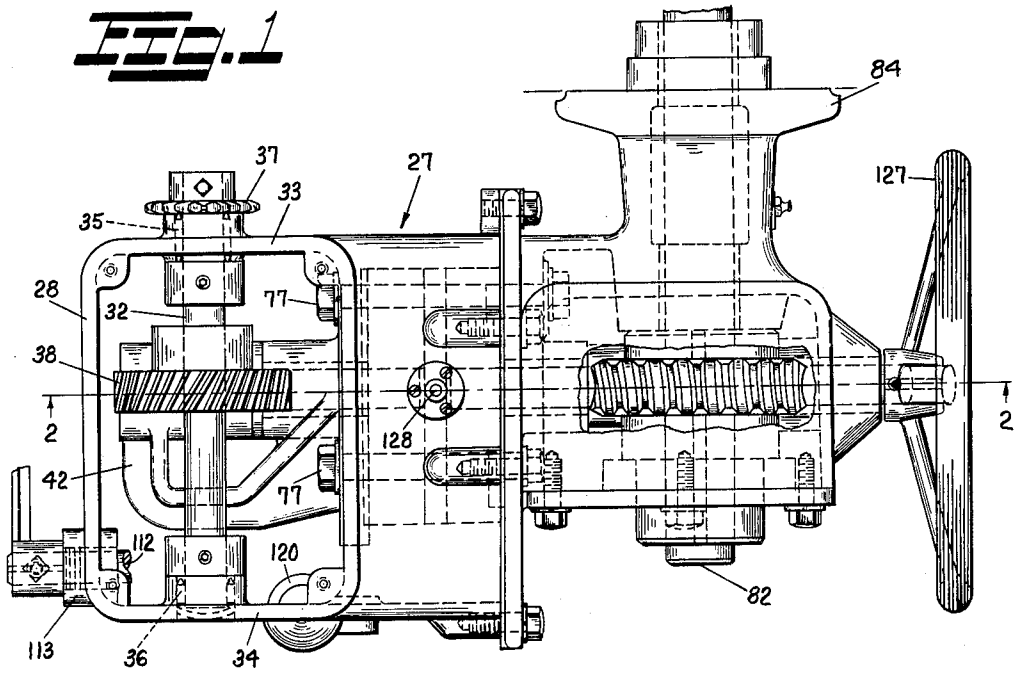
July 19, 1966 R. BERRY 3,261,375

HYDRAULIC LET-OFF

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FIG. 1



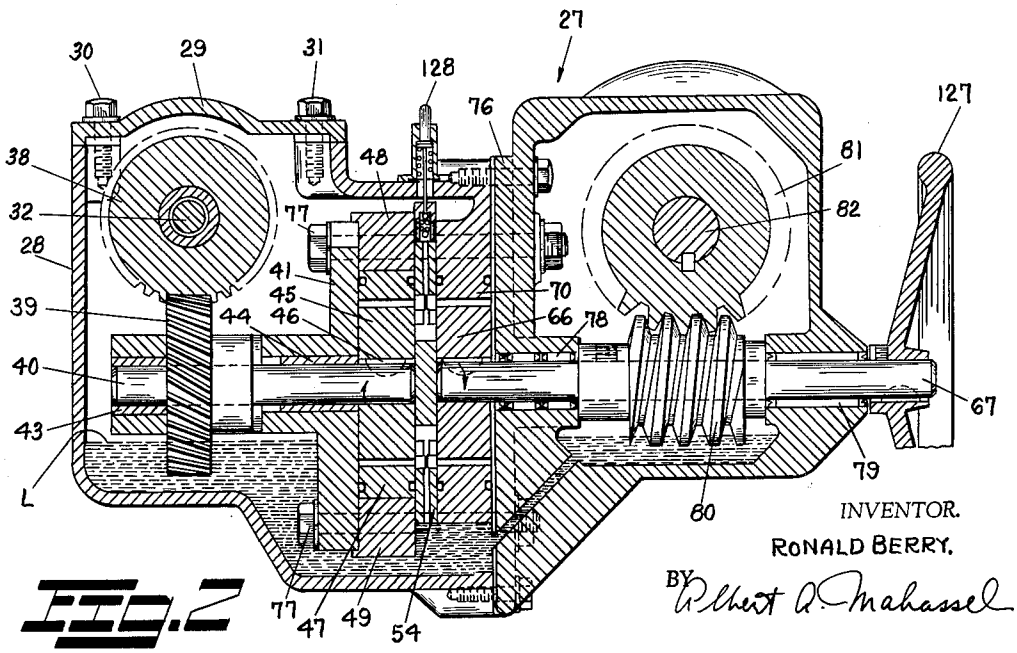


FIG. 2

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HYDRAULIC LET-OFF

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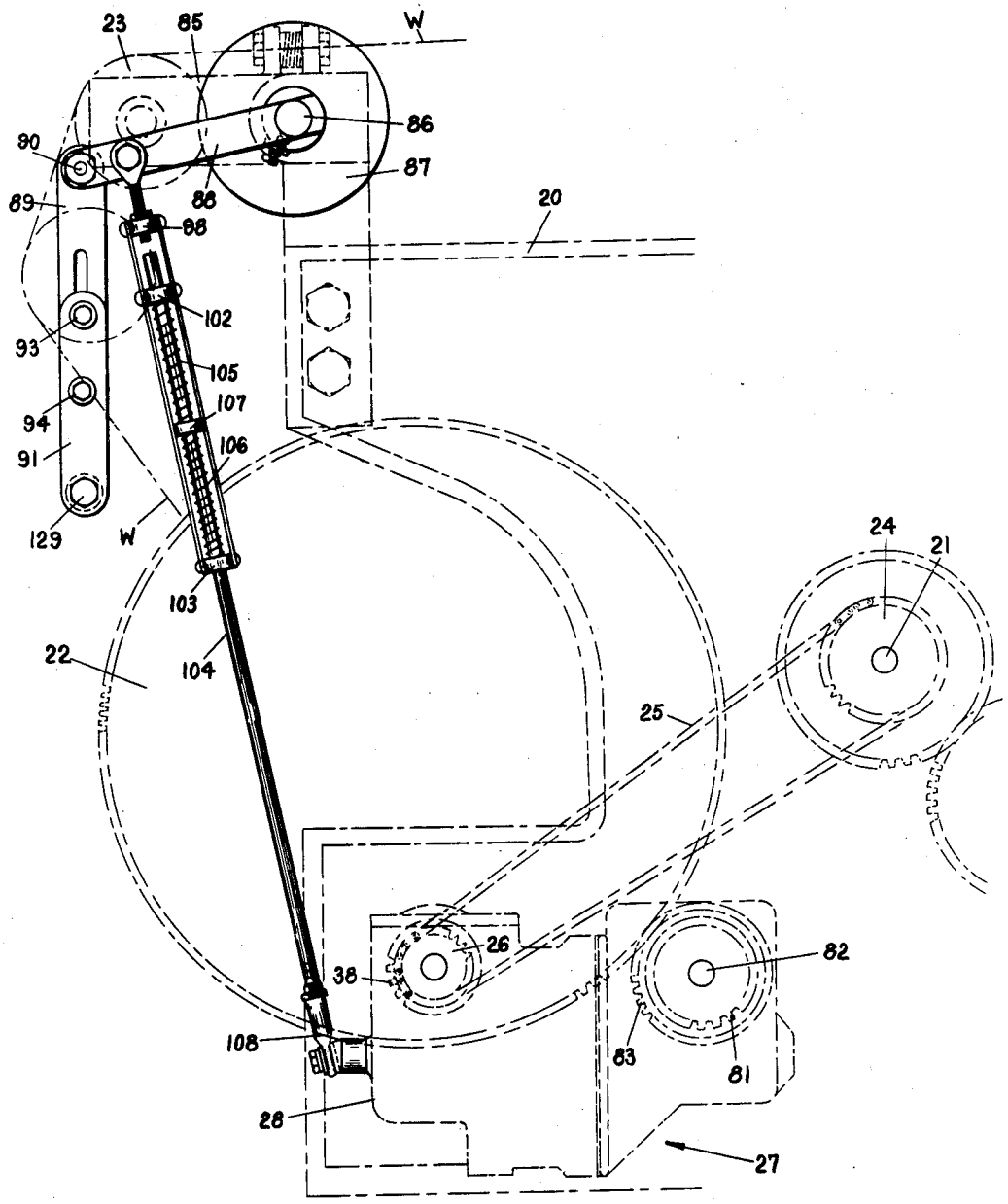


FIG. 3

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HYDRAULIC LET-OFF

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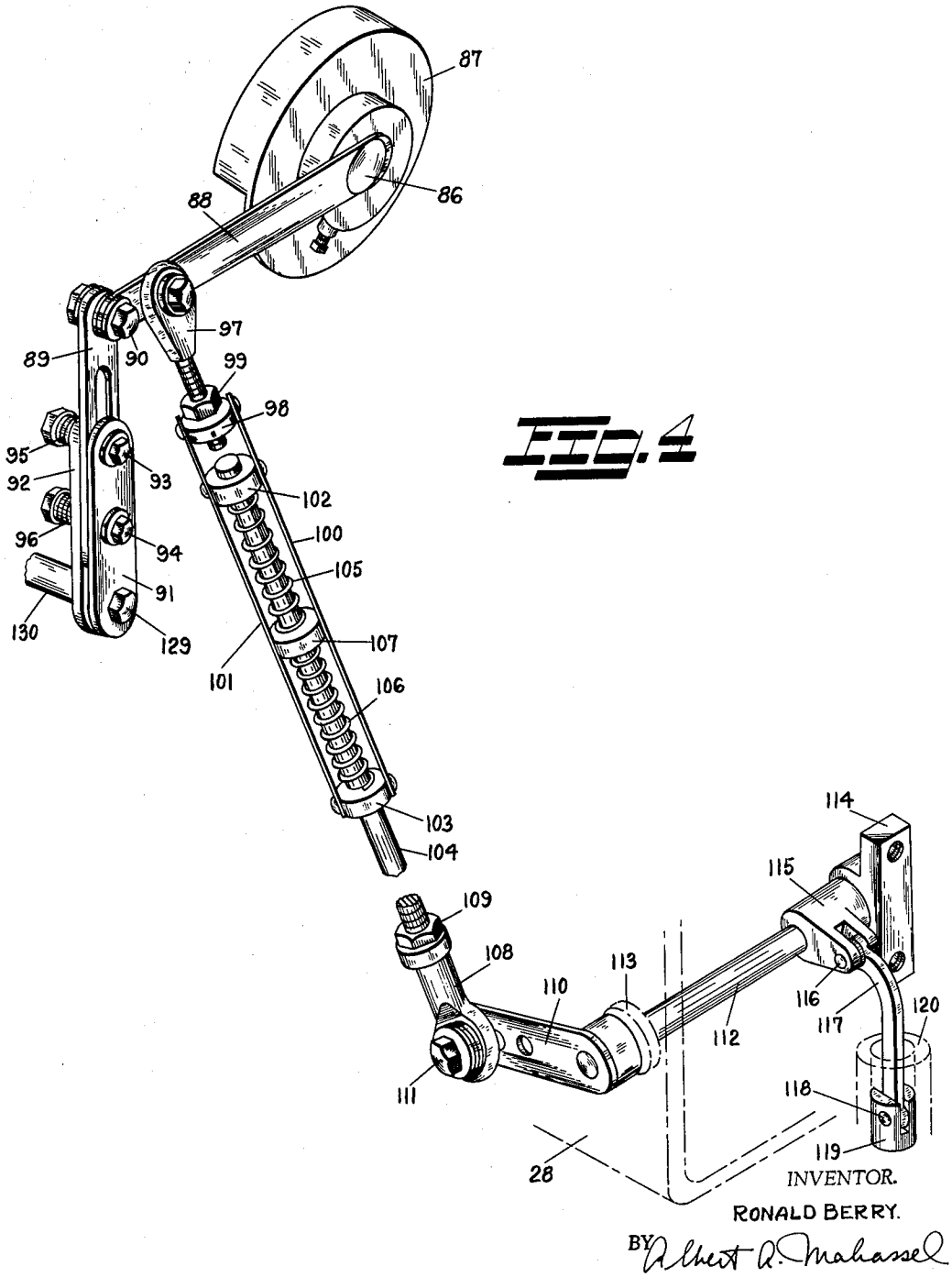


FIG. 4

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HYDRAULIC LET-OFF

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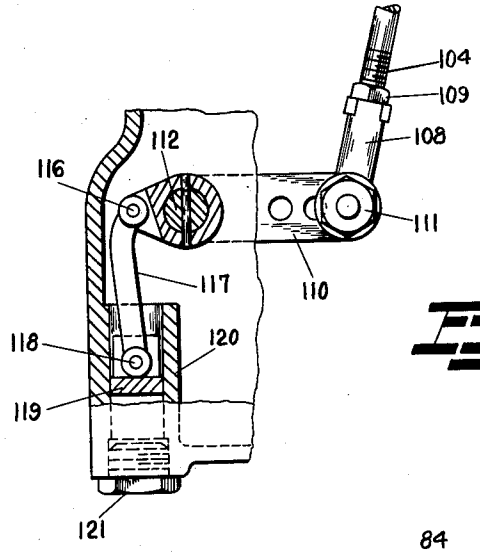


FIG. 5

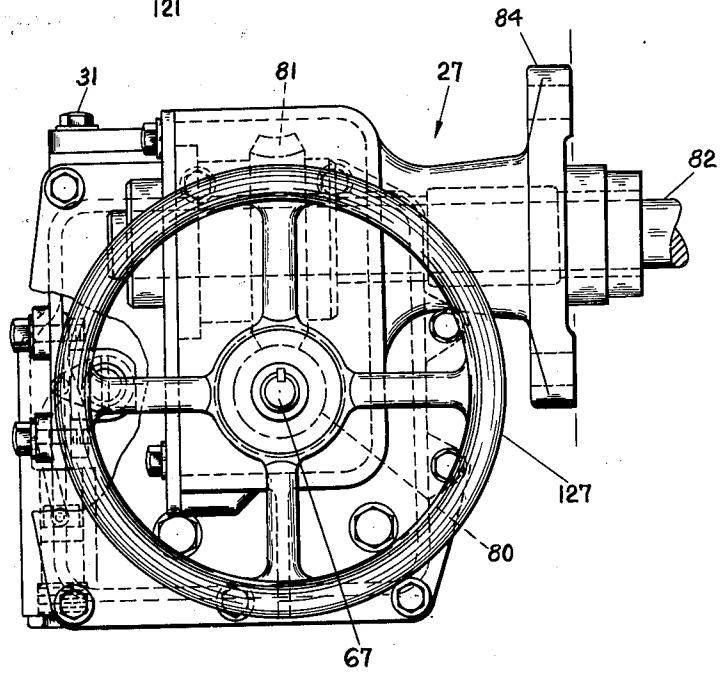


FIG. 5

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HYDRAULIC LET-OFF

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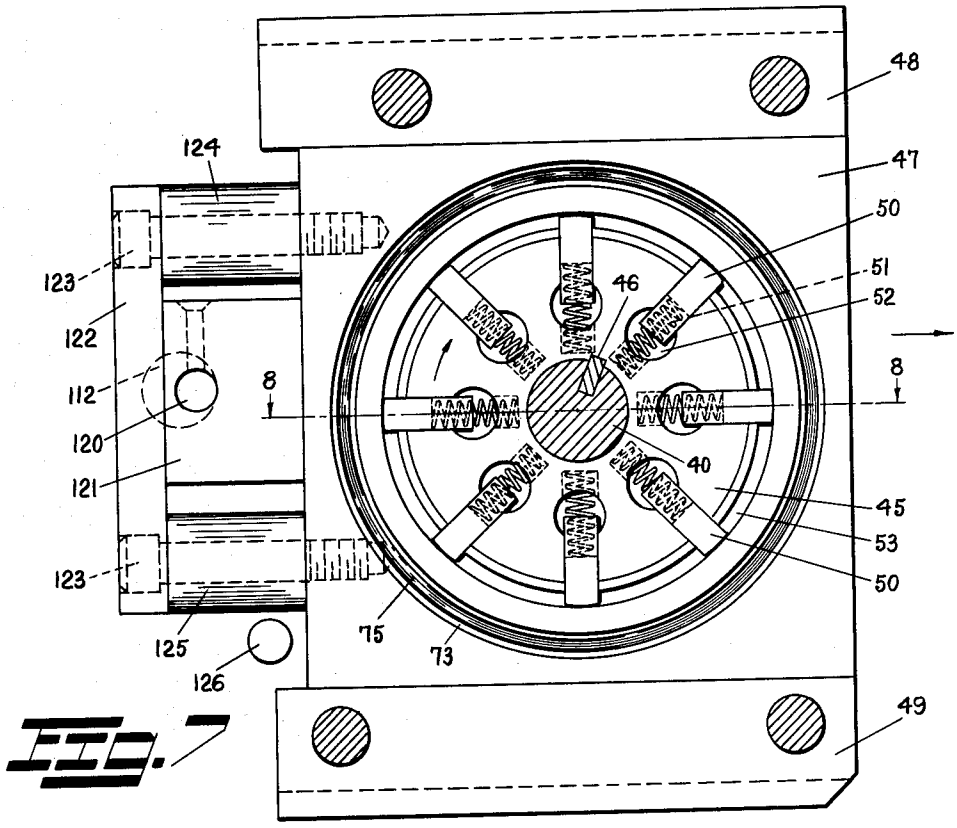


FIG. 7

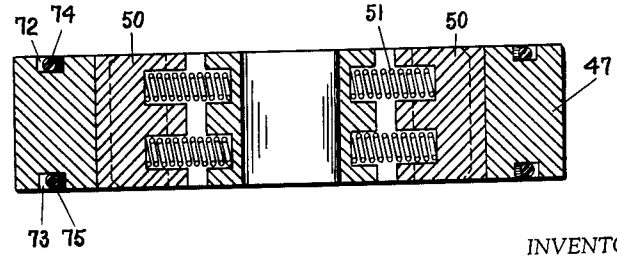


FIG. 8

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HYDRAULIC LET-OFF

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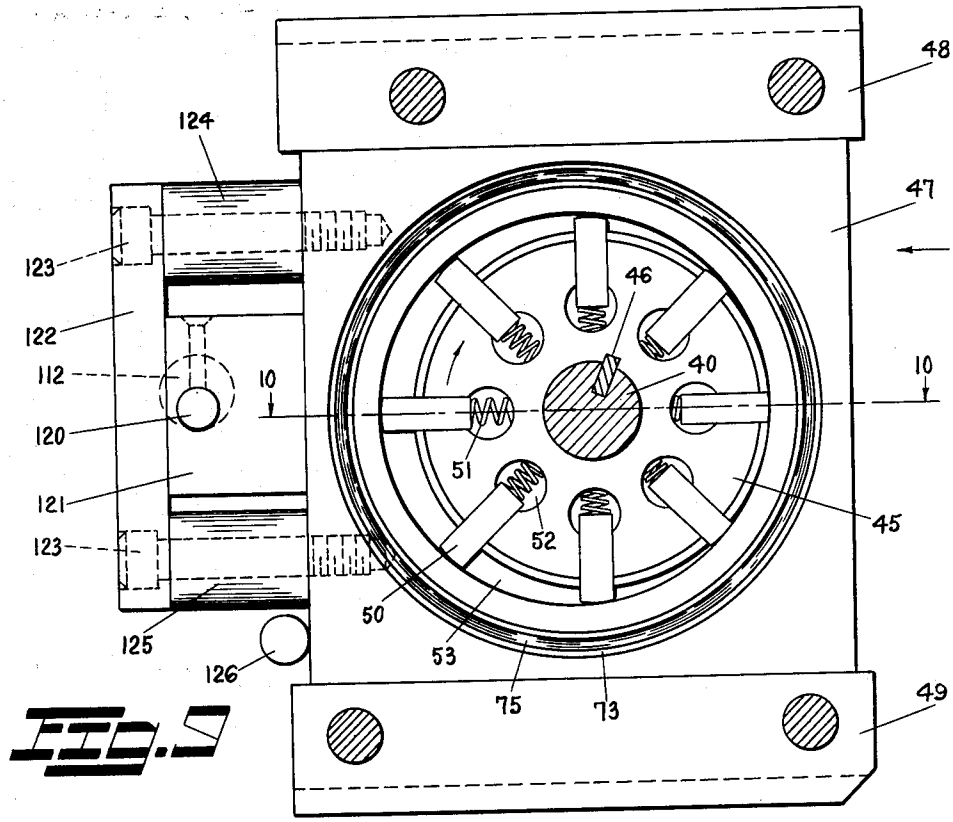


FIG. 9

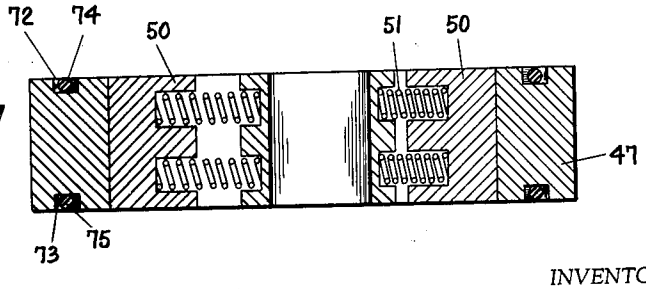


FIG. 10

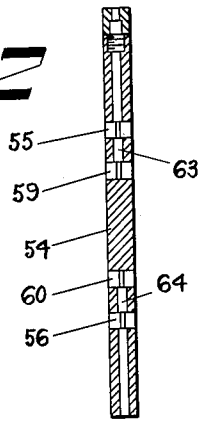
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HYDRAULIC LET-OFF

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FIG. 12



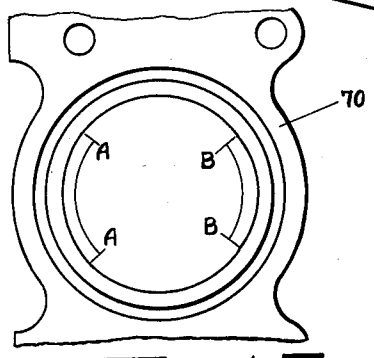


FIG. 13

FIG. 11

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United States Patent Office 3,261,375 Patented July 19, 1966

3,261,375

HYDRAULIC LET-OFF

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Filed Apr. 23, 1964, Ser. No. 362,124
11 Claims. (Cl. 139—110)

This invention pertains to let-off means for warp yarn or other yarn or threads from beams or the like in textile machines such as require the warp supply to be fed into the machine under a near constant tension and at variable predetermined rates of speed. This application is a continuation-in-part of my application Serial No. 226,890 filed September 28, 1962, now abandoned. In machines of this type, it is to be expected that fabric construction requirements and the gradual reduction in the warp yarn supply would inject changes in the letting-off pattern of such yarn supply. It is necessary, therefore, to provide means to let off yarn or thread at varying rates under substantially uniform tension and to that end, this invention is directed.

It is the general object of my invention to provide improved mechanism to let off positively the warp beam of a textile machine and maintain controlled uniform tension.

It is a further object to combine the sensitivity and stepless ratio control of hydraulic force with positive mechanical motion in a textile let-off means.

A further object is that of devising a hydraulic positive let-off by combining a vane type hydraulic pump and vane type driven motor with gearing to actuate positively a let-off motion to the rotatable warp supply.

A still further object of the invention is to devise a simple valveless hydraulic pump and motor mounted in tandem and separated by a single transfer plate containing positioned fluid ports.

A more specific object of the invention is that of providing a hydraulic let-off means which will be sensitive to variations in warp tension, as transmitted through linkage from a usual whip roll mechanism, and be capable of automatically adjusting to the required let-off rate whereby uniform tension will be maintained.

It is another object of the invention to provide control for a let-off to react immediately and sensitively to increases in warp tension which are caused by gradual exhaustion of yarn in the regular weaving or knitting process, but will be unresponsive to, and absorb without changing the let-off rate, any periodic tension variations as evidenced by fluctuations within each picking cycle.

It is another object to provide an improved let-off mechanism for continual rotation of the loom yarn beam through a hydraulic vane type pump and motor which will be driven by a revolving component of the loom in a smooth constant manner corresponding to the tension of the warp yarn at the loom whip roll.

These and other objects of the invention will become apparent as further details are disclosed.

In looms, knitting machines, and other textile equipment where warp or other threads or fabric materials are wound on one or more beams, it is desirable to release or unwind such materials at a rate in accordance with the requirements of the fabric forming or fabric finishing mechanism. These requirements may vary greatly from one type of fabric or material to another and have made manual adjustments of a time-consuming nature necessary to their operation.

To control the releasing or unwinding of such beams of materials, a let-off mechanism of either one of three types is generally employed. There are resistance type let-offs whereby the warp material is drawn off by tension while the beam is restrained through brake methods. There are also positive release let-off mechanisms which

rotate the yarn beams intermittently, generally by a ratchet and pawl arrangement, in a step by step manner. This introduces repeating cycles of uneven tensions in the warp material and may be a cause of imperfect finished goods, in that a constant, predetermined tension is not maintained. There are also positive release let-off mechanisms which rotate the yarn continuously, but these devices are of a mechanical nature and as such have an inherently limited range of let-off rates. These require changes in input speeds by time consuming and inconvenient changes in gearing combinations when a different cloth construction is required.

The instant invention discloses improvements in a positive type let-off and allows warp yarns or the like to be fed at a rate of speed equal to that of the cloth or other material being taken up while maintaining controlled yarn tension at all times. Through hydraulic drive means the beams advance in a smooth continuous motion with automatic increases in revolving speed to compensate for gradual decreases in the diameter of the supply of material on the beam. As the diameter of the yarn or the like on the beam decreases, the present invention increases the speed of rotation so that the linear quantity of material let off and the tension thereon will remain practically constant.

The extremely wide speed range of the hydraulic drive also allows the let-off to be applied to a loom weaving any normal cloth construction without the drive from the loom being tailored to suit the particular application. Similarly, major changes in cloth construction may be made without changing any gearing combinations to or without the left-off.

According to the preferred form of the invention, linkage actuated by the varying tension of the warp yarn, as it passes over the loom whip roll, controls a variable speed hydraulic drive which effects let-off action by rotating the yarn beam.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings, showing by way of example, a preferred embodiment of the inventive idea in which:

FIG. 1 is a plan view of the let-off unit separated from the loom;

FIG. 2 is a section taken on line 2—2 in FIG. 1;

FIG. 3 is a left side elevation of a portion of a loom showing the driving and driven gearing for the instant invention, and also the let-off control linkage from the loom whip roll;

FIG. 4 shows the let-off control linkage from the whip roll to the let-off housing in perspective;

FIG. 5 is a front elevation of the let-off housing;

FIG. 6 is a portion of FIG. 5 showing in detail the dashpot mechanism and the connection for the linkage means;

FIG. 7 is an elevation of the pump rotor with its circumferential enclosure in the minimum delivery position;

FIG. 8 is a section taken on line 8—8 in FIG. 7;

FIG. 9 is the same as FIG. 7 with the enclosure moved to the maximum delivery position;

FIG. 10 is a section taken on line 10—10 in FIG. 9;

FIG. 11 is an exploded view in perspective of the pump and motor mechanism showing the pump enclosure in the minimum delivery position and the motor enclosure in its fixed eccentric position;

FIG. 12 is a section taken on line 12—12 in FIG. 11; and

FIG. 13 is an elevation of a part of the motor enclosure showing those portions of the inner circumference which may formed concentric to the rotor as positioned therein.

Referring now to FIG. 3, only those parts of a loom are shown which will distinguish the proper positioning of the

invention. A loomside 20 of a loom, in this instance the left-hand side, supports one end of a shaft 21 which is adapted to rotate continually while the loom is in operation. A yarn beam is depicted by one beam head 22, and from which beam the warp yarn W is drawn upwardly over a whip roll 23 and thence forwardly of the loom in a well-known manner.

A sprocket 24 is fixed to rotated with shaft 21 and by means of a link chain 25 a further sprocket 26 transmits power to the let-off mechanism generally designated 27, which will be completely explained below. The loom shaft 21, which rotates during loom operation, is interconnected to the let-off mechanism and imparts continuous rotation thereto.

The let-off mechanism is contained within a housing 28 (FIGS. 1 and 2) which is a generally box-like case and is leakproof to contain the hydraulic fluid L necessary to the operation of the device. The top of a portion of the housing is an upwardly curved cover 29 which is tightly fastened by screws 30 and 31 or the like. A driving shaft 32 is supported horizontally by sidewalls 33 and 34 with bearings 35 and 36 and extends outwardly through the sidewall 33. A sprocket 37 is keyed to the outward end of the shaft 32 where it is continuously driven by the chain 25.

Within the housing 28 a crossed helical gear 38 is keyed to the shaft 32 and is in mesh with a similar gear 39 which is keyed to a secondary driving shaft 40 positioned below and perpendicular to the shaft 32 (FIG. 2). A pump plate 41 with a rearwardly extending arm 42 (FIG. 1) supports the secondary driving shaft 40 with bearings 43 and 44 (FIG. 2).

A rotor 45 is secured to the end of the shaft 40 by a key 46 and will be in continuous rotation while the loom is in operation. The rotor 45 is encompassed by a circumferential enclosure 47 which is adapted to slide between an upper gib 48 and a lower gib 49 in a manner to be further explained (FIG. 7). A plurality of vanes 50 are inserted into and extend outwardly from radial slots in the rotor 45. In the present instance eight vanes are considered suitable, but this number is not necessarily specific. Each vane 50 is urged outwardly by two compression springs 51 to keep them in contact with the inner surface of the enclosure 47. Fluid passages 52 which extend through the rotor 45 are in a circular arrangement so that a passage is at the base of each vane 50 for the purpose of furnishing fluid under pressure to coact with the springs 51 (FIG. 7).

The diameter of the enclosure 47 is sufficient to form a chamber 53 between the inner surface of the enclosure and the rotor. To change the configuration of the chamber 53, the enclosure 47 is horizontally slidable from the position in FIG. 7 to that shown in FIG. 9. It will be seen that when a fluid is furnished to the device, as will be explained, when in the position of FIG. 7, a minimum action would occur, but in that position of FIG. 9 the full pump delivery is made. Between the two positions shown innumerable pumping rates are possible and only slight movement of the enclosure 47 toward or away from concentricity with the rotor 45 will vary the delivery rate in either direction.

The pump plate 41 closely abuts the rotor 45 and enclosure 47 on one side, while a separating plate 54 abuts on the other side (FIGS. 2 and 11). The plate 54 has on both sides an upper recess 55 and a lower recess 56. Both are in the form of a curve to match that of the chamber 53 which they abut. Upper openings 57 and lower openings 58 are drilled completely through the plate 54 within the recesses to communicate with the chamber 53 in order that hydraulic fluid may be passed through under pressure. Between the recesses 55 and 56 are two further curved recesses 59 and 60 which are also on opposing sides of the plate 54 and are adjacent to the fluid passages 52 in the rotor 45. Openings 61 and 62 communicate through the plate 54 to the fluid passages 52. A fluid duct 63 extends internally of the plate 54 to connect the recesses 55 and 59 (FIG. 12) and a further duct 64 connects recesses 56 and 60. These ducts allow the fluid pressure to be equalized within the upper and lower pairs of recesses. Feed grooves 65 are vertically positioned in the opposing sides of the plate 54 to serve as supply and return grooves for the fluid (FIG. 11).

The operation of the hydraulic pump or driving means of the let-off will be made by reference to FIGS. 9 and 11. The rotor 45 is in continuous rotation in a clockwise direction as viewed in FIG. 9, and with the vanes continually extended into contact with the enclosure 47, pumping action will occur when the enclosure 47 is moved to any degree eccentric with the rotor 45. Fluid is made accessible through the groove 65 to the chamber 53 and will be raised by the vanes 50 and forced through the upper openings 57. The rate of flow through the upper openings, it will be seen, is readily controllable by minute variations in the eccentricity of the enclosure 47 with the rotor 45.

Plate 54 interposes the driving means, just explained, and a driven means which is in effect a hydraulic motor driven by the fluid forced through the upper openings 57. The driven rotor 66 (FIG. 11) is exactly the same as the driving rotor and is keyed to a shaft 67. Vanes 68 are urged outwardly from slots in the rotor 66 by springs (not shown) which are similar to those in the rotor 45 and by the pressure of fluid in fluid passages 69. A circumferential enclosure 70 encompasses the rotor 66 and is in constant contact with each vane 68 as it rotates. The enclosure 70 is spaced from the rotor 66 to form a chamber 71 therebetween.

When the mechanism is assembled, the enclosure 70 is fastened in a fully eccentric relationship with the rotor 66 as shown in FIG. 11 with the enclosure moved toward the left. It is advantageous to the operation of the device to have two opposing arcs A—A and B—B of the enclosure 70 (FIG. 13) machined concentric with the rotor 66 as it will be when positioned within the enclosure. The two arcs are diametrically positioned and extend generally equally above and below the horizontal center line of the enclosure.

Encircling the pump enclosure 47 (FIGS. 7 and 8) are two opposing grooves 72 and 73 to contain oil seals 74 and 75. Similar grooves and oil seals are a part of the enclosure 70.

An inner vertical wall 76 completes the enclosure of the motor rotor 66 and also supports the complete pump and motor combination (FIG. 2). The pump plate 41, enclosure 47, separating plate 54, and enclosure 70 are bolted to the vertical wall 76 by four bolts 77.

The shaft 67 is rotatably held in bearings 78 and 79 which are supported by wall 76 and the housing 28, respectively. A worm gear 80 is secured to the shaft 67 within the housing 28 and rotates a worm wheel 81 keyed to a secondary driven shaft 82. The rotation of the shaft 82, which extends through the housing 28, controls the letting off of yarn from the yarn beam 22 by rotating a gear 83 meshed with the beam (FIG. 3). Integrally formed with the housing 28 is a supporting bracket 84 for fastening the complete let-off housing 27 to he loomside 20. It will be seen that the shaft 82 and therefore the loom yarn beam to which it is geared will be directly and positively driven by the varying speed of the driven rotor 66.

In operation, the fluid will be forced through the upper openings 57, as has been explained, and enter the chamber 71 where the increase in pressure will rotate the rotor 66 in a counterclockwise direction as viewed in FIG. 11. As each vane passes below a horizontal position, the fluid is returned through the lower openings 58 and groove 65 to the fluid supply L in the lower portion of the housing 28 (FIG. 2.) The fluid ducts 63 and 64 transmit the fluid to both ends of each vane 50 and 68 under equalized pressure during each rotation. In the

motor enclosure 70, by having two arcs concentric with the rotor, the vanes 68 will not be moved radially during that time when the fluid pressure causing rotation is the greatest. This eliminates any tendency toward binding and allows the rotor to move freely.

Referring to FIG. 3, whip roll 23 oscillates in a generally vertical arc on a bracket 85 fixed to a stud 86 of a clock spring mechanism 87 on either side of the loom. The spring 87 through presetting urges the whip roll 23 upward, while tension built up by the warp threads W will tend to overcome the spring action and force the whip roll 23 downward which will turn the stud 86 in a counterclockwise direction. A lever 88 is secured to the stud 86 and will respond to any rotation thereof, as caused by oscillation of the whip roll 23. A slotted bar 89 is pivotally secured to the end of the lever 88 by a bolt 90 and extends downward between two friction plates 91 and 92 (FIG. 4). The friction plates are adjustably held together by bolts 93 and 94 which have been inserted into compression springs 95 and 96. The lower ends of friction plates 91 and 92 are fixed securely by a bolt 129 and to a stationary bracket 130 attached to the loom. This friction type damper is intended to absorb the peaks and valleys of the oscillating pattern of the whip roll that are caused by the intermittent tension changes. The intermittent changes are not indicative of an increase in warp yarn requirements and can be disregarded by the let-off mechanism.

Pivotally attached near the outer end of the lever 88 a ball type end 97 is connected to a spring supported linkage comprising a top frame member 98 and lock nut 99 for lineal adjustment, and two side frame members 100 and 101 which are held in substantially parallel relationship by two round collars 102 and 103 (FIG. 4). Slidably inserted through the two round collars, a connecting rod 104 is encircled by two compression springs 105 and 106. A round separating member 107 is securely fixed to rod 104 substantially equidistant from collars 102 and 103. Each of the springs is compressed between its collar and the separating member to allow vertical motion of frame members 100 and 101 and subsequent motion to the rod 104 when the springs exert sufficient pressure. The lower end of the rod 104 is connected to a further ball type end 108 by a lock nut 109.

End 108 is pivotally fastened through one of several adjusting holes of a lever 110 by a bolt 111. The other end of the lever 110 is keyed to a control shaft 112 which is supported at its outward end by a bearing 113 through the side wall of the housing 28 and near its inward end by a bracket 114 which is fastened securely to housing 28 to support the shaft 112.

Keyed to a central portion of the shaft 112 within the housing 28, a lever 115 with an outwardly extending bifurcated end connected by a pin 116 supports and actuates a link member 117 which is further connected by a pin 118 to a piston 119 (FIGS. 4 and 6). The piston is the active portion of a dashpot mechanism and moves within a cylinder 120 which is closed at its base by a plug 121 (FIG. 6).

Most looms and other textile machinery which supply a plurality of warp threads to a fabricating instrumentality generally pass those threads over a whip roll or other tension bars in their passage from the yarn beam to the point of use. Machines of this type follow a cycle pattern, and within each cycle the yarn is subjected intermittently to high and low tension values which are not permanent to the let-off procedure. These variations in tension which are not permanent are taken up and absorbed in the rod 104 and compression springs 105 and 106 by the restraining action of the dashpot piston 119, which will not rise or descend under sudden forces so that control shaft 112 will not rotate.

There are, however, two causes of warp tension which are of a more permanent nature. First is the possibility of changes of the material construction where more or less linear quantity of warp is required within each cycle, and the second, which has in the past been more difficult to control, is that gradual change caused by the decreasing diameter of the warp supply which necessitates increasing the unwinding speed.

The tension value of these two more permanent forces will lie as a mean between the high and low oscillations of the whip roll or tension bar. Thus, as the mean tension tends to increase, the means position of the lever 88 descends forcing the rod 104 to turn the lever 110 downward, and the gradual pressure will raise the dashpot piston 119 and rotate the shaft 112 sufficiently to increase the let-off speed as will be explained below.

Now referring to FIG. 11, shaft 112 is shown with its inner end turned down substantially to half size and in a complete eccentric position as at 120. This eccentric end is turnably inserted into a hole in a sliding block 121 held adjacent to the left side of enclosure 47 by a cap member 122 which is securely fastened to enclosure 47 by screws 123 through two hollow spacers 124 and 125.

Shaft 112 is therefore a part of the linkage means to control displacement of the pump enclosure 47 and, including the linkage back to the warp threads over the whip roll, is a means to vary selectively the relative positions of the pump enclosure. As the shaft 112 is adapted to rotate only one-quarter of a turn, it will be seen that by so doing, the pump enclosure 47 will be drawn to the left as in FIG. 11 by the action of the block 121 sliding downward and to the left. The horizontal movement of the pump enclosure 47 is limited by stop pin 126 as seen in FIGS. 7 and 9.

Moving the pump enclosure 47 to that position shown in FIG. 9 will change its relationship to the pump rotor 45 from a concentric or minimum delivery position to a full eccentric or full pumping position. Control of let-off speeds is maintained between these two points to include requirements for all yarn beam diameters from full to empty and will cover a wide range of fabric constructions in respect to the number of picks per linear inch of warp yarn.

The fact that let-off speeds are controlled automatically in compensating for the gradual variation tendency will produce more uniform material than that where tensions vary greatly and must be adjusted manually.

It is occasionally desirable to release the warp tension and to let off a quantity of yarn and to later rewind it upon the beam as a means for machine repair or for some other reason. This may be accomplished by use of a hand wheel 127 fastened to the outer end of the shaft 67 (FIGS. 1 and 2). By manually depressing a pressure release valve 128, the hydraulic fluid is directed upward through the plate 54 into the upper portion of the housing 28 and the hand wheel 127 is freed to rotate in a reverse direction. The hand wheel may be manually rotated to let-off yarn, but if an attempt is made to tighten the warp by turning the hand wheel backwards, fluid pressure would make this difficult unless relieved by a release valve 128.

To explain the operation briefly, assume a loom is arranged to weave a construction which requires a given quantity of warp yarn for each pick of filling inserted. Refer to FIGS. 1 and 2; a continually running, constant speed shaft will drive the sprocket 37 which in turn rotates by means of shafts and gearing a pump rotor 45. This rotor revolves at a constant rate as determined by the loom speed. A pump enclosure 47 surrounds the rotor radially and is free to be moved in a horizontal plane to change from a concentric to an eccentric position in respect to the rotor. Spring biased vanes 50 follow the periphery of the surrounding enclosure to raise the hydraulic fluid which has been drawn by pumping action into the chamber 53.

Refer to FIG. 9 where the pump enclosure is shown at the greatest eccentric position. Fluid transported from

the lower portion of the chamber **53** is forced by the diminishing chamber through the upper holes **57** of the plate **54**. The fluid under pressure is received into a further chamber **71** (FIG. 11) where a similar rotor is fixedly eccentric to the motor enclosure **70**. Due to the eccentricity, a larger vane area will be presented to the fluid in a counterclockwise direction and the motor rotor **66** will so turn.

It will be seen that as the eccentricity between the pump rotor **45** and the pump enclosure **47** increases or decreases, so will the speed of rotation of the motor rotor **66** also increase or decrease.

To review now the operation of the means to control the relative position of the pump enclosure, refer to FIGS. 3 and 4. The warp threads are passed with a predetermined tension over a whip roll **23** which is spring biased upward by clock type springs. The amount of tension on the warp threads will determine the mean position of the whip roll which is free to oscillate vertically with fluctuations in tension during each picking cycle. High and low tension values occur within each picking cycle and are not pertinent to lef-off procedure, so they are absorbed within the friction damping lever **89** and the spring linkage on the shaft **104** which by connection to the whip roll fulcrum **86** react with the oscillations of the whip roll. In FIG. 4 it is shown that the spring shaft is connected by levers to a dashpot mechanism which has a damping effect on the fluctuations of the spring shaft.

However, as the warp tension tends to vary between successive pick cycles due to causes inherent in the weaving process such as variations in the rate of warp consumed or reduction in diameter of the warp supply, the high and low positions of the whip roll will ascend or descend, causing a similar change in the mean position. This change acting through the linkage to the lever **110** will rotate the control shaft **112** (FIG. 4) and thus by rotation of the eccentric **120** on the end of the shaft **112** will control the eccentricity of the pump enclosure and therefore the pump delivery.

For instance, as the volume of warp supply diminishes and need for delivery speed is increased, the mean whip roll position will descend thus rotating the shaft **112** and causing the eccentric end on the shaft to move downward and to the left (FIG. 11), forcing the pump enclosure to further eccentricity and increasing the pump delivery.

Conversely, if the warp tension should decrease, the mean whip roll position would rise and cause the lever **110** to rise which would rotate the shaft **112** and cause the eccentric end **120** to move upward and to the right, thus reducing the pump enclosure eccentricity and reducing the pump delivery.

Refer again to FIG. 2 where the rotor **66**, which is rotated at variable speeds, will turn the shaft **67** and through worm gears also turn the shaft **82** which is keyed to a yarn beam gear for direct control of the let-off speed.

In the embodiment disclosed the hydraulic fluid serves also to lubricate the gears within the let-off housing. The fluid level, as shown at L, should be sufficiently high to immerse partially the gears **39** and **80** as shown in FIG. 2.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor, a plurality of vanes extending from said rotor, spring means to engage each of said vanes with said enclosure, fluid passages in said rotor to coact with said springs to urge each of said vanes into engagement with said enclosure, means controllable from the warp tension of the loom for varying the relative positions of said enclosure and said first rotor, means for effecting continuous rotation of said first rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plurality of vanes extending from said second rotor, spring means, and fluid passages in said second rotor to coact with said spring means to engage said vanes with said further enclosure, means interposing said first and second rotors having openings communicating with said fluid passages in said first and second rotors, and means connected to said second rotor and adapted to let off yarn from the loom yarn beam.

2. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor, a plurality of vanes extending from said rotor, spring means to engage each of said vanes with said enclosure, fluid passages in said rotor to coact with said springs to urge each of said vanes into engagement with said enclosure, means controllable from the warp tension of the loom for varying the relative positions of said enclosure and said first rotor, means for effecting continuous rotation of said first rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plurality of vanes extending from said second rotor, spring means, and fluid passages in said second rotor to coact with said spring means to engage said vanes with said further enclosure, a plate member interposed between said first and second rotors, said plate member having openings therein adapted to communicate with said chambers, said openings being disposed in recesses in said plate member, said plate member having further openings therein adapted to communicate with said fluid passages, said further openings being disposed in further recesses in said plate member, fluid ducts connecting said recesses with said further recesses, and means connected to said second rotor and adapted to let off yarn from the loom yarn beam.

3. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor, a plurality of vanes extending from said rotor and adapted to be engaged with said enclosure, means controllable from the warp tension of the loom for varying the relative positions of said enclosure and said rotor, means for effecting continuous rotation of said first rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plurality of vanes extending from said second rotor and adapted to be engaged with said further enclosure, said further enclosure being secured in eccentric relationship with said second rotor, at least one portion of said further circumferential enclosure defining an arc concentric with said second rotor, and means connected to said second rotor and adapted to let off yarn from the loom yarn beam.

4. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor

and in spaced relation therewith to define a chamber between said enclosure and said rotor, a plurality of vanes extending from said rotor, spring means to engage each of said vanes with said enclosure, fluid passages in said rotor to coact with said springs to urge each of said vanes into engagement with said enclosure, means controllable from the warp tension of the loom for varying the relative positions of said enclosure and said first rotor, means effecting continuous rotation of said first rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plurality of vanes extending from said second rotor, spring means, and fluid passages in said second rotor to coact with said spring means to engage said vanes with said further enclosure, said further enclosure being secured in eccentric relationship with said second rotor, at least one portion of said further circumferential enclosure defining an arc concentric with said second rotor, a plate member interposed between said first and second rotors, said plate member having openings therein adapted to communicate with said chambers, said openings being disposed in recesses in said plate member, said plate member having further openings therein adapted to communicate with said fluid passages, said further openings being disposed in further recesses in said plate member, fluid ducts connecting said recesses with said further recesses, and means connected to said second rotor and adapted to let off yarn from the loom yarn beam.

5. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor, linkage means controllable from the warp tension to control displacement of said enclosure and to vary selectively the relative positions of said enclosure and said rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plate member interposed between said first and second rotors, said plate member having recessed openings therein adapted to communicate between said chamber and said further chamber, means connected to said second rotor being adapted to let off yarn from the loom yarn beam, and reversing means for rotating said second rotor reversely for winding up yarn on the loom yarn beam, said reversing means including manual rotating means and fluid pressure release means.

6. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor, a plurality of vanes extending from said rotor, spring means to engage each of said vanes with said enclosure, fluid passages in said rotor to coact with said springs to urge each of said vanes into engagement with said enclosure, means controllable from the warp tension of the loom for varying the relative positions of said enclosure and said first rotor, means for effecting continuous rotation of said first rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plurality of vanes extending from said second rotor, spring means, and fluid passages in said second rotor to coact with said spring means to engage said vanes with said further enclosure, a plate member interposed between said first and second rotors, said plate member having openings therein adapted to communicate with said chambers, said openings being disposed in recesses in said plate member, said plate member having further openings therein adapted to communicate with said fluid passages, said further openings being disposed in further recesses in said plate member, fluid ducts connecting said recesses with said further recesses, means connected to said second rotor being adapted to let off yarn from the loom yarn beam, and reversing means for rotating said second rotor reversely for winding up yarn on the loom yarn beam, said reversing means including manual rotating means and pressure release means.

7. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor, a plurality of vanes extending from said rotor, spring means to engage each of said vanes with said enclosure, fluid passages in said rotor to coact with said springs to urge each of said vanes into engagement with said enclosure, a spring supported linkage means controllable from the warp tension, a dashpot mechanism within said linkage means to control displacement of said enclosure and to vary selectively the relative positions of said enclosure and said rotor, means effecting continuous rotation of said first rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plurality of vanes extending from said second rotor, spring means, and fluid passages in said second rotor to coact with said spring means to engage said vanes with said further enclosure, said further enclosure being secured in eccentric relationship with said second rotor, at least one portion of said further circumferential enclosure defining an arc concentric with said second rotor, a plate member interposing said first and second rotors, said plate member having openings therein adapted to communicate with said chambers, said openings being disposed in recesses in said plate member, said plate member having further openings therein adapted to communicate with said fluid passages, said further openings being disposed in further recesses in said plate member, fluid ducts connecting said recesses with said further recesses, means connected to said second rotor being adapted to let off yarn from the loom yarn beam, and reversing means for rotating said second rotor reversely for winding up yarn on the loom yarn beam, said reversing means including manual rotating means and pressure release means.

8. In a let-off for a loom, a housing, a driving means including a first rotor in one portion of said housing, a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor, a plurality of vanes extending from said rotor, spring means to engage each of said vanes with said enclosure, fluid passages in said rotor to coact with said springs to urge each of said vanes into engagement with said enclosure, means controllable from the warp tension of the loom for varying the relative positions of said enclosure and said first rotor, means for effecting continuous rotation of said first rotor, a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor, a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween, a plurality of vanes extending from said second rotor, spring means, and fluid passages in said second rotor to coact with said spring means to engage said vanes with said further enclosure, a plate member being interposed between said first and second rotors, said plate member having openings therein adapted to com-

municate with said chambers, said plate member having further openings therein adapted to communicate with said fluid passages in said first rotor and said fluid passages in said second rotor, and means connected to said second rotor and adapted to let off yarn from the loom yarn beam.

9. The mechanism as defined in claim **8** wherein said openings include a plurality of upper openings and a plurality of lower openings, and said further openings include a further plurality of upper openings and a further plurality of lower openings.

10. The mechanism as defined in claim **8** wherein said openings are disposed in recesses in said plate member and said further openings are disposed in further recesses in said plate member.

11. In a let-off for a loom the combination of:

(a) a housing,

(b) a driving means including a first rotor in one portion of said housing,

(c) a circumferential enclosure encompassing said first rotor and in spaced relation therewith to define a chamber between said enclosure and said rotor,

(d) a plurality of vanes extending from said rotor,

(e) fluid passages in said rotor for urging said vanes into engagement with said enclosure,

(f) linkage means controllable from the warp tension to control displacement of said enclosure and to vary selectively to relative positions of said enclosure and said rotor,

(g) a driven means including a second rotor in another portion of said housing, said second rotor being mounted in opposed relation to said first rotor,

(h) a further circumferential enclosure encompassing said second rotor and in spaced relation thereto to define a further chamber therebetween,

(i) a plurality of vanes extending from said second rotor,

(j) fluid passages in said second rotor for urging said vanes into engagement with said further enclosure,

(k) means interposing said first and second rotors having openings communicating with said fluid passages in said first and second rotors, and

(l) means connected to said second rotor and adapted to let off yarn from the loom yarn beam.

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