the spirally wound coil **26** of strip material **11**.

Strip **11** passes from coil **26** under and over an auxiliary drum or idler wheel **27** mounted by a ball or roller bearing **27'** on a horizontally disposed shaft **28**. Shaft **28** is one leg of an L-shaped bent rod, the other leg **29** of which is welded or otherwise fixed to a channel bar **30**. Rod **29** and bar **30** constitute a rocker arm pivotally connected to frame bar **15** by a pivot pin **31** passing through aligned apertures in the apices of a pair of triangular plates **32** welded to the sides of bar **15**.

The constant-tension automatic brake mechanism is very simply and economically provided by a V-pulley **33** serving as a brake drum and by a V-belt **34** serving as a brake shoe. Pulley **33** is keyed or otherwise non-rotatably fixed to shaft **17'**. Belt **34** is clamped by a nut and bolt collectively designated **35** between the end of a metal strip **36** and its reversely bent end **37**. The other end of the metal strip **36** has a series of apertures **38** therein for gross adjustment of the assemblage to belts of different sizes and to strip material of different characteristics. Said adjustment is conveniently effected by a screw **39** passing through a selected one of said apertures **38** and received in a tapped bore in the upper end of rocker arm bar **30**.

Fine adjustment of the brake is provided by a spring-

loaded device generally designated **40** (FIGURES 1–5 inclusive) and adjustably acting between rocker arm bar **30** and frame bar **15** (FIGURE 5). Device **40** comprises a section of channel bar **41** welded to the lower end of bar **30** and overlying the upper surface of frame bar **15**. Each end of the bight portion of part **41** is apertured at **41'** to receive loosely therethrough a headed screw **43** adjustably engaged in a tapped bore in frame bar **15**. A coiled spring **44** is compressed between the head of each screw **43** and a washer **45** bridging each aperture **41**. Thus, by loosening one screw **43** and tightening the other one, more or less spring force can be added to or subtracted from the gravity force produced by the weight of the auxiliary drum on its tilted rocker arm **29–30** for varying the tension on the loop of strip material **11** passing over said drum, the tension adjustably selected being maintained by the automatic braking action described below.

The ends of base frame bars **12** and **13**, FIGURES 1–4, are desirably provided with leveling screws **46** to compensate for any irregularities in the floor surface supporting the apparatus.

The disclosure of FIGURES 6 and 7 differs from that of FIGURES 1 to 5 only in the use of a plurality of reels of substantially identical size and construction and carrying the same quantities of strip material of the same characteristics. Since the parts of FIGURES 6 and 7 are the same as in FIGURES 1–5, the same reference characters are applied thereto.

In the embodiment illustrated in FIGURES 8 and 9, the structural differences involved are only those relating to the structure of the reel **18**. As noted heretofore, it is desirable to provide means for exerting a force in a radially outward direction against the coil of material **26**. This is accomplished, in accordance with the invention, by replacing elements **21–25** inclusive, FIGURES 1–7 inclusive, with the structural features now to be described.

Such features are included in the modified embodiment illustrated in FIGURES 8 and 9. As before, reel-supporting shaft **17'** is arranged and serves the same purpose as in the preceding figures. However, shaft **17'** is now provided with a central bore or passageway **17***a*. Also, in this embodiment, reel **18'** is also removably fastened to shaft **17'** and comprises a hub member **19***a* having four bosses **20** to receive and support four spokes **21***a* equally spaced apart and suitably secured to bosses **20**, for example, by welding. Hub member **19***a* is provided with cross passageways **19***b* in communication with passageway **17***a*. Spokes **21***a* are also provided with internal passageways **21***b* that communicate with passageway **19***b*. Thus, in effect, for reasons which will appear presently, since passageways **17***a*, **19***b* and **21***b* are all connected together and in fluid communication, they thus form a single fluid passageway. At the outer extremity of spokes **21***a*, a piston **47** is secured, for example, by known threaded fastener or screw means **48**. Piston **47** is mounted for relatively sliding movement within a cylinder **49** having end closures **50**, **51**. Threaded fastening means **48** is provided with a central passageway **48***a* that is relatively large as compared to a similar passageway **47***a* that is relatively small as compared to passageway **48***a*. Thus, fluid communication is established between passageways **17***a*, **19***b*, **21***b* and the upper interior portion **52** of cylinder **49** by passageway **48***a*. Similarly, fluid communication is established between the upper interior portion **52** of cylinder **49** and the lower portion **53** thereof by means of connecting passageway **47***a*.

An extension spoke **54** is connected to cylinder **49** by any convenient means, for example, by welding. As illustrated in the drawings, spoke **54** is of tubular construction and is provided with a hollow central portion **55** closed at both ends thereof by a closure **56**, **57**.

The wall of cylinder **49** is provided with an opening **49***a* aligned and in registry with a similar opening **54***a* provided in the wall of spoke **54**. Thus, the interior portion **52** of cylinder **49** is in fluid communication with the interior portion **55** of spoke **54** by means of the connecting passageway formed by aligned openings **49***a* and **54***a*.

At the end portion of shaft **17'** and cooperatively disposed relative to passageway **17***a*, there is provided a threaded portion **58** for connection with a suitable fitting (not shown) for connection to a suitable source (not shown) of fluid under pressure. When fluid under pressure is so connected and supplied to the device, such pressure will be communicated to the upper portion **52** of cylinder **49** by means of connecting passageways **17***a*, **19***b*, **21***b* and **48***a*. The application of such pressure to interior portion **52** causes cylinder **49** and spoke **54** to move radially outward since piston **47** and spoke **21***a* are connected to the hub member **19***a*.

Means are provided for permitting the outward movement of cylinder **49** and spoke **54** as thus described and at the same time restraining such movement within desired limits. This is accomplished in accordance with the invention by the provision of a floating circular plate **59** connected to each of the four cylinders **49** by four separate links **60** as is best illustrated in FIGURE 8 where only one of such links is shown in the interests of clarity. The outermost end of link **60** is connected to cylinder **49** by a pin **61** and the inner end of the link is connected to plate **59** by a pin **62**.

Each of cylinders **49** is provided with guiding means to avoid binding which might otherwise occur between cylinder **49** and piston **47** if these elements were subjected to unusually heavy strain. A rib **63** is suitably connected to cylinder **49** by any convenient means, as by welding, and extends longitudinally and in a direction generally parallel with the axis of the cylinder. The ribs **63** are slidably mounted within radial slots **64** provided in a plate **65** so that the cylinders **49** are free to move either inwardly or outwardly but are constrained to move in a radial direction. At the outer extremities of ribs **63**, there is connected thereto by any convenient means, for example, threaded fastening means **66**, a curved shoe or bearing member **67** for exerting pressure against the inner surface of coil **26** when cylinder **49** moves outwardly in the manner described above.

If desired, a guide element (not shown) but similar to arm **24** (FIGURE 1) may also be connected to rib **63** by threaded fastening means **66** which, together with spoke **54**, would form a bifurcation similar to **25** (FIGURE 1) within which coil **26** is retained. Alternatively, coil retention means may be employed as illustrated in FIGURE 9. Such retention means includes a central portion comprising a hub **69** having a flanged portion **70** to which are connected arms **71**, **72**. Hub **69** is provided with a central bore thereby enabling it to be slipped over shaft **17'** and secured thereto by a thumb screw **73** or other suitable securing means.

In order to maintain ribs **63** and slots **64** in a properly spaced and centered relation relative to shaft **17'**, plate **65** is secured by any convenient means, as by welding to a hub **68** having a central bore therein closely fitted with and slidably engageable upon the shaft **17'**.

In the interests of clarity and simplicity, the connection between element **15** and element **30** is merely shown as a pivoted connection in FIGURE 8 but it will be understood that such connection may include the adjusting means **40** illustrated in FIGURES 1 through 7 inclusive if desired.

In the operation of the device, the operator first disconnects the device from the source of fluid pressure. Usually, such disconnecting means will be a known type of valve which forms no part of the present invention and accordingly is not shown. The operator then removes the retention means comprising hub **69**, flange portion **70** and arms **71**, **72** from shaft **17'** by loosening thumb screw **73**.

Since the device has been removed from the pressure

source, cylinder **49**, extension spoke **54**, and curved shoes **67** will be fully retracted to their innermost position for reasons which will appear presently. Accordingly, the operator can easily place a coil **26** of material over the shoes **67** and against extension spokes **54** in the position best illustrated in FIGURE 8. The retention means comprising hub **60**, flange portion **70** and arms **71**, **72** is then replaced on the end of shaft **17'** and secured thereto by thumb screw **73**. The free end of material **11** from coil **26** is then looped around drum **27** as illustrated in FIGURE 8 and the free end is connected to the tension device of a machine, not shown, where the material is to be used. The operator then reconnects passageway **17***a* with the pressure source and the device is then ready for operation.

As noted above, when fluid under pressure is supplied to pasageway **17***a*, such pressure is communicated to the upper cylinder portion **52**, **21***b* and **48***a*.

Ultimately, the pressure in the lower portion **53** and in the spoke portion **55** will become equalized with the pressure existing in the upper portion **52** because the ends of extension spoke **54** are closed by closures **56** and **57**. However, initially, because of the restriction provided by passageway **47***a* which is small compared to the other passageways, a differential pressure will exist with the pressure in upper portion **52** exceeding that existing in lower portion **53**, thus causing cylinder **49** and shoes **67** to move radially outward relative to spokes **21***a* and exert a force in a radially outward direction on coil **26** carried thereby. Within a very short interval, the pressure in the lower portion **53** and hollow portion **55** will become equalized with that existing in upper portion **52** so that cylinder **49** and shoes **67** will remain in the outwardly extended position as long as such equalized pressure condition exists.

When the operator disconnects passageway **17***a* from the source of fluid under pressure, and simultaneously vents passageway **17***a* to the atmosphere, the pressure in upper portion **52** will quickly fall to a value approaching atmospheric pressure since the connecting passageways between upper portion **52** and passageway **17***a* are relatively large. During such interval, and because of the restriction provided by small passageway **47***a* the pressure remaining in hollow portion **55** and lower portion **53** will remain relatively high as compared to that existing in upper portion **52** thus causing cylinder **49** to return to its radially retracted position. Thus, it will be seen that the invention provides simple means for the relative shifting of the movable elements thereof and does not require springs or other biasing means nor does it require the use of a double acting hydraulic or pneumatic cylinder.

While particular embodiments of the invention have been illustrated and described, it will be obvious to those skilled in the art that various changes and modifications can be made without departing from the invention and it is intended to include in the appended claims all such changes and modifications that fall within the true spirit and scope of the invention.

What is claimed is:

1. In a device of the character described, a reel comprising shaft means,

a plurality of hollow spoke means connected to the shaft means and extending radially outwardly therefrom in equally spaced apart relation,

piston means connected to each of said spoke means,

cylinder means substantially closed at both ends thereof with said piston means disposed within the cylinder means and the spoke means extending through one of said ends for relative slidable and reciprocable movement therebetween,

means including passage means within said spoke means and said shaft means for supplying fluid under pressure into said cylinder means at the end opposite to said one end thereof, and

means including restricted passage for establishing fluid communication within said cylinder means between both ends thereof.

2. Structure in accordance with claim **1** wherein said restricted passage means extends through said piston means.

3. Structure in accordance with claim **1** and also including tubular extension spoke means connected to said cylinder means, closure means for closing both ends of said extension spoke means, and means connecting the interior of said spoke means in fluid communication with the interior of said cylinder means adjacent said one end thereof.

4. A device of the character described comprising a frame structure, reel means rotatably mounted on said structure and adapted to carry a supply of coiled material, and means for receiving material from said reel in one direction and for simultaneously feeding said material in an opposite direction and preventing kinking thereof, said reel means including

a plurality of hollow spoke means connected to the shaft means and extending radially outwardly therefrom in equally spaced apart relation,

piston means connected to each of said spoke means,

cylinder means substantially closed at both ends thereof with said piston means disposed within the cylinder means and the spoke means extending through one of said ends for relative slidable and reciprocable movement therebetween,

means including passage means within said spoke means and said shaft means for supplying fluid under pressure into said cylinder means at the end opposite to said one end thereof, and

means including restricted passage for establishing fluid communication within said cylinder means between both ends thereof.

5. Structure in accordance with claim **4** and also including tubular extension spoke means connected to said cylinder means, closure means for closing both ends of said extension spoke means, and means connecting the interior of said spoke means in fluid communication with the interior of said cylinder means adjacent said one end thereof.

References Cited by the Examiner

UNITED STATES PATENTS

1,113,082	10/1914	Zeni	242—110.1
2,558,055	6/1951	Meredith	242—72 X
2,950,071	8/1960	Tidland	242—110.1 X
3,228,624	1/1966	Brinkman	242—75.43

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