# United States Patent [19]

**Maruszczak**

[11] **3,868,065**

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[54] **ROTARY STRIP ACCUMULATOR**


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[52] **U.S. Cl.** ..... **242/55,** 242/78.1

[51] **Int. Cl.** ..... **B65h 17/48**

[58] **Field of Search** .... 242/55, 55.16, 55.17, 55.18, 242/55.19 R, 78, 78.1, 110.2, 77.1



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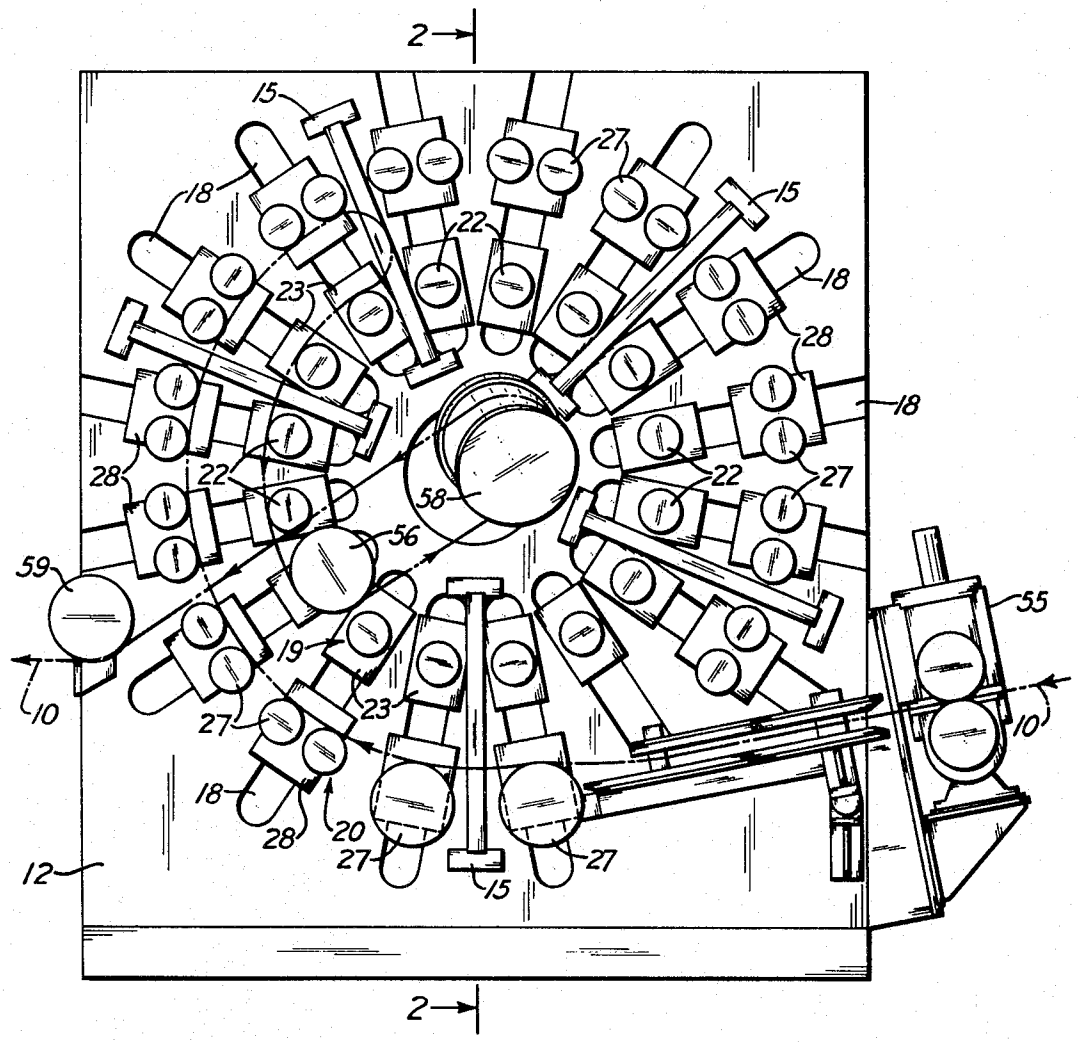
[57] **ABSTRACT**

The disclosure of this invention relates to a rotary strip accumulator for web-like material, such as, rolled steel strip, and includes inner and outer roller concentric baskets between which the strip is accumulated in the form of two distinct coils separated by a reversible loop of strip. The baskets are formed by a series of cooperating rollers and are supported by a frame in which the rollers are cantileverly mounted on the frame so that the coils are formed externally of the frame. The rollers of each basket are moved in unison by spider members supported by a common tubular member arranged coaxially with the axes of the coils.


**3 Claims, 2 Drawing Figures**



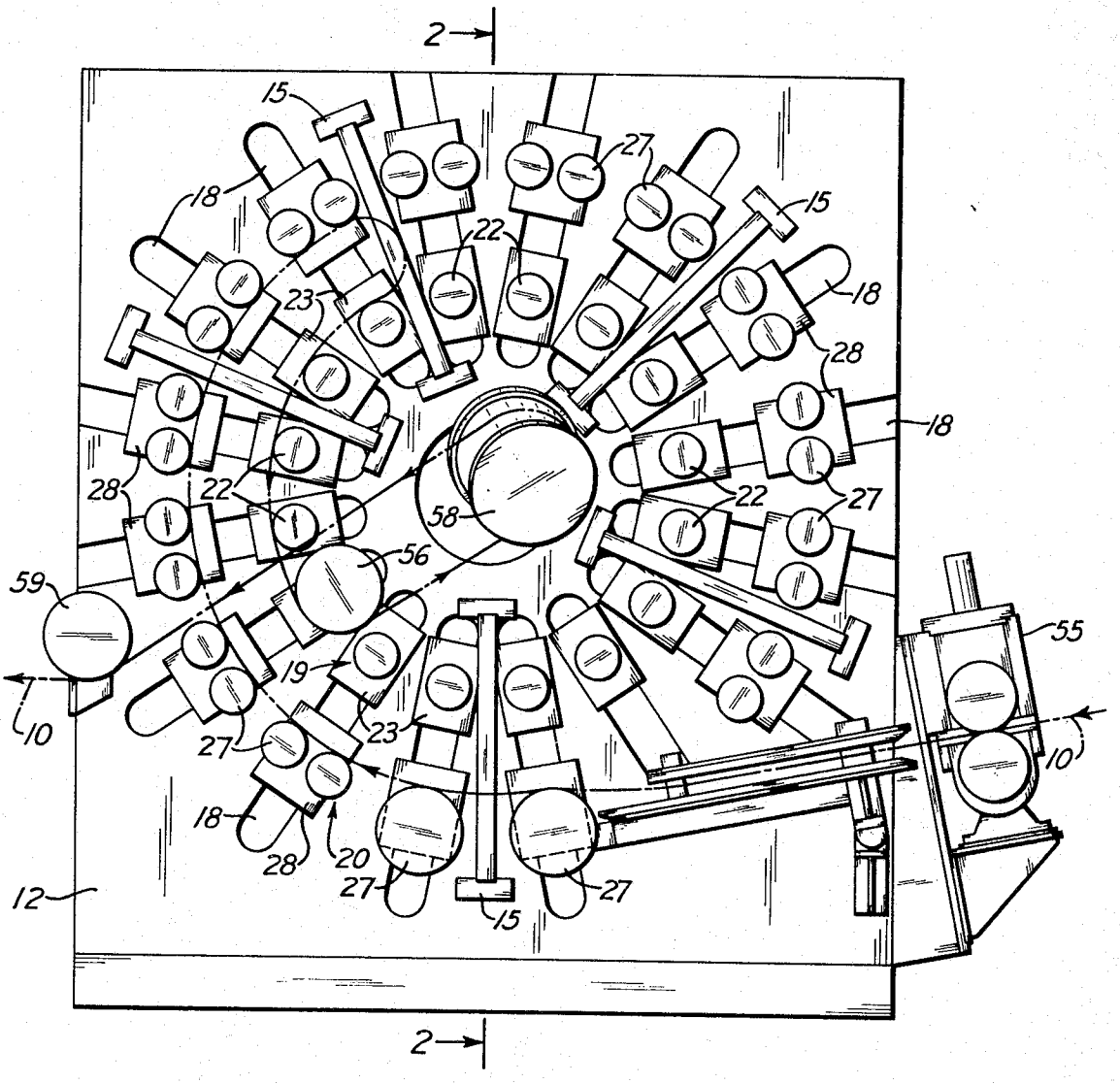

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Fig. 1

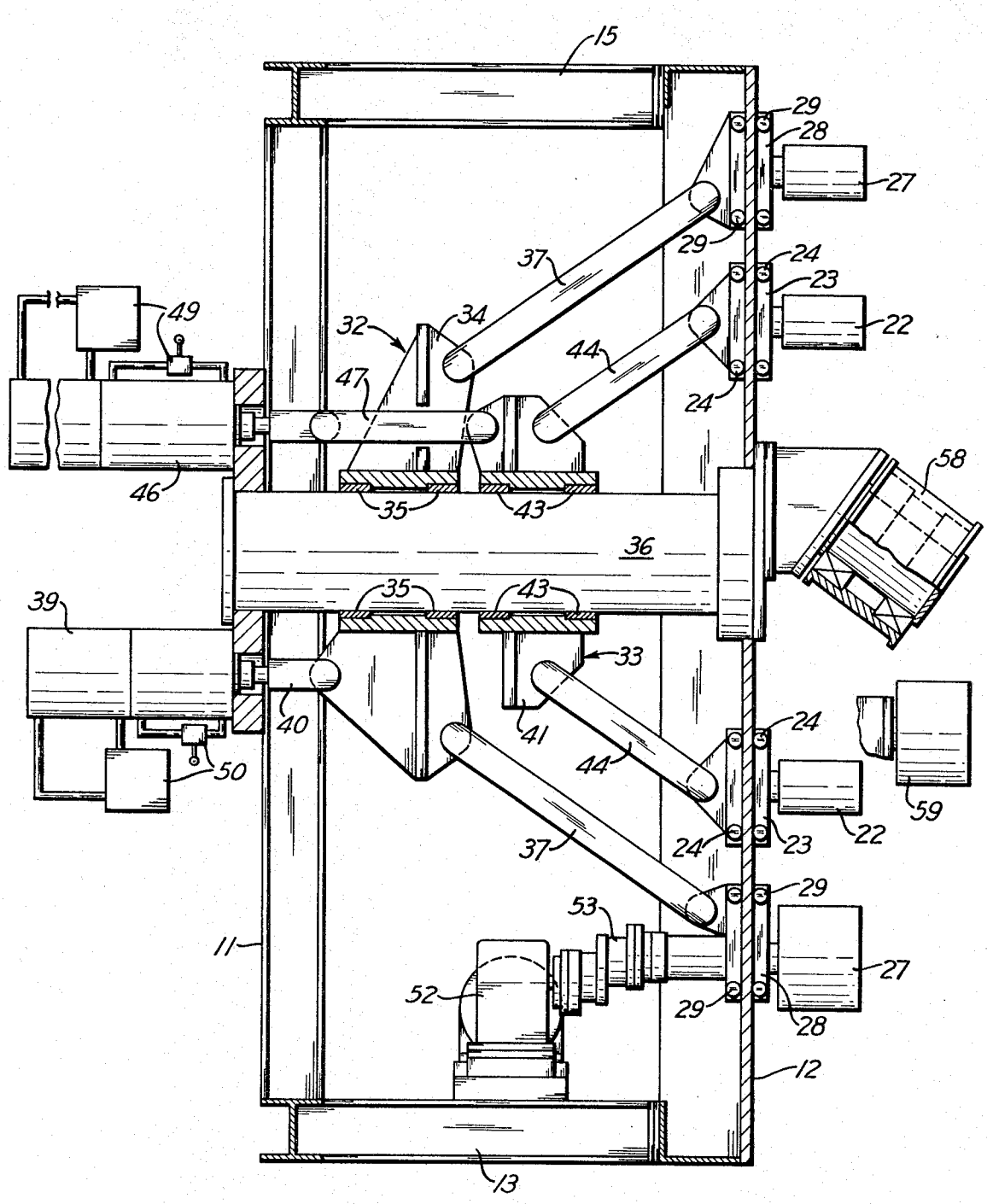
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Fig. 2

# ROTARY STRIP ACCUMULATOR

Rotary strip accumulators of the type illustrated in U.S. Pat. Nos. 3,258,212, 3,341,139 and 3,506,210, and particularly the latter have not received their full acceptance because, among other things, of the complicatedness of their designs which not only adversely reflect in the initial cost of manufacture, but also their maintenance cost and ease of operation.

Another difficulty of past rotary strip accumulators is the extreme difficulty in performing ordinary maintenance and being able to easily and quickly determine the condition of the strip and roller baskets during operation.

A still further difficulty of past rotary accumulators is that the roller baskets are not maintained concentric during the entire range of movement of the baskets, and therefore require a larger machine for a given thickness and type of material.

It is, therefore, the object of the present invention to provide an improved construction of a rotary strip accumulator of the above-noted type which will overcome each and every one of the aforesaid disadvantages noted with respect to present-day rotary accumulators.

More particularly, the present invention provides a strip accumulator having a first series of rollers arranged to form an inner roller basket, a second series of rollers arranged to form an outer roller basket which basket is concentric with the inner roller basket, the baskets being arranged relative to each other so that a number of convolutions of strip can be wound into two distinct coils separated by a reversible loop of the strip, a frame for supporting the first and second baskets, and means carried by the frame for connecting the rollers to the frame in a manner that the rollers are cantileverly mounted relative to the frame and the coils are formed externally of the frame.

It is a still further object of the present invention to provide an accumulator in accordance with the aforesaid object, including separate spider elements for each of the roller baskets and a centrally located member for supporting the spider elements so as to allow them to move independently in a direction normal to the direction of movement of the rollers, and separate means for moving the spiders to cause movement of the rollers.

These objects, as well as other novel features and advantages of the present invention, will be better appreciated when the following description of a preferred embodiment is read along with the accompanying drawings of which:

FIG. **1** is an elevational view, certain portions being omitted for clarity, of an accumulator incorporating the features of the present invention, and

FIG. **2** is a sectional view taken on lines **2 - 2** of FIG. **1.**

In FIG. **1** there is illustrated an accumulator for rolled steel strip, the entry and delivery of which are indicated by the arrows associated with the strip **10** in which it is desired to feed the strip made up of a continuous supply of coils to a processing machine not shown, such as, a pickling line where the line is to be operated continuously even though succeeding coils must be welded end-to-end and which requires a stoppage of the strip in the welding zone. The fundamental characteristic of the illustrated accumulator will not be repeated herein since they appear in the aforesaid U.S. Patents, particularly in U.S. Pat. No. 3,506,210.



The accumulator illustrated includes a front and back upright members **11** and **12,** supported on a common base **13** and additionally tied together by radially arranged separator members **15.** The front member **12** is provided with a series of equally spaced radially arranged guide slots **18** into which are received the rollers carried by bearing chocks of the inner and outer baskets **19** and **20,** respectively. According to the procedure in operating present-day rotary accumulators referred to above, the strip **10** is formed into two distinct coils separated by a reversible loop of strip by the roller baskets **19** and **20.**

In referring to the inner basket **19,** its rollers **22** are rotatably supported by bearing chocks **23** which, in turn, are received in the guide slots **18.** FIG. **2** best illustrates the construction of the bearing chocks **23** which include four pairs of cooperative antifriction bearings **24** that engage and roll over the frame member **12** while the rollers **22** are guided in the guide slots **18.** The outer basket **20** has rollers **27** rotatably mounted in bearing chocks **28** in cooperative pairs of two's, except for the two lowermost rollers, the chocks also being received in the guided slots **18.**

As shown in FIG. **2,** the bearing chocks **28** as in the case of the bearing chocks **23,** each include four cooperative pairs of anti-friction bearings **29** that engage and roll over the frame member **12** while the rollers **27** are guided in the slots **18.** The rollers of each basket **19** and **20** are moved radially in unison by spider members **32** and **33,** the member **32** serving the outer basket **20** while the member **33** serves the inner basket **19.** Referring first to the member **32,** it consists of a circular slide **34** having separate bearings **35** that allow the slide to move over a tubular support **36** which is horizontally carried by the upright members **11** and **12.** The slide **34** is connected to the bearing chocks **28** of the outer basket rollers **27** by links **37.** The links are caused to expand and collapse and, hence, causes a similar movement of the roller basket **20** on movement of the slide **34** by a tandemly arranged air-oil double piston cylinder assembly **39** which is connected to the slide by a clevis **40** connected in turn to the piston rod. In the assembly which is supplied in the trade by several manufacturers, such as, Miller Fluid Power of Bensenville, Ill., the air is employed to generate the power to move the piston of the cylinders and the oil is used to regulate the speed.

The member **33** also consists of a circular slide **41** arranged in tandem fashion with respect to the slide **34** and has spaced bearings **43** that permit the slide **41** to move over the supporting member **36.** The slide **41** is connected to the bearing chocks **23** of the rollers **22** of the inner basket **19** by links **44.** These links are caused to expand and collapse and, hence, cause a similar movement of the roller basket **19** on movement of the slide **41** by a tandemly arranged air-oil double piston cylinder assembly **46** which is connected to the slide **41** by a link **47** similar to the assembly **39.**

As described, it will be appreciated, that the relationship of the slides **32** and **33** and their links **37** and **44** assure that the baskets **19** and **20** will be maintained concentrically throughout their entire range of movements.

The operation of the twin piston cylinder assemblies **39** and **46** which are supported by the upright member

11 is controlled to cause a carefully controlled movement of the baskets 19 and 20 by means of hydraulical flow control units 49 and 50.

In place of the piston cylinder assemblies 39 and 46 there can be provided an electrical motor screw jack unit in which, if desired, each sleeve 34 and 41 can be moved by a pair of screw jacks driven by separate electrical motors carried by the back upright member 11.

The two lowermost rollers 27 of the outer baskets are single rollers and are positively driven, the driving arrangement being best shown in FIG. 2 where separate electrical motor-gear units 52 are connected to the rollers 27 through flexible couplings 53. The coupling illustrated is known as a Schmidt Coupling supplied by The Tool Steel Gear & Pinion Company of Cincinnati, Ohio. U.S.A. and described in its catalog 3000-G dated 12/1/69.

As shown in FIG. 1 the strip 10 is fed to the accumulator by a pair of driven pinion rolls 55 over the power driven rollers 27 of the outer basket 20 and, hence, between the inner and outer baskets where it is caused to take the form of a reverse loop which loop is shown in outline form in FIG. 1. Following the loop, the strip passes over a guide roll 56 and around a takeoff spool 58 to an exit guide roll 59 where the strip leaves the accumulator. The condition of the strip illustrated in FIG. 1 depicts the beginning of the accumulation of the strip in which as the loop passes around the basket wraps are added to the inner and outer coils formed between the baskets and separated by the free loop. During this formation the baskets are displaced continually by the controlled operation of the piston cylinder assemblies 39 and 46. The cantilever construction of the baskets will allow the condition of the strip to be inspected continuously and maintenance to be formed on the rollers without the removal of any parts of the frame.

In accordance with the provisions of the patent statutes, I have explained the principle and operation of my invention and have illustrated and described what I consider to represent the best embodiment thereof.

I claim:

1. An accumulator for weblike material having a first series of rollers arranged to form a circular inner roller basket and a second series of rollers arranged to form a circular outer roller basket,

said two baskets being arranged relative to each other so that a number of convolutions of material can be wound into two distinct coils separated from each other by a reversible loop of material,

a frame for supporting said first and second baskets in a manner that the coils are formed with their major axes in an horizontal plane,

said frame includes a member arranged in a plane normal to the planes containing the axes of rotation of said rollers,

said member having a number of guide slots located radially to the axes of the formed coils,

means for rotatably supporting said rollers,

said roller supporting means received in said guide slots,

separate spider elements common to the rollers of a different one of said baskets for moving their respective baskets in said guide slots,

said frame including a central supporting means for carrying said spider elements in tandem fashion and in a manner that the elements are free to move parallel to the axes of the formed coils,

links for connecting said spider elements to their associated rollers so that on movement of the spider elements over said central supporting means their associated rollers will move radially in unison,

a piston cylinder assembly for each spider element for moving their respective baskets, and

said member of said frame arranged on one side of said frame for connecting said rollers of said first and second baskets to the frame in a manner that the rollers are cantileverly mounted relative to said frame and project away from said frame so that said rollers are open and unobstructed from said one side of said frame.

2. An accumulator according to claim 1 including an air-oil double piston cylinder assembly wherein air is employed to generate the power to move the piston and oil to regulate the speed of the piston and control means for controlling the operation of said piston cylinder assembly.

3. An accumulator according to claim 1 wherein said support means for said rollers includes low friction means engaging said frame adjacent said guide slots.

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