United States Patent

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[54] **ACCUMULATOR**
4 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **226/119,** 242/47.5, 242/55.01
[51] **Int. Cl.** **B65h 17/42**
[50] **Field of Search** 226/113, 114, 118, 119; 242/47.5, 55.01

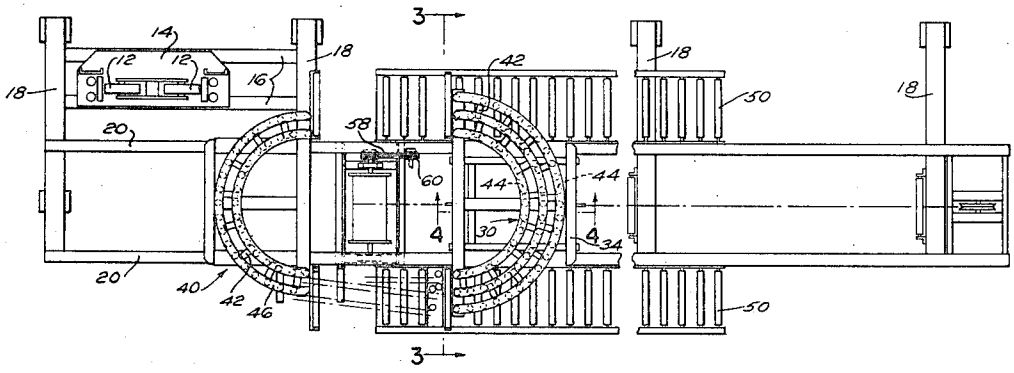
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ABSTRACT: An accumulator used in an extrusion system or other wire line system that requires temporary wire storage when one is paying into the line or when taking from the line as, for example when changing takeup reels to thereby allow the extruder to operate continuously. The structure consists of a fixed flat platform having horizontal rollers placed thereon in a plurality of semicircular paths and having vertical roller guides placed on both ends of the longitudinal axis of the horizontal rollers to form semicircular channels. There is also a movable carriage having a flat platform with horizontal rollers thereon forming a plurality of semicircular paths, one nested within the other, and having vertical guide rollers on each side of the ends of the horizontal rollers to form the semicircular channels. The movable carriage is mounted on rails and is aligned so that its open channels face the open channels of the fixed platform. The wire is wound in a circulating path through the aligned channels and the amount of wire to be stored in the accumulator can be varied as the movable carriage is run back and forth on the rails.



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SHEET 1 OF 2

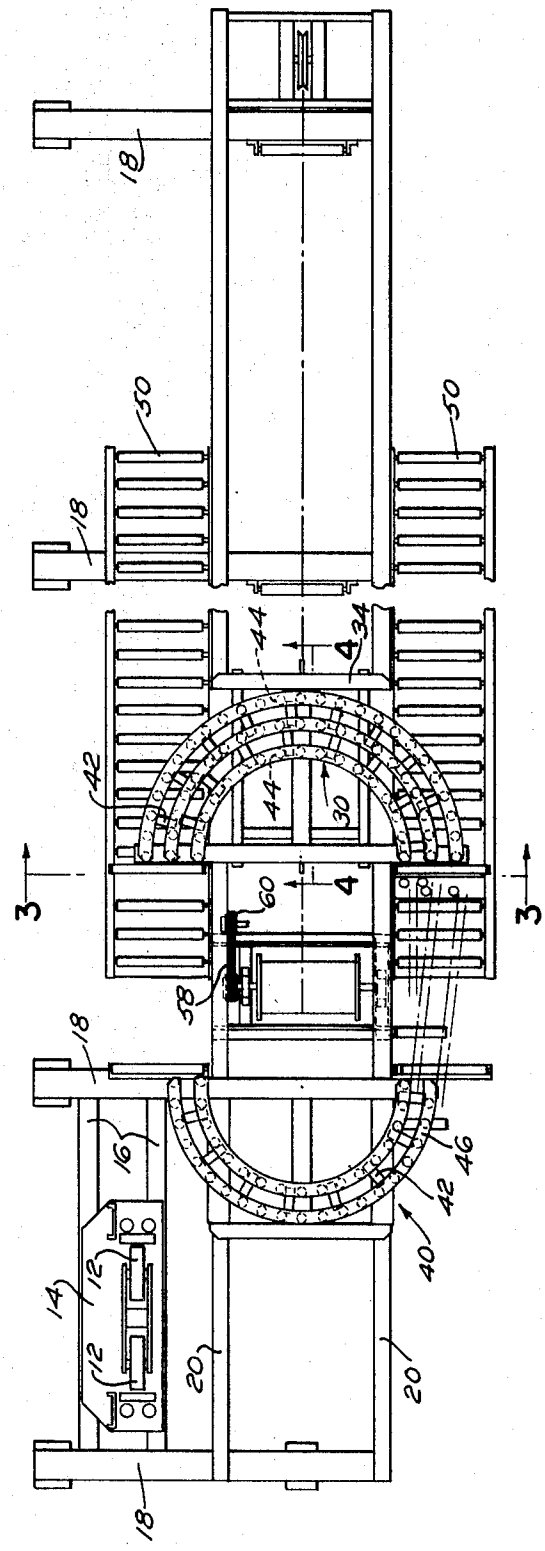


FIG. 1

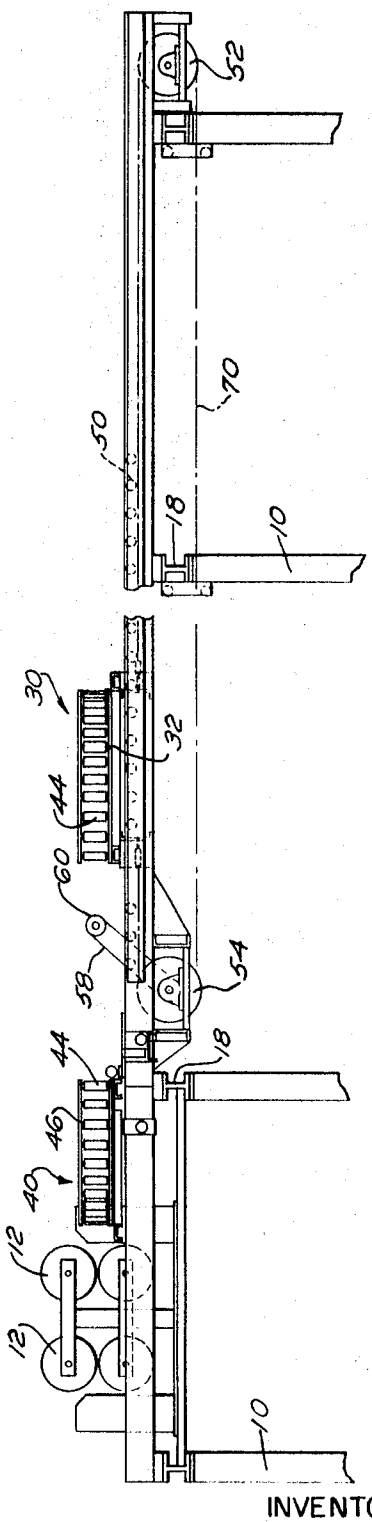


FIG. 2

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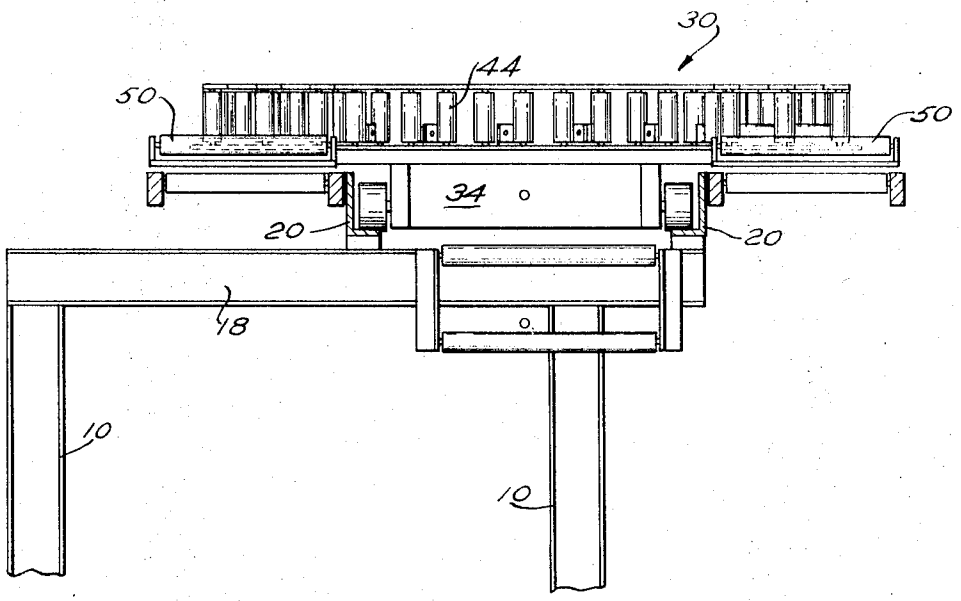


FIG. 3

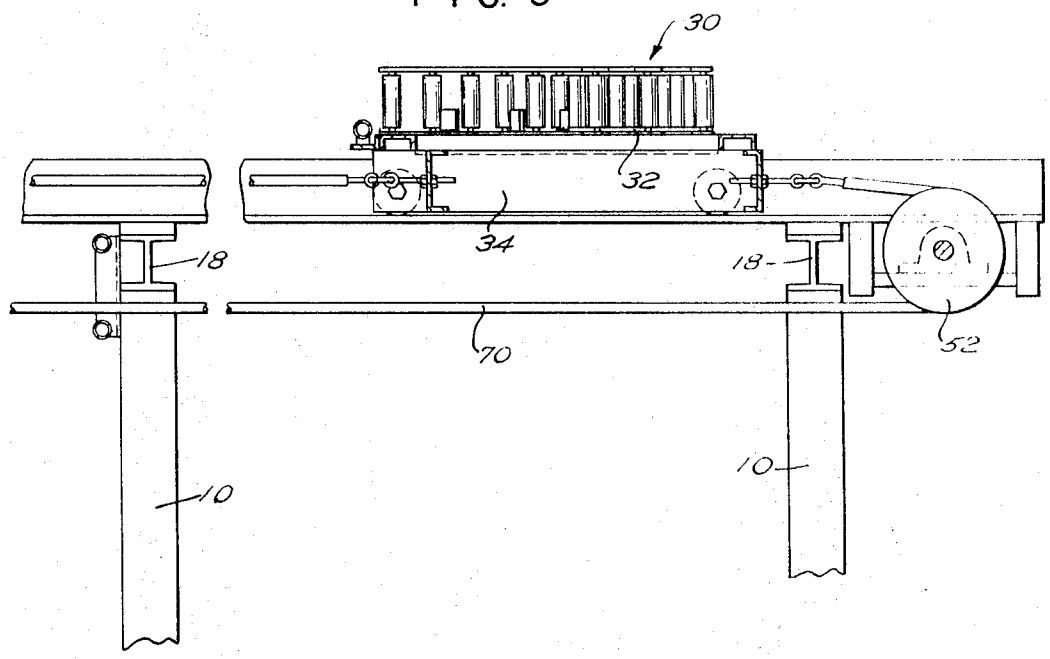


FIG. 4

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BACKGROUND OF THE INVENTION

One of the problems of the wire-extruding industry and other related industries which perform an operation on a piece of wire, cable, etc., is to attempt to maintain a continuously running extruding or other operation while changing the takeup reels. By stopping the operation while taking off the full reel and placing on an empty reel, a resulting inefficient utilization of the extruding machine is optimum production. Industry has overcome this problem by placing an accumulator in the sequence of operations directly in advance of winding the wire on the takeup reel.

The accumulators of the prior art consist basically of a fixed roll unit, a dancer roll unit, and structure and mechanism which can vary the distance between the two roll units. Each of the roll units consists of a plurality of sheaves vertically positioned and having common horizontal axes. The dancer roll unit is mounted on some sort of a track or rail and movable away from the fixed roll unit. The wire comes into the accumulator and is wound around a sheave of one of the roll units and is stretched across to a sheave of the other unit and then looped back to a sheave of the first unit and back and forth until several loops are formed and the path of the wire runs around each of the sheaves. As the wire passes out of the accumulator, it goes to the takeup reel operation. When a takeup reel is full, the accumulator will not pay out anymore wire yet it continues to receive a wire input. To provide storage for the excess wire the dancer roll unit moves along the track away from the fixed roll unit thereby increasing the length of wire in each of the loops. As soon as a new takeup reel is in place, wire may again be removed from the accumulator and when removed at a rate faster than that entering the accumulator, the dancer roll unit begins to come back toward the fixed roll unit. Accumulators may, of course, also be used immediately after a payoff and before the extruder. In this case, the accumulator pays out material on demand during a change of the reels in the payoff.

The use of the heavy sheaves creates both a weight and mass problem when accelerating or decelerating the accumulator. An attempt to place the sheaves horizontally would produce the problem of supporting the cable to keep it from falling off the sheaves. Also the sheaves placed horizontally would be much harder to accelerate or decelerate. In addition the length of the carriage and the weight become prohibitive when the sheaves are placed in tandem in a horizontal plane.

Another object of the present invention is to come up with a new design for an accumulator which operates more efficiently. The elimination of heavy sheaves from the accumulator results in greatly reducing the amount of inertia which it was necessary to overcome in changing the speed of rotation of the sheaves and also when changing direction of rotation of the sheaves. The force of inertia to overcome in the horizontal support rollers and vertical guide rollers will be small in comparison to that of the sheaves.

SUMMARY OF THE INVENTION

The present invention relates to an integral unit of a wire-extrusion system or any other system requiring temporary wire storage in order to maintain a continuous operation. The use of an accumulator allows wire to be continuously extruded while the takeup reels are being changed.

In operation the wire comes into the outermost channel on the movable carriage and winds around a path 180° where it exits and then enters the outermost channel on the fixed platform and winds around a path 180° where it exits. The wire is then directed back into the outermost unoccupied channel on the movable carriage and through it and out the other side. In the disclosed embodiment the wire would then go off to the takeup reels. The number of channels on the respective platforms may be increased in order to enlarge the storage capacity of the accumulator.

Once the wire has been wound through the accumulator and attached to the takeup reel the system is ready for operation. As the wire is continuously fed into the accumulator it is also continuously fed out to the takeup reel. When the takeup reel is full, the accumulator discontinues feeding out wire. At this time the carriage travels away from the fixed platform along the track to accommodate the additional wire which is still continuously flowing into the accumulator. Before the accumulator has reached its maximum storage capacity a new takeup reel will have been installed and the wire will be drawn out of the accumulator at a faster rate than it is being fed into the accumulator. The carriage then returns along the track toward the fixed platform as the amount of wire stored decreases with the amount stored at a minimum just prior to the changing of takeup reels.

Other objects and features of the invention will be more readily understood from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of the accumulator;

FIG. 2 is a side elevation of the accumulator;

FIG. 3 is a detail view taken along line 3–3 of FIG. 1 illustrating the support for the movable carriage unit; and

FIG. 4 is a detail view taken along line 4–4 of FIG. 1 illustrating how the movable carriage is moved along the track.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein the like numerals designate the same or similar elements throughout the several views, the accumulator, as shown in FIGS. 1 and 2, is mounted on an elevated framework which is supported by beams 10. The input feed rollers 12 are mounted upon a platform 14 which is itself supported on cross-structural members 16. Elements 18 are transverse I-beams, two of which support the cross-structural members 16. The beams that extend the length of the structure double as rails 20 to provide a track upon which the movable carriage unit 30 travels. Also the rails 20 provide a support base for the fixed platform unit 40.

The fixed platform unit 40 consists of a base upon which horizontal support rollers 42 are mounted in an arcuate path. Along both ends of the horizontal support rollers 42 are vertical guide rollers 44 which together form an arcuate channel therebetween and through which the wire runs. A horizontal structural member 46 is attached to the top ends of the vertical guide rollers 44 to support them.

The movable carriage unit 30 can best be described by looking at FIG. 4. A platform 32 is supported atop the undercarriage base 34 which is essentially a rectangular frame with vertical walls and having wheels 36 mounted along the two longitudinal sides. The wheels rest upon the horizontal flanges of the rails 20 and ride back and forth along their length. The top of the platform 32 has horizontal support rollers 42 laid out in arcuate path with the vertical guide rollers 44 placed along the peripheries of these paths to form channels therebetween. Although only two channels are shown on the disclosed movable carriage, it is to be understood that the number of channels on both the fixed support unit and on the movable carriage unit may be increased depending upon the amount of temporary storage capacity which is required in the system.

In operation the invention can best be understood by picturing wire coming into the input feed rollers 12 from the extruding apparatus (not shown). The wire enters the outermost channel on the movable carriage unit 30 winding its way around the 180° loop and out the other end. It then enters the aligned channel on the fixed platform unit 40 and exits at its far end and enters the inner channel on the movable carriage unit. After the wire exits from the channel it travels off to the takeup reels. While the operation is running there is a continuous flow of wire into the input feed rollers and since the takeup reels need to be changed frequently this is when the accumulator provides its needed service. When a takeup reel is full the payout of wire is stopped and responsive to controls in

the system the movable carriage will start to move down the track **20**. The controls which operate according to predetermined conditions are not disclosed as they are ordinary control components and do not form part of the invention. As the carriage moves down the track more and more wire is looped through the different channels and temporarily stored. As the movable carriage unit moves away from the fixed platform unit the auxiliary conveyor support rollers **50** provide support for the wire extending between the two units. The auxiliary conveyor support rollers are mounted along the outside walls of the track **20**. The mode in which the carriage is transported along the track is by a cable **70** which is attached to the rear vertical wall of the undercarriage **34** and extending along the length of the track and around a pulley **52** supported at the far end. The cable then travels back the length of the track where it is wound on a reel **54** with the free end being attached to the front vertical wall of the undercarriage **34** to complete the loop. The reel **54** has a pulley mounted on the same axle as the reel and it is connected by a belt **58** to another pulley **60** which is in turn driven by a power source not shown since it forms no part of the invention and its inclusion would only add confusion to the drawings. The programmed responsive controls turn pulley **60** through a gear train (not shown) to move the carriage back and forth along a track. When a new takeup reel has been installed the wire is fed to the takeup reel at a rate faster than that entering the input feed rollers which causes the movable carriage unit to return towards the fixed platform unit and decreases the amount of wire temporarily stored in the accumulator. This is a cyclic operation which starts each time the takeup reel is full.

It is to be understood that the above described embodiment is simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

I claim:

1. An accumulator for temporarily storing varying amounts of elongated material which it continuously receives taking up said elongated material upon demand and paying out said elongated material upon demand with means for supporting said elongated material in storage comprising a first horizontal platform fixedly supported and a second horizontal platform mounted upon a movable carriage, means horizontally disposed upon each of the platforms to facilitate movement of the elongated material across the top surfaces of the platforms, and vertical guide means on the platforms to direct the elongated material along a circulating path back and forth between the two platforms, means for expanding and contracting the storage capacity of the accumulator by varying the distance of the movable carriage from the fixed platform.

2. An accumulator as recited in claim **1** wherein the means for expanding and contracting the storage capacity comprises a track leading horizontally from the base of the fixed platform, the movable carriage is mounted on this track and having means for running the carriage back and forth along the track.

3. An accumulator as recited in claim **2** wherein the vertical guide means on the platforms are rollers extending vertically and placed in arcuate columns on both ends of the horizontal support rollers to form a channel through which the elongated material is guided, the channels on the platforms are matched up so that the openings on one platform face the openings on the other platform.

4. An accumulator as recited in claim **3** wherein there are auxiliary conveyor-support rollers lying on both sides of the track and parallel thereto, these rollers providing support for the elongated material when the carriage moves down the track away from the fixed platform.