March 9, 1943. N. L. ETTEN 2,313,134

DIMINISHING PRESSURE WRINGER

Filed March 25, 1940 5 Sheets-Sheet 1

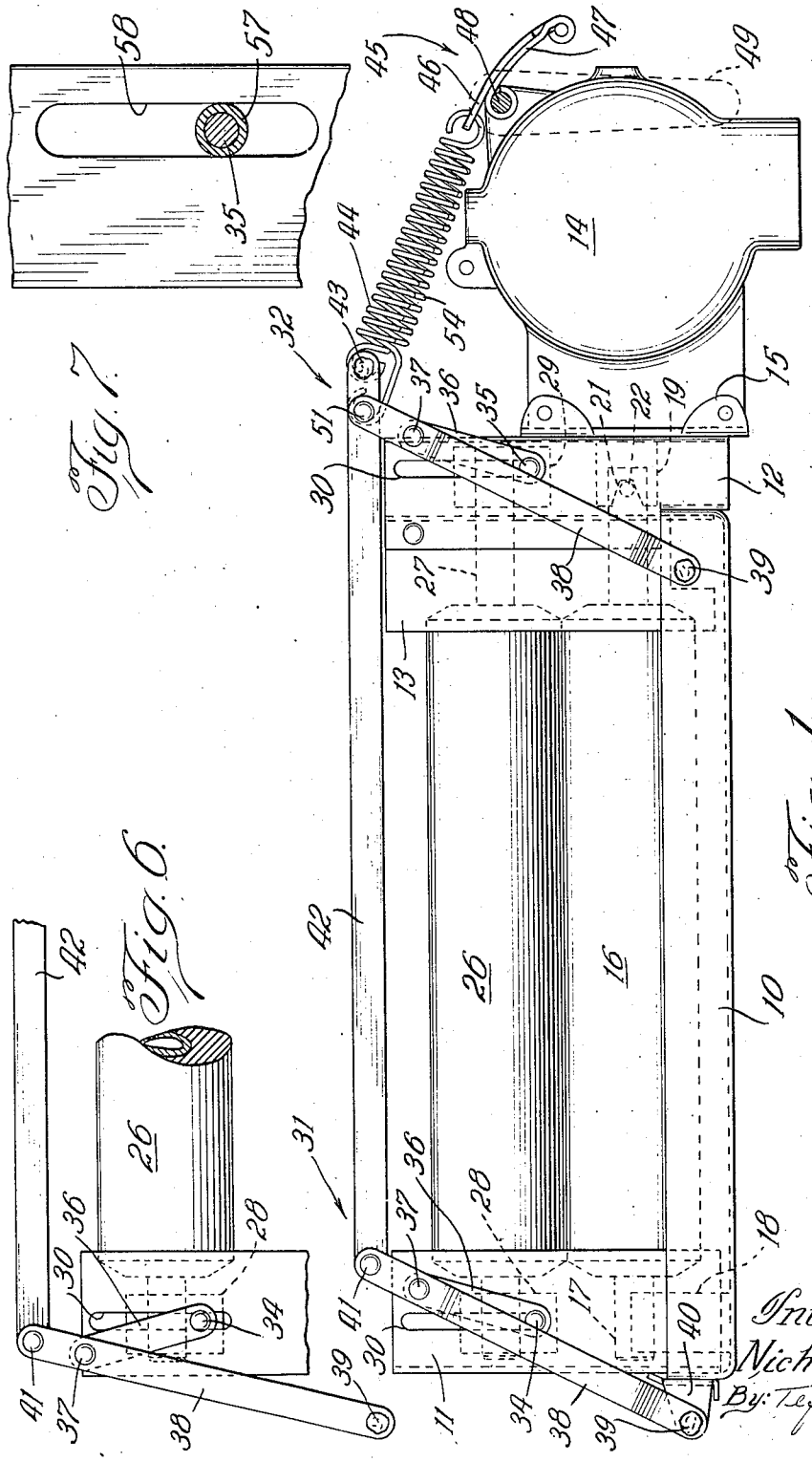


Fig. 7.

Fig. 6.

Fig. 1.

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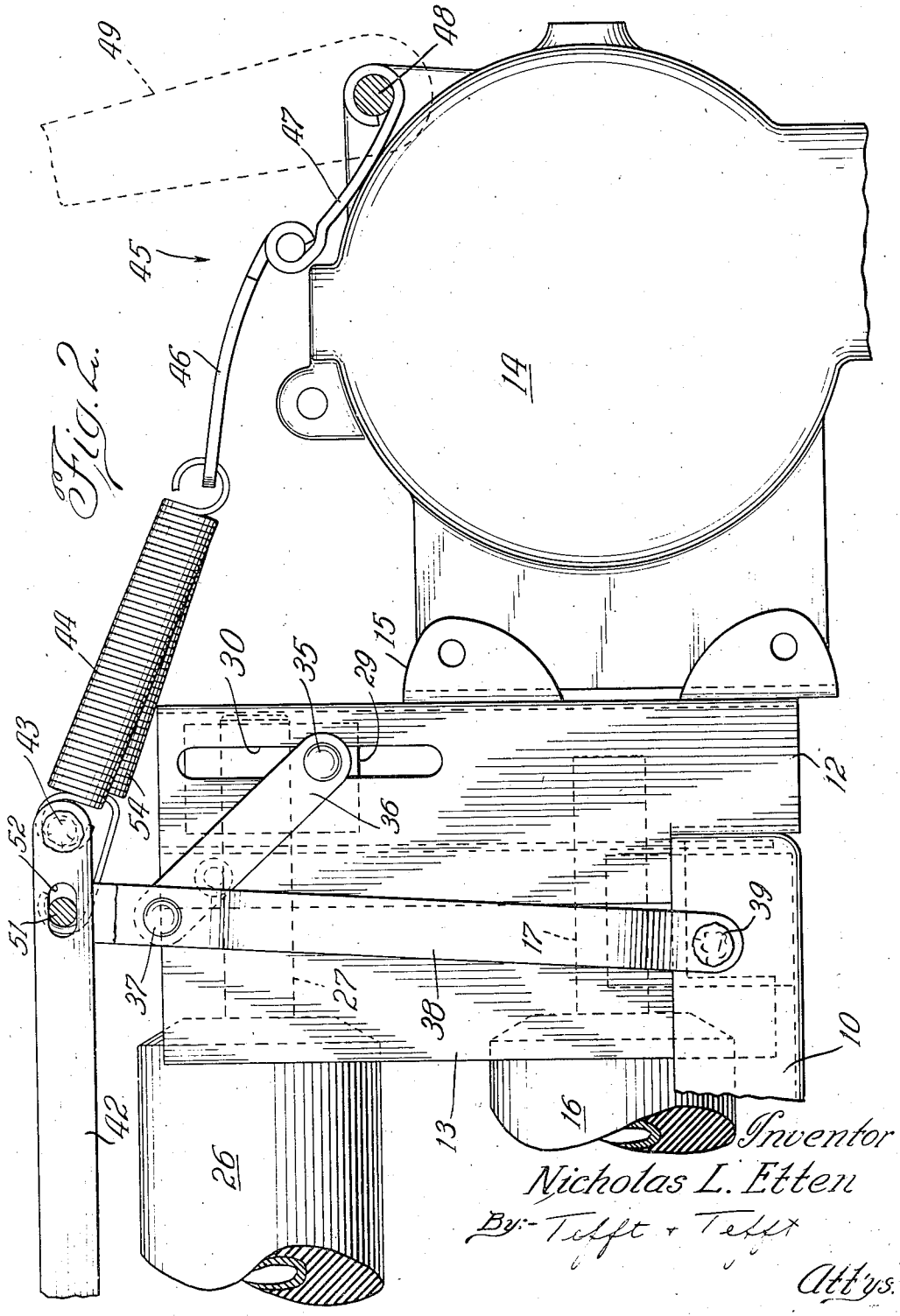


Fig. 2.

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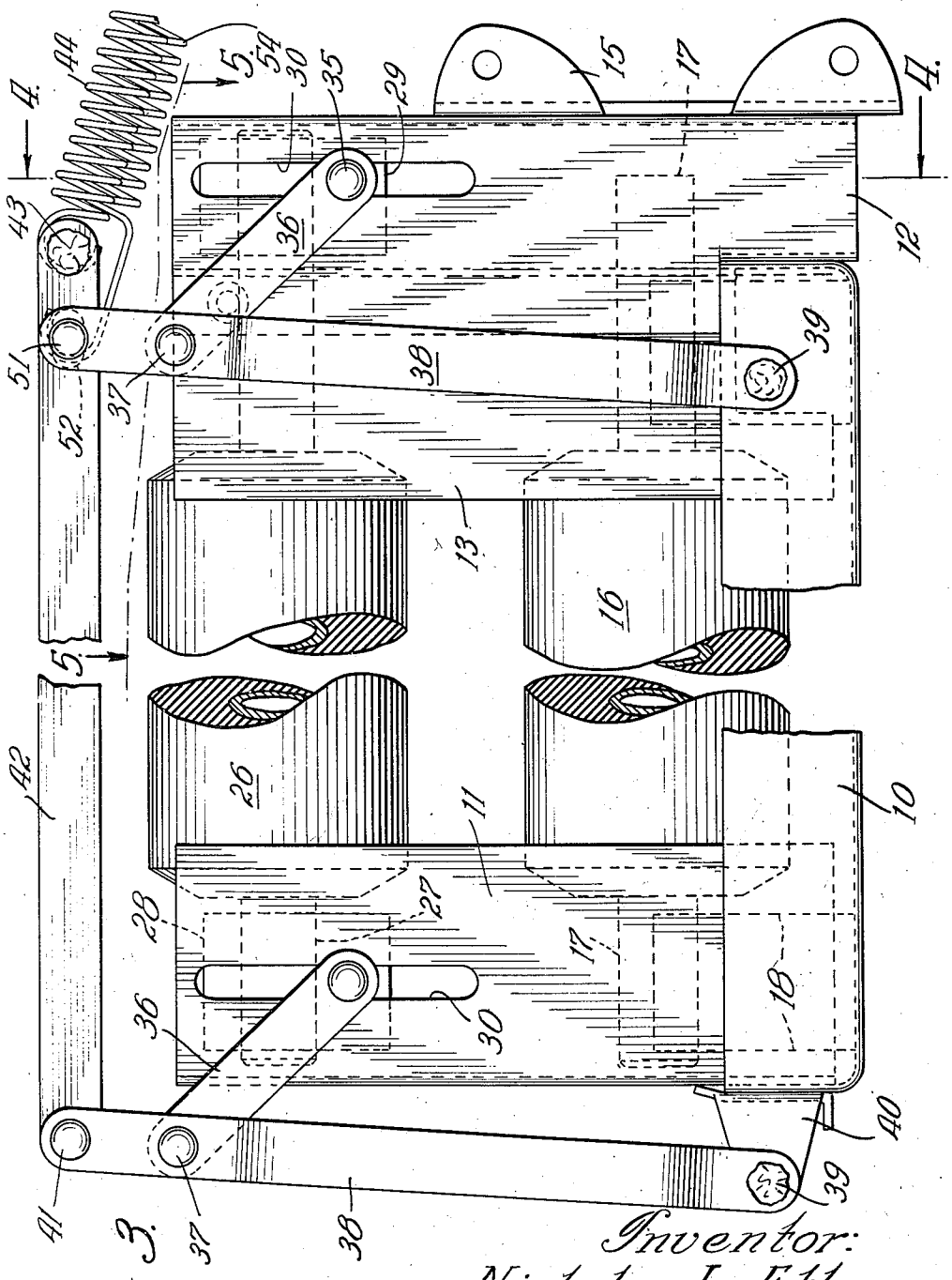


Fig. 3.

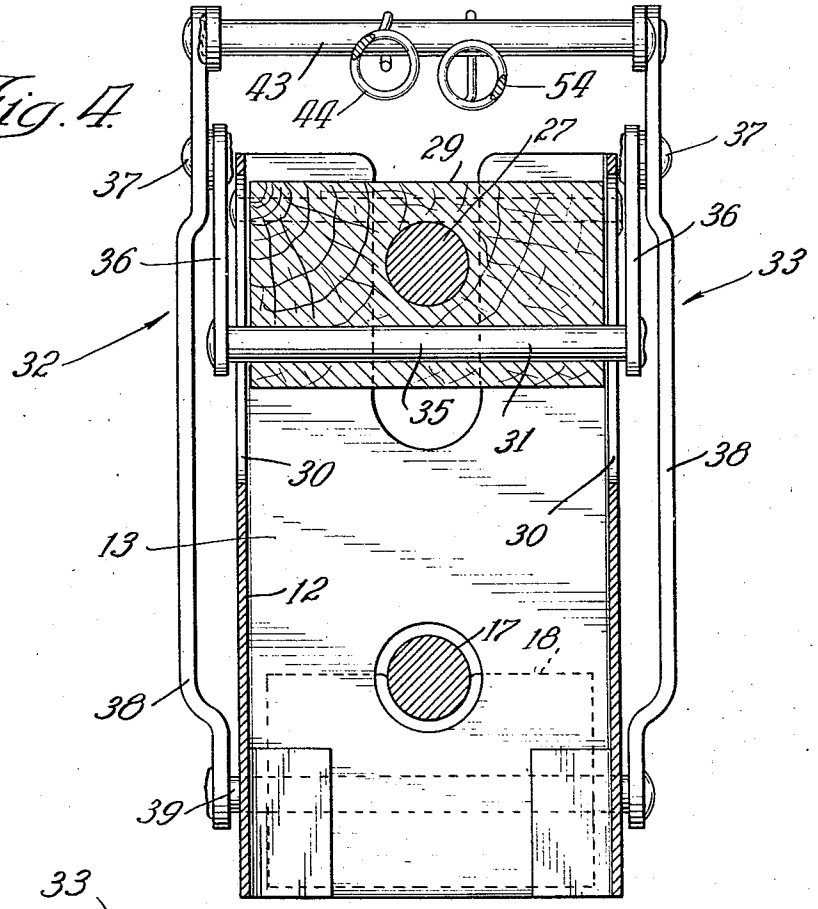
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DIMINISHING PRESSURE WRINGER

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Fig. 4.



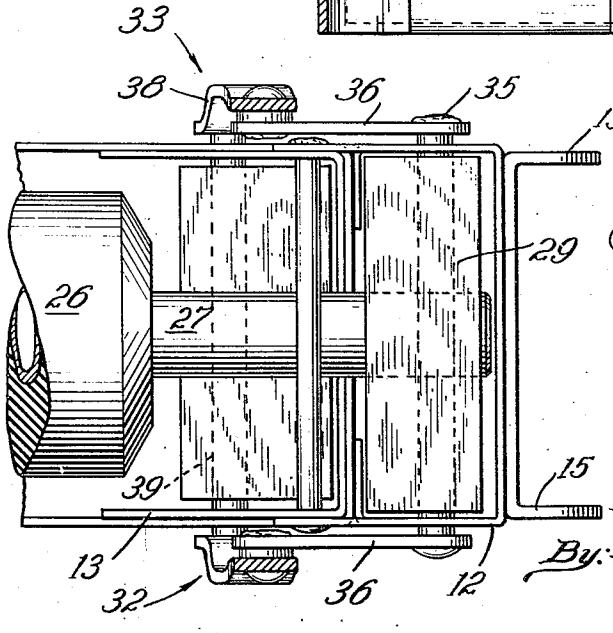


Fig. 5.

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Fig. 8.

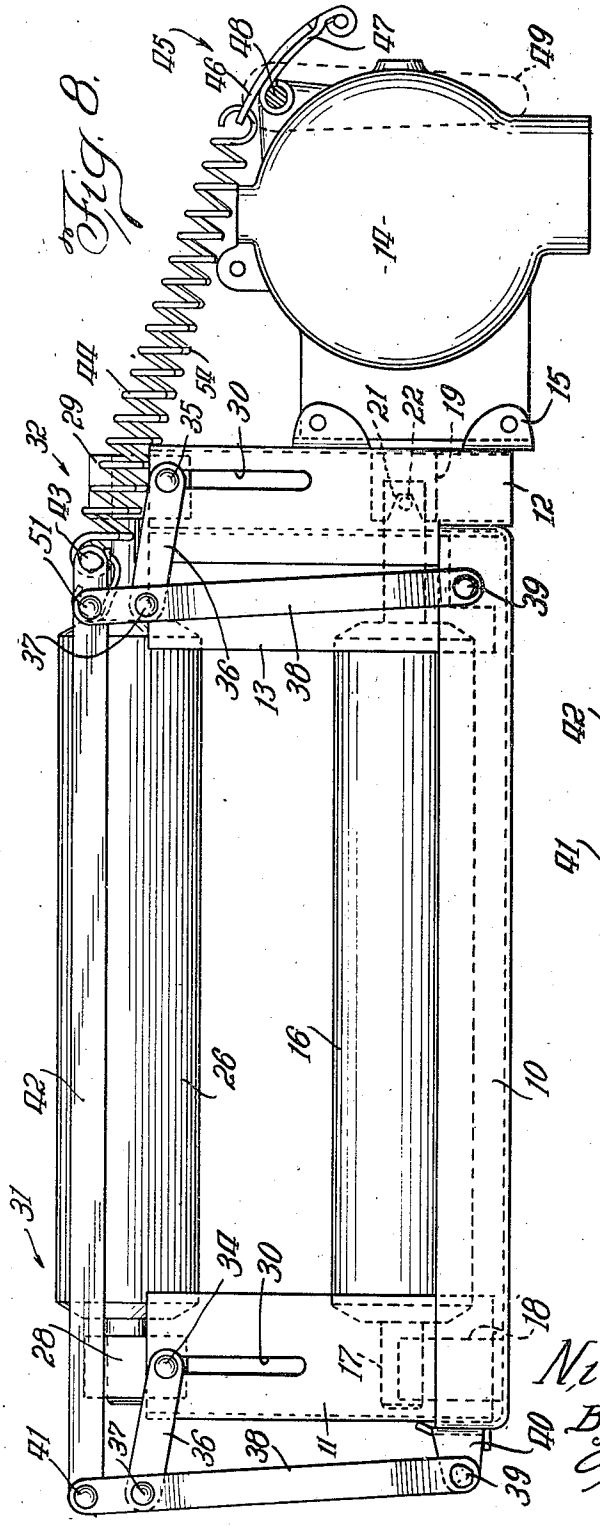
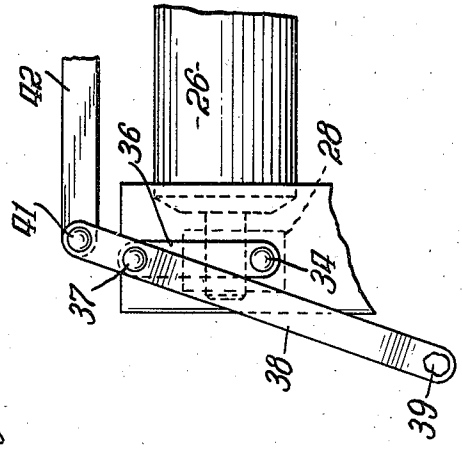


Fig. 9.



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Patented Mar. 9, 1943

2,313,134

UNITED STATES PATENT OFFICE

2,313,134

DIMINISHING PRESSURE WRINGER

Nicholas L. Etten, Waterloo, Iowa

Application March 25, 1940, Serial No. 325,757

10 Claims. (Cl. 68—262)

This invention relates to clothes wringers of the type commonly designated as constant pressure wringers and refers more particularly to a wringer in which the rolls are adapted to work under substantially constant pressure during the normal operation of the machine and to exert a greatly diminished pressure in the event that the rolls are forced apart an abnormal distance.

In the prior art numerous structures have been devised intended to provide a wringer in which the pressure between the rolls would not rise to great extremes in the event that the rolls are forced apart a distance greater than required for normal operation. The aim of each of these structures has, of course, been to provide a wringer of inherently safe design which would not cause extremely serious injuries in the case of accidents, as for example, in case the operator should allow her arm to become caught between the rolls. In certain of the prior art structures known to the applicant, wringer rolls have been journaled in bearing blocks mounted in slideways and inter-connected to pressure springs by means of toggle joints, but these structures have proved to be operable in theory only and entirely impractical from a commercial point of view, for two reasons.

First, the toggle linkages heretofore used have been of such design and dimensions as to extend from the bearing block at a relatively large angle with respect to the direction of movement of the roll and with respect to the walls of the bearing slideway. When it is appreciated that the rolls in modern wringers operate under pressures of several hundred pounds, it will be seen that to develop such pressures by the application of forces acting at a large angle with respect to the slideways will result in forcing the bearing blocks against the side walls of the bearing slideway under such terrific pressure as to practically lock the bearing in the slideway and positively prevent any further separation of the rolls. In this connection it should be pointed out that although a linkage may be satisfactory when stationary, in conditions encountered in actual practice the links are not at rest, but are being moved by the wedging action of goods of increasing thickness passing between the rolls, and thus when this locking action of the bearings takes place, the progressive rotation of the rolls will result in an extreme wedging action easily capable of crushing flesh and bone and causing serious injury to the operator. Secondly, the prior art structures have been objectionable in that the linkage has been of necessity arranged above the movable roll with the result that the wringer structure itself must be of comparatively great height and therefore awkward and unattractive.

It is, therefore, the principal object of this invention to provide a wringer having pressure control members including links extending substantially parallel to the direction of the wringer bearings in order to apply pressure to the wringer roll with a minimum of side thrust on the bearings.

A further object of the invention is to provide a pressure control mechanism wherein the pressure link is adapted to swing through an arc extending on both sides of the line of thrust of the roll bearings in such a manner that when the wringer is operating on goods of normal thickness, the link may lie in exact parallel alignment to the line of thrust and thus reduce any friction due to incidental side thrust to absolute zero.

A further object of the invention is to provide a pressure control mechanism comprising an acute angled toggle linkage including a long arm mounted on a stationary pivot and a short arm pivoted to the long arm and operatively connected with the wringer roll.

A further object of the invention is to provide a pressure control mechanism at each end of the wringer rolls of such design that the wringer rolls may move apart in non-parallel spaced relationship, such that the angularly divergent rolls may accomplish a more complete wringing action on materials of non-uniform cross section.

Another important object of the invention is to provide a diminishing pressure wringer adapted for non-parallel separation of the rolls with lost motion connections to limit the angular divergence between the fixed roll and the movable roll.

Another important advantage of the invention is to provide a diminishing pressure device arranged to lie within the area of space defined by the dimensions of the wringer rolls themselves to the end that a wringer may be equipped therewith without material increase of the heighth or length of the wringer structure.

Other objects will appear hereinafter.

Referring now more particularly to the drawings:

Fig. 1 is a front elevation of a preferred embodiment of the invention;

Fig. 2 is an enlarged fragmental elevational view showing the wringer in released position;

Fig. 3 is a broken front elevation of the wringer illustrating the rolls in abnormal spaced relationship;

Fig. 4 is a detail sectional view taken substantially on the plane of the line 4—4 in Fig. 3;

Fig. 5 is a detail plan sectional view taken substantially on the plane of the line 5—5 in Fig. 3; and

Fig. 6 is a fragmental front elevation of the wringer showing the rolls separated approximately the maximum distance required in normal operation; and

Fig. 7 is a fragmental sectional view of a modified form of the device illustrating anti-friction rollers for the bearings.

Fig. 8 is a front elevation illustrating the position of maximum separation of rolls.

Fig. 9 is a fragmental front elevation of the wringer showing the links 36 in a vertical position.

The wringer illustrated includes a longitudinally extending lower frame member 10, a vertical outer bearing slideway 11, a vertical inner bearing slideway 12, and a shield 13. These members are preferably rigidly united by spot-welding or otherwise in any manner commonly employed in the art and the entire wringer frame is mounted on any usual type of power head 14 by means of a mounting bracket 15. The lower roll 16 of the wringer includes a roll shaft 17 having its outer end journaled for rotation in a stationary bearing block 18 and having its inner end telescoped into the driving sleeve 19 of the power head 14. Inasmuch as these parts of the wringer structure form no novel part of the present invention, they will not be described in greater detail, it being believed sufficient to point out that the power head 14 is adapted to be fitted on the vertical wringer column of any standard modern washing machine and that the power of the washing machine motor will be transmitted through reversing gears housed within the power head 14 to rotate the driving sleeve 19, and since the driving sleeve 19 is coupled to the roll shaft 17 by means of the slot 21 and cross pin 22, the roll 16 will be power driven and will normally rotate on the stationary axis.

The upper roll 26 includes a roll shaft 27 having its outer end journaled for rotation in a bearing 28 and having its inner end journaled for rotation in a similar bearing 29. These bearings are housed within the outer bearing slideway 11 and the inner bearing slideway 12 respectively, and each is operatively connected to a spring by a system of pressure control links. The bearing 28 is controlled by the pressure control linkage 31 positioned on the front of the wringer and an identical cooperating linkage on the rear side of the wringer, while the bearing 29 is similarly controlled by the linkage 32 on the front of the wringer and an identical linkage 33 on the rear of the machine. Each of these linkages is identical in structure and operation and each is operatively connected to the wringer roll 26 by one of the cross pins 34 or 35 which is mounted in one of the bearing blocks 28 or 29 respectively, and which extends outwardly through the slots 30 of the bearing slideways and is riveted in the lower ends of the links 36. The links 36 each extend upwardly to a pivot 37 mounted near the top of a relatively long link or arm 38 stationarily pivoted on the rivet 39. On the inner end of the machine this rivet 39 is mounted directly in the longitudinal frame member 10, and on the outer end of the wringer the rivet 39 is mounted on an extension bracket 40 provided for the purpose. The long arm 38 of the control linkage 31 extends upwardly a short distance beyond the pivot 37 and is riveted to a cross pin 41 which extends between the linkage on the front side of the machine and the identical linkage arrangement on the rear side (not shown). The cross pin 41 also penetrates openings in the coupling bars 42 extending from the outer end of the wringer to the cross pin 43 to which a coiled tension spring 44 is secured. This tension spring 44 is anchored to a release and reset mechanism 45 comprising a plate 46 and arm 47 pivotally interconnected and mounted on the rock shaft 48 journaled in suitable brackets formed integrally with the power head 14. A pair of pressure release and reset handles 49 are mounted on either end of this shaft 48, so as to be conveniently located on the front and rear sides of the wringers.

At the inner end of the wringer the upper ends of the long arms 38 are joined by a cross pin 51 which extends through a pair of slots 52 in the coupling bars 42. A second coiled tension spring 54 is anchored to the plate 46 and extends to the cross pin 51.

From this it will be seen that the pressure control mechanisms at each end of the wringer are each provided with a separate and independent spring. That is, spring 44 acts on the cross pin 43 and through the coupling bars 42 to exert tension on the cross pin 41, while spring 54 acts directly on the cross pin 51 and will exert no influence on the coupling bars as long as the wringer rolls 16 and 26 remain in parallel spaced relationship. By this arrangement the wringer is made to accommodate and exert even wringing action on work of non-uniform cross section. For example, if a garment is placed between the rolls in such a position that it is of greater thickness near one end of the rolls than at the other, it is necessary that the rolls tilt or assume an angularly divergent position in order to exert a substantially uniform wringing pressure on all portions of the garment. It is obvious that if provision is not made to accomplish this result, any thick portion of a garment will cause the rolls to move apart sufficiently so that the thinner portions will not be acted upon by the wringer and will pass through and emerge from the opposite side of the wringer in a saturated condition.

While it is necessary and desirable to provide for this limited amount of non-parallel movement between the rolls, it is also desirable to provide means to limit this movement and prevent extreme and unnecessary angular divergence between the rolls. In this connection it will be seen that the cross pin 51 which extends between the upper ends of the long arms 38 of the linkages 32 and 33 on the inner end of the machine extends through the longitudinal slots 52 in the coupling bars 42, and that this pin and slot arrangement comprises a lost motion connection between the pressure control mechanisms at the inner and outer ends of the device. Thus in the normal operation of the machine when the rolls remain in parallel relationship, the spring 44 acts on the outer pressure control mechanisms only and spring 54 acts on the inner pressure control mechanisms only, but when the rolls 16 and 26 move into non-parallel position, the pin 51 will engage one end of the slot 52 and cause the force of both springs to be concentrated on the more widely separated ends of the rolls.

As hereinbefore pointed out, it is one of the objects of this invention to permit non-parallel separation of the rolls and to thus accommodate

garments of uneven cross section and the arrangement illustrated has been found very satisfactory for this purpose since it not only permits such separation, but also provides means to limit the angular divergence between the rolls and to utilize the pressure exerted by both springs to prevent extreme separation of one end of the rolls.

It is another important object of the invention to provide a constant or diminishing pressure wringer in which the linkages are positioned in approximately the same area of space required by the rolls in order that a wringer of compact design and pleasing appearance may be provided. In this connection it will be noted that the present structure accomplishes this perfectly, for the extreme upper top of the linkage, namely the coupling bars **42**, are below the level to which the top of the upper roll **26** rises when moved into extreme spaced relationship with the lower roll **16**. Similarly, the lower extremities of the pressure control linkages, namely the pins **39**, do not extend appreciably below the lower surface of the lower roll **16**.

The prime object of the invention is, however, the provision of a pressure control mechanism of the "constant pressure" type that is not only operable in theory but is thoroughly practical from a commercial standpoint, and in order to point out the practical value of the mechanisms here disclosed, it is believed desirable to briefly review the operation of the mechanism. Whenever any garment is passed between the rolls the thickness of the garment will cause the resiliency mounted upper roll **26** to be displaced upwardly against the force exerted by the springs **44** and **54**. As these springs are elongated, the force exerted by them grows progressively greater, but at the same time each of the four pressure control linkages comprising the arms **36** and **38** are caused to alter their positions and reduce the mechanical advantage of the springs in an inverse ratio. The use of the acute angle toggle, including a long and a short arm, provides a highly satisfactory wringer of great inherent safety, and accomplishes a very desirable pressure control, since this arrangement has been found to give approximately constant pressures when the rolls are operating normally and to reduce the pressures very greatly when the rolls are forced apart beyond their normal spacing. In this connection it will be understood that in normal operation the wringer rolls do not move greatly: in fact, probably the great majority of the work operated on will not cause a lateral displacement of more than one-half inch, and the pressure will remain about constant. In the device illustrated, the links **36** lie at an angle of about 15° to the right of the vertical slots **30** when the rolls are in contact, but experiments show that satisfactory results may be obtained by even shorter links, arranged to remain in an angular position not greater than 30° divergent from the direction of thrust of the roll bearings during the initial ½" of displacement of the upper roll.

In an emergency, however, the rolls may be forced apart an abnormal distance and in this event the toggle is effective to greatly reduce the pressure and minimize injury insofar as possible. In this connection it will be noted that a complete pressure release may be accomplished by operating the release and reset lever **49** as shown in Fig. 2, but, since it is well known that injuries sometimes occur simply because of failure to actuate a pressure release, it is of great importance to provide a structure in which the pressures never rise to great extremes under any conditions.

To insure satisfactory operation it is essential that the pressure control mechanism operate freely and without undue friction. This is accomplished in the present construction since all moving parts of the control are mounted on pivots, and the linkage is arranged to act in a direction substantially parallel to the length of the bearing slideways and consequently in the same direction as the direction of thrust on the roll bearings.

When the rolls are in contact the short arm or link **36** lies at a small angle to the right of the slots **30**, as viewed in the drawings, but substantially in alignment with the direction of thrust. As goods of maximum normal thickness force the rolls apart this link will swing to a position at approximately the same angle on the other side of the center line of the bearing thrust and of the slots **30**, but at all times during this range of movement the components of force act so nearly parallel as to exert practically no side thrust on the bearings; in fact, at many times the links **36** lie in exactly vertical position and no side thrust whatsoever is present.

If desired, friction between the bearings and the slideways may be further reduced by the provision of the antifriction rollers **57** adapted to ride in slots **58** as shown in Fig. 7, but this is not essential, as the inherent design of the pressure control linkages reduces the friction well within permissible practical limits.

I have shown and described a preferred embodiment of the invention in accordance with the requirements of the patent statutes. I am aware, however, that it is subject to numerous variations and modifications, and therefore wish the scope of the invention to be considered as limited only by the appended claims.

I claim:

1. In a wringer including a frame, a spring, and a pair of coacting pressure rolls, the combination of toggle link diminishing pressure control devices for said rolls, said pressure control devices being positioned substantially above the lower extremity of the lower roll and substantially below the upper extremity of the upper roll in position of maximum roll separation.

2. In a wringer including a frame, a spring and a pair of coacting pressure rolls, the combination of toggle link diminishing pressure control devices for said rolls, said pressure control devices extending substantially across the vertical limits of space defined by said rolls.

3. In a wringer including a frame, a spring, an axially stationary pressure roll and a laterally displaceable pressure roll, the combination of constant pressure control linkages operatively interconnecting said spring and said laterally displaceable roll, said linkages including a toggle having two arms arranged to assume an acute angular position with relation to each other when the said rolls are in contact and to move to positions of progressively greater angular divergence responsive to lateral separation of the rolls.

4. In a wringer including a frame, a spring, an axially stationary pressure roll and a laterally displaceable pressure roll, the combination of constant pressure control linkages operatively interconnecting said spring and said laterally

displaceable roll, said linkages including a toggle having a short arm and a long arm arranged to assume an acute angle position with relation to each other when the said rolls are in contact and to move to positions of progressively greater angular divergence responsive to lateral separation of the rolls.

5. In a wringer including a frame, a spring, an axially stationary pressure roll and a laterally displaceable pressure roll, the combination of constant pressure control linkages operatively interconnecting said spring and said laterally displaceable roll, said linkages including a toggle joint having a long arm mounted on a fixed pivot and a short arm interconnecting said long arm and said laterally displaceable rolls said arms being arranged to assume an acute-angle position with relation to each other when the said rolls are in contact and to move to positions of progressively greater angular divergence responsive to lateral separation of the rolls.

6. In a wringer including a frame and a pair of coacting pressure rolls, the combination of a spring adapted to exert pressure at one end of said rolls, a spring adapted to exert pressure at the opposite end of said rolls, and coupling means between said two springs responsive to angular divergence between said rolls to concentrate the force of both of said springs at the more widely separated end of the rolls.

7. In a wringer including a frame and a pair of coacting pressure rolls, the combination of individual pressure control devices associated with each end of said pair of coacting rolls, individual springs, each adapted to act through said pressure control devices to exert pressure at one end of said rolls, coupling means between said pressure control devices adapted to exert pressure from both springs at either end of said pair of rolls, and pressure release and reset mechanism common to both of said springs to effect simultaneous release and reset of the pressure at the opposite ends of said rolls.

8. In a wringer including a frame, a spring, and a pair of coacting rolls, the combination of movable bearings for one of said rolls and pressure control mechanisms operatively interconnecting said bearings and said spring, said pressure control mechanism consisting of a plurality of acute-angle toggles, each including a long arm mounted on a fixed pivot and a short arm operatively interconnecting said long arm and one of the aforementioned movable roll bearings; said short arm being pivoted with respect to said bearing and adapted to move through an arc extending on both sides of the line of thrust of said bearing and to assume a position in substantial alignment with the direction of thrust of said bearing responsive to the normal separation of the rolls, said pressure control mechanisms extending substantially across the vertical limits of space defined by said rolls.

9. In a wringer including a frame and a pair of coacting pressure rolls, the combination of a spring adapted to exert pressure at one end of said rolls, a spring adapted to exert pressure at the opposite end of said rolls, individual pressure control mechanisms interconnecting each of said springs with one end of said pair of rolls, said pressure control mechanisms comprising a plurality of acute-angle toggles, each including a link pivotally associated with one of said pressure rolls and extending in the same general direction as the direction of thrust of said rolls, and coupling means between said pressure control devices responsive to angular divergence between said rolls to concentrate the force of both of said springs at the more widely separated ends of the rolls; all of said pressure control mechanisms extending substantially across the vertical limits of space defined by said rolls.

10. In a wringer, the combination of a plurality of pressure rolls including a movable roll mounted in bearings for movement in a direction lateral to the roll axis, spring means associated with said movable roll, and pressure control mechanisms interconnecting said spring means and said roll, said spring means and pressure control mechanisms being characterized by means to maintain predetermined initial operating pressure between said pressure rolls when said rolls are in contact, means responsive to a normal lateral displacement of said movable roll to exert undiminished pressure between said rolls, and means responsive to abnormal lateral displacement of said movable roll to gradually and progressively diminish the effective pressure between said rolls.

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