Oct. 4, 1949. R. O. BALOGH 2,483,517

HYDRAULIC CHECK

Filed May 16, 1946

4 Sheets-Sheet 1

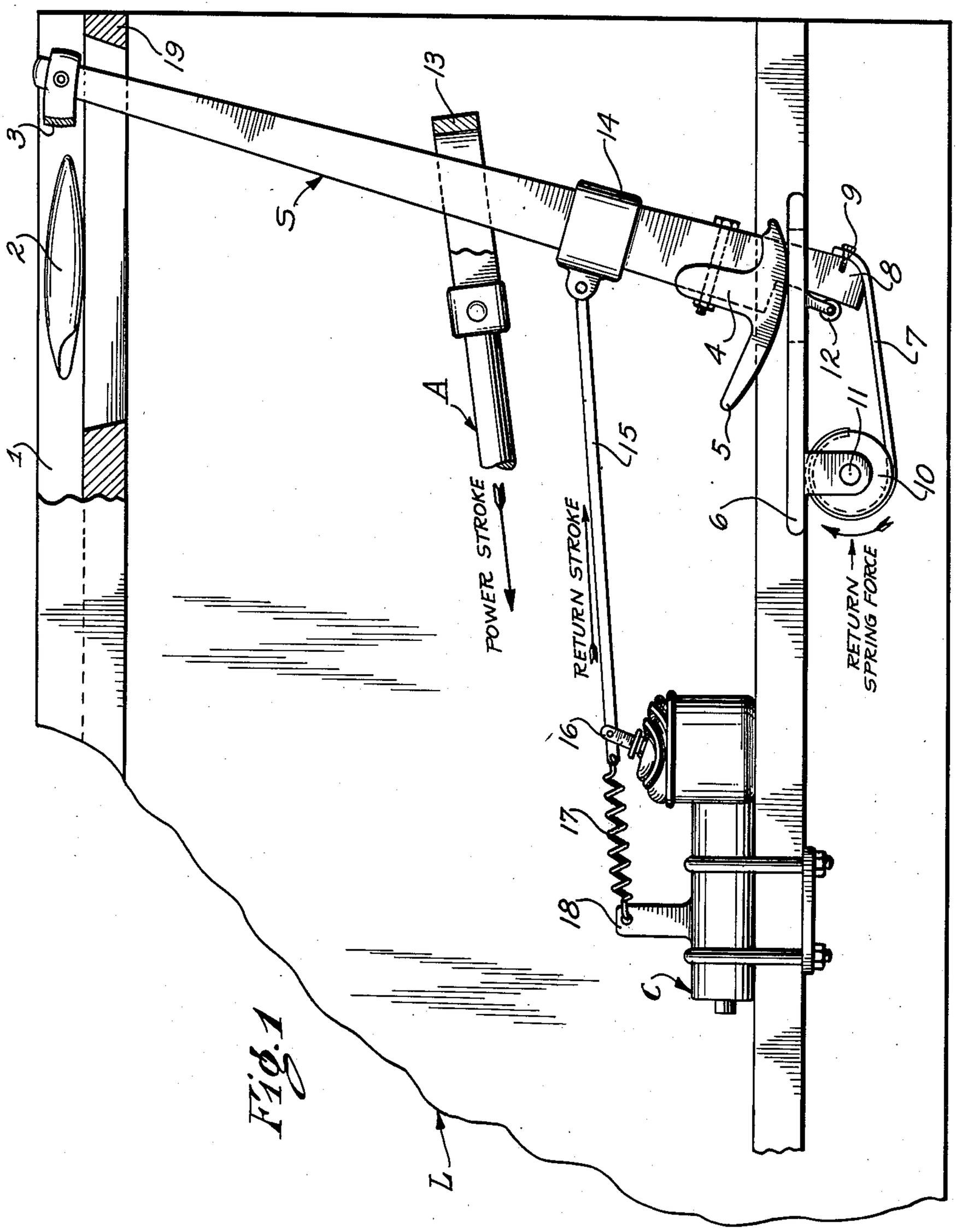

Fig. 1

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May 8, 1945. W. S. BLAUVELT 2,375,517

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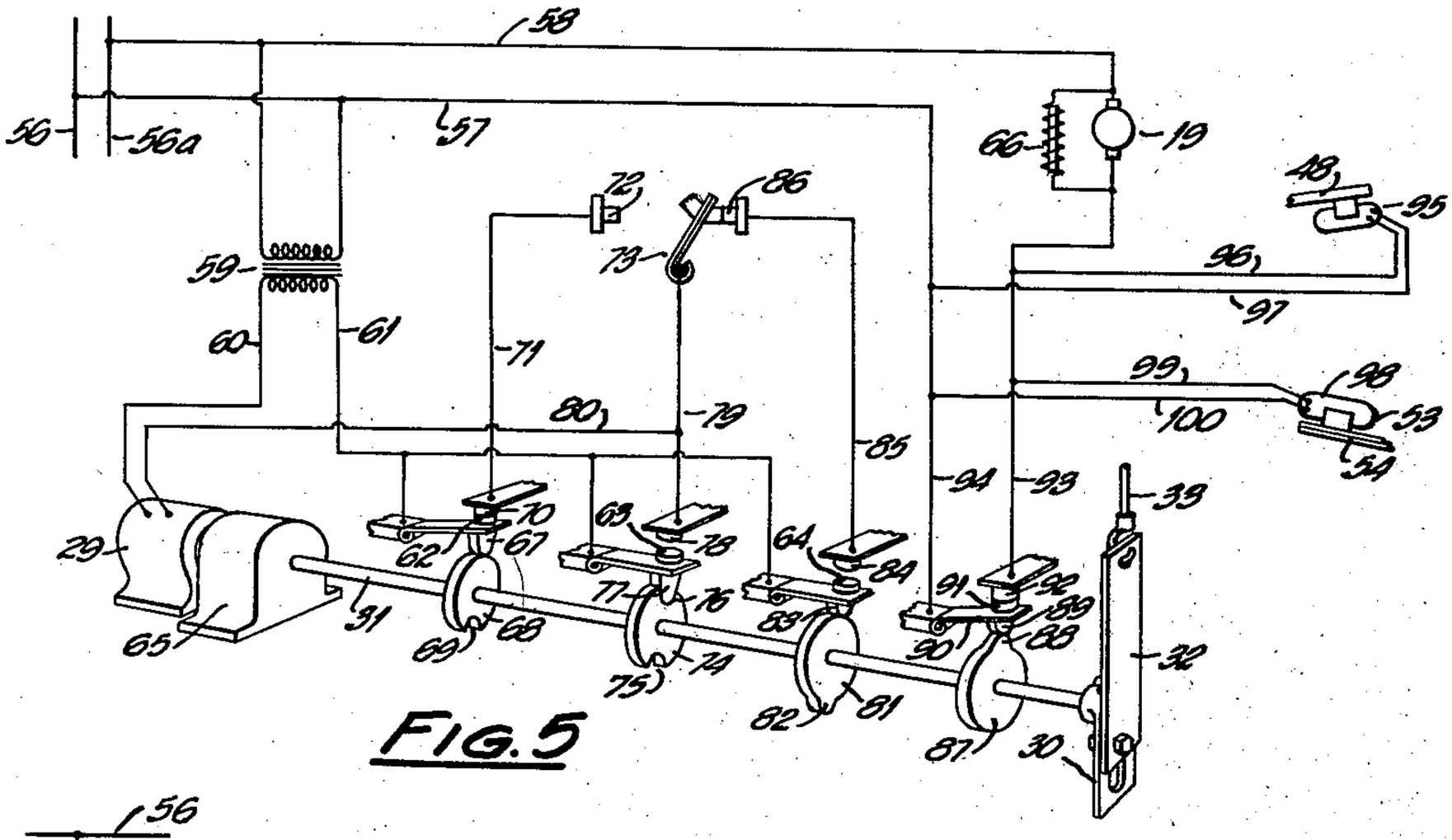

FIG. 5

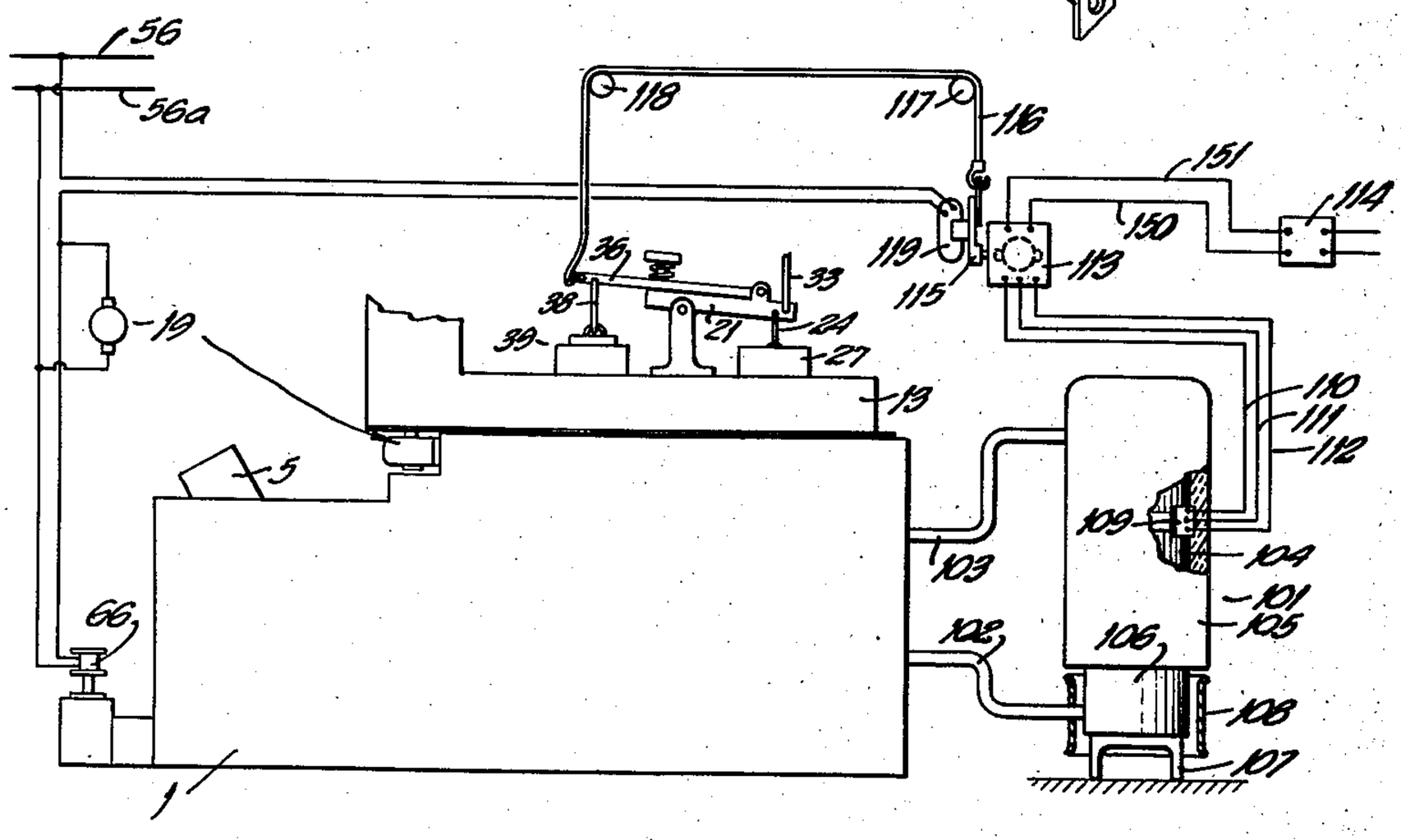

FIG. 6

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HYDRAULIC CHECK

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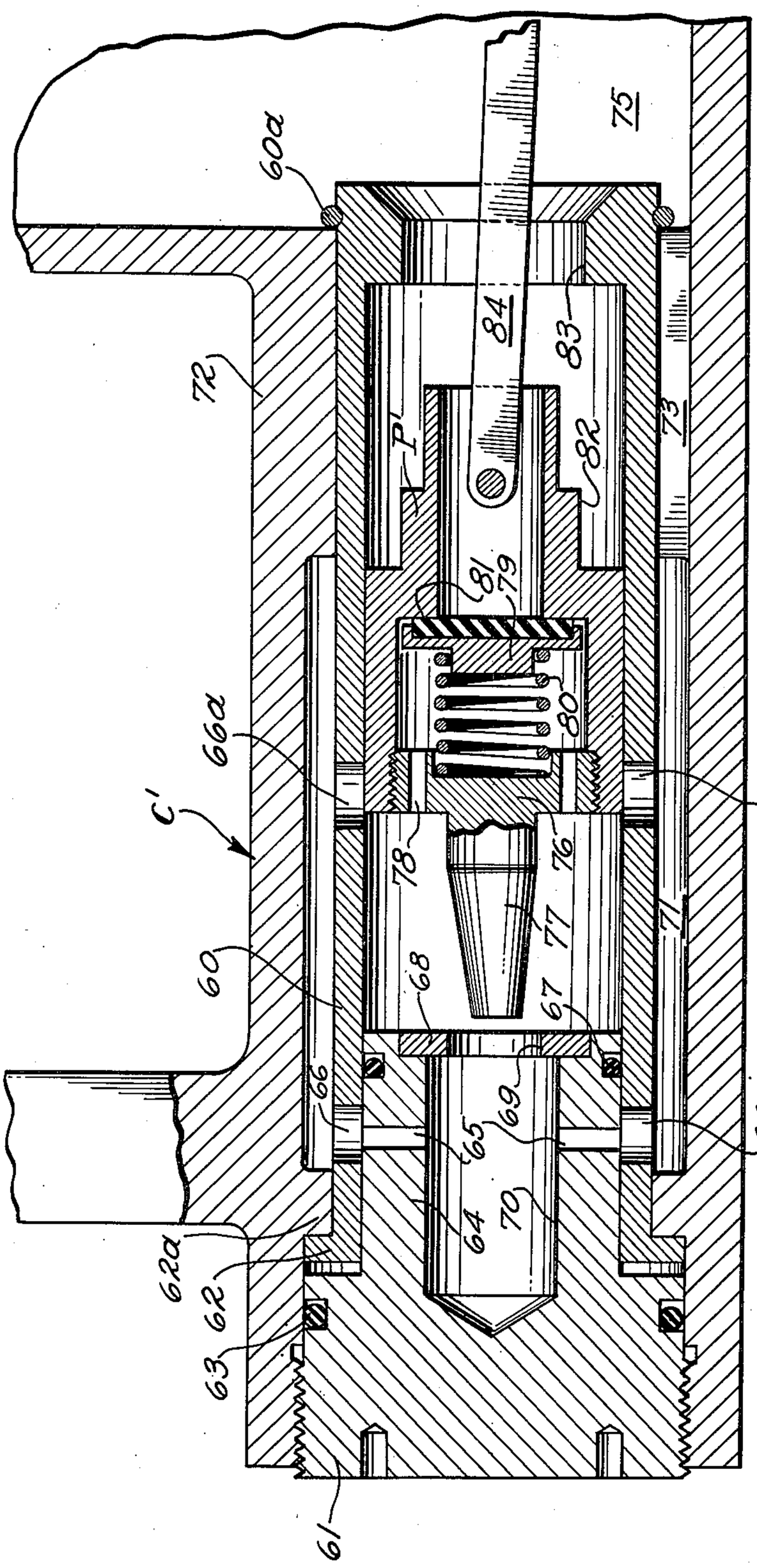

Fig. 5

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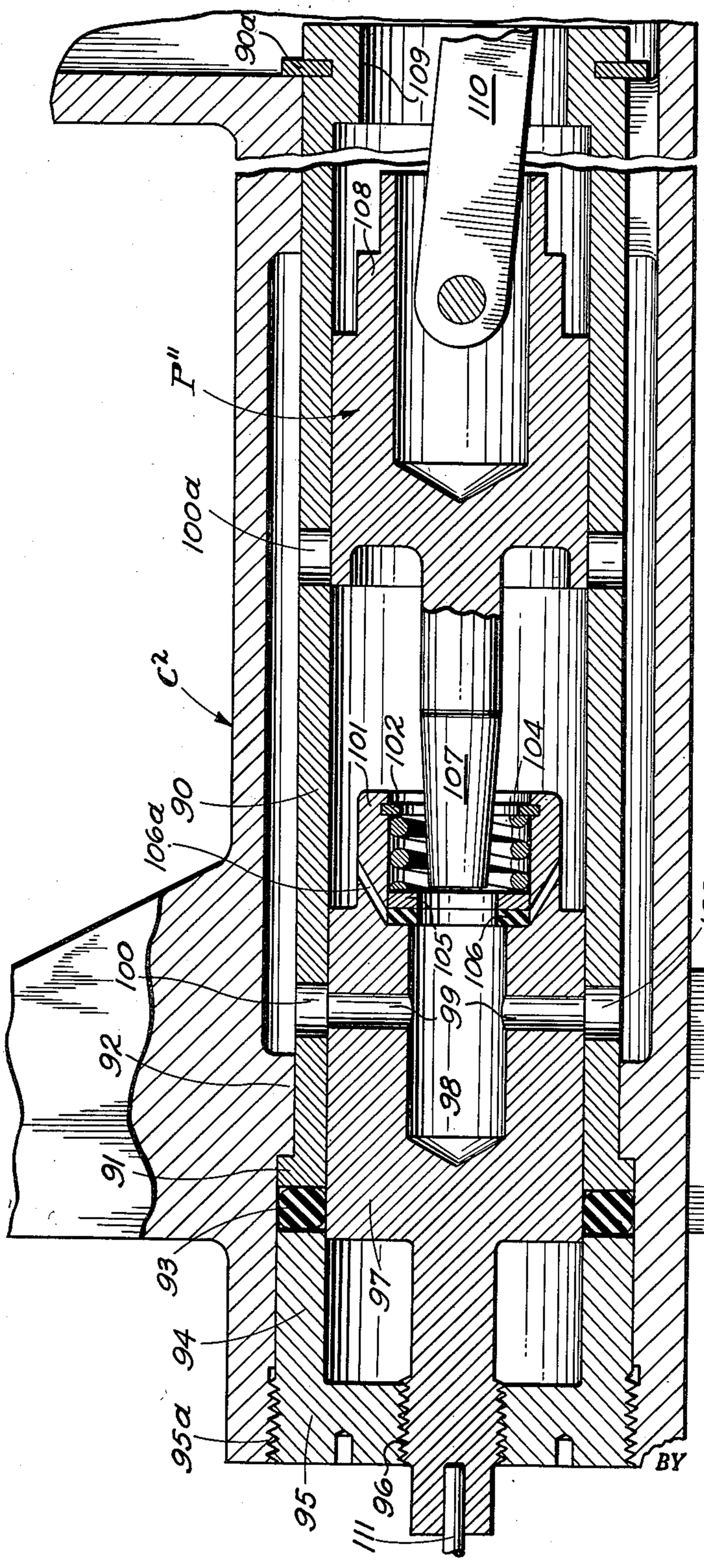

Fig. 6.

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HYDRAULIC CHECK

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17 Claims. (Cl. 139—161)

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This invention relates to a loom mechanism, more particularly to the provision of a novel hydraulic checking apparatus for the picker staff of the loom.

Modern practice in the weaving art tends towards a steady increase in loom operating speed. One of the problems encountered when attempting to increase the speed of the loom involves trouble with the operation of the shuttle and picker staff. It has been found that if the picker staff is not checked and brought smoothly to a stop at the end of its return stroke, without oscillation or rebound, that the shuttle is not always received in a pre-determined position and erratic casting of the shuttle to the opposite side of the loom results. Early picker checks have included leather straps which have proven unsatisfactory particularly where the humidity of the atmosphere is subject to variation. Also, such straps are unsatisfactory in that they do not permit accurate adjustment and do not eliminate rebound. The prior art also discloses various pneumatic checks which have been proven inferior in that the tendency of the compressed air to re-expand as the picker staff comes to rest results in serious rebound and poor operation. I am aware that the broad idea of a hydraulic check for the picker staff is disclosed in the prior art but prior hydraulic devices are subject to numerous objections and have been found unsatisfactory for high-speed operation. Hydraulic checks of the prior art have not been connected to the picker staff but have been merely placed in its path like the old strap or pneumatic check, so that the staff strikes the check operating mechanism towards the end of the return cycle. This arangement has proven undesirable in that the staff suddenly strikes the check arrangement while moving rapidly, resulting in rebound and erratic operation. It is an object of this invention to eliminate the undesirable characteristics of an abruptly engaged check mechanism by attaching the check mechanism to the picker staff at all times and so designing the check mechanism that it permit unchecked travel of the staff over certain portions of the stroke and provides a smooth checking operation for the end of the return stroke.

Another deficiency in prior hydraulic check devices lies in the fact that no controlled or graduating checking action was provided for. If the prior hydraulic checks are made to permit the picker staff to retract to the retracted position in the time alloted, the hydraulic checking action could not be made great enough to hydraulically bring the staff to a smooth stop. This

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resulted in either a bump or shock at the end of the retract stroke or the necessity for providing a spring in the check mechanism to absorb the shock at the final portion of the stroke. Provision of a spring to aid in checking reduces the advantages of a hydraulic check, because if a spring is provided which is strong enough to have any checking effect on the staff the same spring will simultaneously tend to produce a rebound of the staff. It is a further object of the present invention to accomplish the final checking by hydraulic means without relying on a spring for the final shock absorbing action.

It is another object of this invention to so design the hydraulic means that the staff is brought to a rest in an exceedingly smooth and positive manner without any jarring or rebound. This is accomplished by providing a graduated or metered checking arrangement. Briefly, the principle of operation resides in the fact that at the beginning of the checking action where the velocity of the picker staff is high even though a relatively large amount of liquid is by-passed an effective checking action is produced. As the velocity of the picker is decreased the liquid by-passing passageway is correspondingly decreased which maintains an effective checking action. In this manner the checking action can be held substantially constant regardless of the picker staff velocity so that the picker staff is brought to a smooth stop without rebound.

It is customary in loom construction to move the picker staff on its power or shuttle casting stroke with positively acting mechanism and to return the picker staff to its retracted position by means of a spring or weight. In many looms the spring serves the dual function of returning the staff and holding the lower end of the staff in position on a supporting plate. The spring arrangement just described will tend to bring the staff to its completely retracted position before the staff receives the shuttle. If a dampening mechanism is present under these conditions this means that the position of the staff in its return stroke when the shuttle strikes it depends upon the delicate construction of the damping orifices. The shuttle might strike the staff towards the beginning of the damping stroke or, if the return spring is strong, the staff might be in a completely retracted position when the shuttle strikes it. This results in non-uniform casting of the shuttle or possible rebounding of the shuttle in case the staff has come to rest when it receives the shuttle. It is an object of the present invention to insure that the shuttle cannot rebound by

canceling the return spring pressure a short time before the staff reaches its retracted position whereby the inertia of the shuttle as it strikes the staff returns the staff to its retracted position. In my design I eliminate all chance of rebound of the shuttle by adjusting the springs and designing the check mechanism so that the point of balance of a balance spring on the check mechanism and the return spring on the picker staff is somewhat near or at the point where the hydraulic checking action begins. In this manner the shuttle inertia moves the staff through the last part of its retract stroke against the uniform checking action of the checking device, and since my novel checking device is made adjustable, it is very simple to start the machine and adjust the mechanism for a given speed so that the shuttle and staff are brought to a smooth stop without rebound. These and other advantages of my invention will be apparent as the following description proceeds.

In the drawings:

Fig. 1 is a simplified view of the picker staff in the loom showing how my hydraulic check mechanism is connected thereto;

Fig. 2 is a sectional view through my hydraulic check mechanism;

Fig. 3 is a cross-sectional view taken at 3—3 of Fig. 2;

Fig. 4 is a partial sectional view during the final portion of the check stroke;

Fig. 5 is a partial sectional view of the modified form of piston and cylinder assembly; and

Fig. 6 is a section of a second modification.

Referring to Fig. 1, a portion of the loom frame is indicated at L. The picker staff is shown at S and arm A operated by conventional loom mechanism moves the staff on a power stroke to cast the shuttle. The improved check mechanism is shown at C. In accordance with conventional practice a track 1 is provided in the lay for the shuttle 2 and a picker 3 on the picker staff throws the shuttle across the loom when the staff is advanced on the power stroke. The picker staff itself is mounted in a shoe 4 which has a curved surface 5 for rolling on the supporting plate 6, mounted on the rocker shaft in the conventional manner the purpose of this arrangement being to approximate a straight line motion of the picker 3. A flexible strap 7 is passed over an extension 8 of the picker staff and fastened at 9. A spring drum 10 is mounted as at 11 on the shoe 6 and the drum is spring urged to move the picker staff in its retracted position as indicated by the arrow. This description of the picker staff mounting is merely given as a background for explaining the present invention, the details thereof are immaterial so far as the present invention is concerned. Any convenient fastening means 14 may be provided to link a rod 15 to a lever 16 in the hydraulic mechanism C. The spring 17 is the balancing spring previously referred to in the general description and it connects to a fixed ear 18 which may be integral with the housing of the hydraulic mechanism. The retracting force of the spring in drum 10 is balanced at some position before the picker stag reaches its fullest retracted position by spring 17. For example, assume that the shuttle 2 is approaching the picker 3. The picker staff has come to rest a certain distance before it engages the positive stop 19 so that the remainder of the staff travel absorbs shuttle inertia.

Referring to Fig. 2, a cylinder housing 20 is connected to or integral with a reservoir 21 and

oil or other liquid 22 is provided in the assembled device. For economy of construction the device may include a cylinder liner 23 retained by a cylinder head or cap member 24 threaded to member 20 as at 25 and sealed by an O-ring or other convenient sealing means 26. The cap 24 engages the end of the cylinder liner 23 and is sealed therein as at 27. The cylinder liner 23 has one or more apertures 28, the purpose of which will be described presently. The cylinder head 24 may be grooved as at 30 and apertured as at 31 to provide communication between the interior and the exterior of the cylinder. An annular chamber 32 is formed between the cylinder liner 23 and the cylinder housing 20. The flanges at each end of the cylinder liner would block liquid flow so these are slotted as at 33 and 34 to permit communication from the closed end of the cylinder to the reservoir. An extension 35 may be formed on the cylinder cap to receive the check valve 36 which valve is urged by spring 37 against the cylinder cap in order to block apertures 31. Spring 37 acts against a retainer 38.

An adjustable metering rod 40 may be threaded to the cylinder block as at 41 and has a cylindrical portion 42 and a tapered end 43. A liquid seal 40a is provided for the rod 40. The piston P is apertured at 44 end to end, and a metering aperture 45 is provided of equal or slightly larger diameter than the cylindrical portion 42 of the metering pin. Wrist pin 46 links connecting rod 47 to actuating lever 16 by a pin 48. The actuating lever 16 is pivoted as at 50 in any convenient manner. Flexible cover member 51 may be provided to retain and prevent splashing out of the liquid.

Fig. 3 shows how the flanges in the cylinder housing 20 may be relieved as at 34 to provide a liquid passageway. Similar structure is formed as at 33.

In describing the operation of the device, the situation illustrated in Fig. 2 is that which occurs during the initial part of the return stroke wherein the spring 10 on the picker staff is moving the arm 15 to the right and hence the piston P is being forced to the left. As shown by the small arrows superimposed in the liquid, liquid tends to flow in two paths during the intial part of the return stroke. Any liquid trapped in the closed portion of the cylinder can escape out through apertures 45 and 44 and thereby out through the reservoir. Likewise, liquid can be forced through apertures 28 in the cylinder liner and passing through chamber 32 and passage 34, find its way to the reservoir. Thus, it can be seen that an appreciable part of the return stroke is substantially unimpeded by the hydraulic mechanism, permitting the return spring 10 to rapidly retract the picker staff regardless of the fact that the check mechanism is permanently linked to the staff.

As the return or check stroke continues, the piston moves to the left as seen in Fig. 2 until it blocks apertures 28. Now the only manner in which liquid can be displaced from the closed end of the cylinder is through the metering aperture 45 in the piston. But at this point the tapered metering portion 43 of the pin begins to enter the aperture 45 to restrict displacement of the liquid.

Turning to Fig. 4, it can be seen that the piston has advanced and the apertures 28 are completely blocked. Simultaneously, the tapered metering portion 43 is gradually closing off the aperture 45, the only path through which liquid can be displaced to the reservoir. This action con-

tinues until towards the end of the stroke the cylindrical portion 42 substantially closes off the aperture 45 in the piston. Of course, the metering rod can be adjusted so that the closing off of the aperture does not occur until the return or check stroke is completed or it is possible to make the portion 42 slightly smaller than the aperture 45 in the piston so that a slight amount of liquid displacement is permitted when the cylindrical pin portion is in the metering aperture. When the tapered pin portion 43 first enters the metering aperture in the piston, the piston is traveling rapidly and although a substantial amount of liquid can be displaced, since the piston is moving rapidly the liquid velocity and the checking action will be at a substantial value. As the return or check stroke continues, the effective aperture is steadily decreasing but the piston velocity decreases likewise, so that the checking action remains substantially constant. This action continues until the piston is brought to a smooth stop at the end of its stroke.

Since the checking mechanism is linked to the picker staff, it is important that the check mechanism provide for an unimpeded power stroke. This is made possible by the check valve 36 which opens on the power stroke, permitting liquid to pass from the reservoir into the cylinder through passage 34, chamber 32 and passage 33, and through the apertures 31 in the plug. In this manner free return of the piston is permitted during the power stroke even though the by-pass apertures 28 in the cylinder liner are covered by the piston during the first part of the stroke. Since the shuttle usually leaves the picker staff before it reaches the end of its power stroke, it is desirable to cushion the end of that stroke and this is accomplished by making the sleeve portion 51 on the piston move through an aperture 52 in the cylinder liner, the relative diameters are such that liquid is trapped in the right hand portion of the cylinder and must be forced through the annular aperture in order to complete the power stroke of the piston. Thus a highly desirable cushioning action at the end of the power stroke is provided in a very simple manner.

With respect to the inter-action of the spring 17 on the check mechanism and the spring drum 10 at the picker staff, it is possible to so adjust the tension of spring 17 that it balances the tension of the spring in drum 10 at about the time the piston begins to close off the by-pass apertures 28 in the cylinder. This is near the end of the return stroke and is the place at which cushioning action begins under impact of the shuttle. The adjustable by-pass metering pin can be set so that the final checking action of the cylinder absorbs the inertia of the rapidly moving shuttle as it strikes the picker staff. Of course, it is possible to omit the spring 17 and adjust the metering pin so that a similar action is obtained except that in this case slightly greater checking rate would probably be required to cushion the force of the spring at the picker staff as well as the inertia of the shuttle towards the end of the return stroke.

The modification shown in Fig. 5 has functions like that previously described but the metering pin is carried by the piston instead of by the cylinder. The cylinder liner 60 may be retained in the cylinder C′ by a snap ring 60*a* or other fastening means at its open end, which urges the flange 62 at the other end against a flange 62*a* on the cylinder housing. Cylinder cap 61 is

threaded to the cylinder body C′ and is provided with a seal as at 63 of any conventional design. An extension portion 64 of the cylinder cap enters the cylinder liner 60 and is apertured as at 65 to communicate with one or more by-pass apertures 66 in the cylinder liner. The extension portion of the cylinder cap is sealed with the cylinder liner as at 67, and the extension may be provided with an orifice plate 68 pressed into place or integral with the end cap. The metering aperture 69 communicates with a central bore 70 so that liquid trapped in the confined portion of the cylinder may pass through apertures 65 and 66 and back to the reservoir. The chamber 71 and the relieved portion 73 of the cylinder housing complete the return passageway from the end of the cylinder to the reservoir 75.

The piston may be formed with a removable plug 76 having a tapered metering pin 77 for cooperating with the metering aperture 69 in the cylinder cap. The plug is formed with apertures 78 in communication with a central bore in the piston. Passage of liquid through the piston is prevented on the return stroke by check valve 79 which is spring urged by spring 80 against seat 81 in the piston. The final buffing action at the end of the power stroke is obtained by restriction between pilot portion 82 on the piston and an aperture 83 in the cylinder liner. Link 84 is connected to move the piston as in the first modification. In operation the device shown in Fig. 5 is like that previously described. The piston moves to the left and in the first portion of the check stroke liquid is by-passed from the closed end of the cylinder through ports 66*a* and ports 66 back to the reservoir. When the piston closes ports 66*a* the metering pin 77 begins to enter orifice plate 68 and the liquid trapped between the piston and the end of the cylinder cap must pass through the ports 65 and 66. In this manner the checking action against a piston traveling at constantly diminishing speed is maintained relatively constant and the piston is brought to a smooth stop. Adjustment of the checking action may be provided by rotation of the cylinder cap 61 by any convenient means and, of course, a locking set screw or other locking device may be used to maintain that adjustment.

The modification in Fig. 6 functions very much like that shown in Fig. 5 except that the metering orifice plate also serves as a check valve to permit an unchecked power stroke of the piston. The cylinder body C^2 carries the cylinder liner 90 retained by a snap ring 90*a* working against the shoulder 91 on the cylinder liner which shoulder abuts internal flange 92 in the cylinder body. Sealing ring 93 is engaged by the sleeve portion 94 of the end cap 95. The sealing ring also bears against the wall of the cylinder body and an adjustable plug member 97. The cap member 95 is threaded to the cylinder body at 95*a* and it also retains the plug member 97 by means of threads 96.

Plug 97 is bored as at 98 and provided with communicating apertures 99 which are lined with apertures 100 in the cylinder liner to permit flow of liquid during the check stroke, after the piston has closed off the other set of apertures 100*a* in the cylinder liner. The plug 97 has an extension 101 which carries the snap ring 102 to back a spring 104 causing it to hold a metering plate 105 and a valve washer 106 against a seat formed on the plug member.

The tapered metering rod 107 is attached to the piston P″ and functions in conjunction with the

metering plate 105 in the manner described in connection with Fig. 5. On the return stroke a vacuum is initially created in the closed cylinder end which causes the metering plate 105 and the washer 106 to unseat and liquid can fill the end of the cylinder by passing through bleed ports 106a in the plug.

At the other end of the piston the buffing projection 108 and its cooperating orifice 109 are provided for purposes previously described. The connecting rod 110 is partially shown in the view and at the left of the view an adjusting wire 111 is shown which may be used to adjust the position of the plug 97 and hence control the checking action.

Having described the details of the three forms of my invention, it will be recognized that various modifications may be made without departing from the essential nature of my device. Although I have disclosed means of assembling parts which are readily machined in order to build up my check device, these have been shown more in the nature of an illustration than as a necessary method of manufacturing my device. Essentially, what is needed is an unchecked initial portion of a return stroke followed by a checked portion of that stroke wherein the liquid must pass through apertures of diminishing cross section as the return stroke continues. I have illustrated three forms which will produce this function but it is to be understood that I contemplate that numerous modifications and mechanism expedients can be devised to produce the same results. In addition, the action of my check device in conjunction with the picker staff of a loom wherein the device is connected to the staff throughout both strokes and which produces the efficient action described earlier in this specification is not found in the prior art and my invention resides in that combination of elements as well as in the detailed construction of a check mechanism which makes it possible to produce such a combination. For this reason the design details I have shown in the drawings are not to be construed as limited to the scope of the invention as defined in the appended claims.

Having thus described the present invention so that others skilled in the art may be able to understand and practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

What I claim is:

1. In a loom, the combination of a picker staff, means to move said picker staff in a power stroke, return spring means to move said picker staff in a return stroke, a hydraulic check device linked to said picker staff at all times, means in said check device so that an initial portion of said return stroke is unchecked hydraulically, spring means arranged to oppose and balance said return spring means at substantially the end of the unchecked portion of said return stroke, and hydraulic means in said check device to hydraulically check a terminal portion of said return stroke.

2. In a loom, the combination of a picker staff, means to move said picker staff in a power stroke, return spring means to move said picker staff in a return stroke, a hydraulic check device linked to said picker staff at all times, means in said check device so that an initial portion of said return stroke is unchecked hydraulically, spring means arranged to oppose and balance said return spring means at substantially the end of the unchecked portion of said return stroke, means in said check device to hydraulically check a terminal portion of said return stroke and means in said check device to provide a substantially unchecked power stroke.

3. In a loom, the combination of a picker staff, means to move said picker staff in a power stroke, return spring means to move said picker staff in a return stroke, a hydraulic check device linked to said picker staff at all times, means in said check device so that an initial portion of said return stroke is unchecked hydraulically, spring means arranged to oppose and balance said return spring means at substantially the end of the unchecked portion of said return stroke, means in said check device to hydraulically check a terminal portion of said return stroke and means in said check device to provide an unchecked power stroke, said check means including means to present an orifice of decreasing area for by-passing liquid during the return stroke.

4. In a loom, the combination of a picker staff, means to move said picker staff in a power stroke, return spring means to move said picker staff in a return stroke, spring means to oppose said return spring means, said springs balancing after a substantial portion of said return stroke is completed, said picker staff receiving the inertia of the shuttle during the remaining portion of the return stroke, a hydraulic check device cooperating with said picker staff and means in said check device to hydraulically check a substantial portion of the return stroke during which the inertia of the shuttle acts upon the picker staff.

5. In a loom, the combination, of a picker staff, means to move said picker staff in a power stroke, return spring means to move said picker staff in a return stroke, spring means to oppose said return spring means, said springs balancing after a substantial portion of said return stroke is completed, said picker staff receiving the inertia of the shuttle during the remaining portion of the return stroke, a hydraulic check device linked to said picker staff and means in said check device to hydraulically check a substantial portion of the return stroke during which the inertia of the shuttle acts upon the picker staff, the unbalanced portion of the return stroke being unchecked hydraulically.

6. A hydraulic check device for the picker staff of a loom comprising a cylinder element closed at one end, a liquid reservoir, a piston element in said cylinder element forming a pressure chamber with said closed cylinder element, passageway means in one of said elements to provide liquid communication between said chamber and the reservoir, metering means associated with the other of said elements arranged to gradually restrict said passageway means so that liquid flow from said chamber to the reservoir is restricted as the piston element approaches the closed end of the cylinder element on the return stroke, said restricted passageway means forming the sole path of liquid transfer from said chamber during the terminal portion of said piston element motion.

7. A hydraulic check device for the picker staff of a loom comprising a cylinder element closed at one end, a liquid reservoir, a piston element in said cylinder element forming a pressure chamber with said closed cylinder element, by-pass means in said cylinder element establishing communication between said chamber and reservoir, said by-pass means being closed by said piston element as it approaches said closed end, passageway means in one of

said elements to provide liquid communication between said chamber and the reservoir, metering means associated with the other of said elements arranged to gradually restrict said passageway means so that liquid flow from said chamber to the reservoir is restricted as the piston element approaches the closed end of the cylinder element on the return stroke, said restricted passageway means forming the sole path of liquid transfer from said chamber during the terminal portion of said piston element motion.

8. A hydraulic check device for the picker staff of a loom comprising a cylinder element closed at one end, a liquid reservoir, a piston element in said cylinder element forming a pressure chamber with said closed cylinder element, by-pass means in said cylinder element establishing communication between said chamber and reservoir, said by-pass means being closed by said piston element as it approaches said closed end on its return stroke, passageway means in one of said elements to provide liquid communication between said chamber and the reservoir, metering means associated with the other of said elements arranged to gradually restrict said passageway means so that liquid flow from said chamber to the reservoir is restricted as the piston element approaches the closed end of the cylinder element, said restricted passageway means forming the sole path of liquid transfer from said chamber during the terminal portion of said piston element motion, and second by-pass means to provide for transfer of liquid from the reservoir to said chamber, and check valve means for said second by-pass means arranged to close the same on said return stroke and open it on the other stroke.

9. A hydraulic check device for the picker staff of a loom comprising a cylinder closed at one end, a liquid reservoir, a piston in said cylinder forming a pressure chamber with said closed cylinder, by-pass means in said cylinder element establishing communication between said chamber and reservoir, said by-pass means being closed by said piston as it approaches said closed end, passageway means through said piston to provide liquid communication between said chamber and the reservoir, metering means carried by said cylinder arranged to gradually restrict said passageway means so that liquid flow from said chamber to the reservoir is restricted as the piston approaches the closed end of the cylinder on the return stroke, said restricted passageway means forming the sole path of liquid transfer from said chamber during the terminal portion of said piston motion.

10. A hydraulic check device for the picker staff of a loom comprising a cylinder closed at one end, a liquid reservoir, a piston in said cylinder forming a pressure chamber with said closed cylinder, passageway means in said cylinder to provide liquid communication between said chamber and the reservoir, tapered metering means projecting from piston and aligned with a portion of said passageway means, said metering means being arranged to gradually restrict said passageway means so that liquid flow from said chamber to the reservoir is restricted as the piston approaches the closed end of the cylinder on the return stroke, said restricted passageway means forming the sole path of liquid transfer from said chamber during the terminal portion of said piston motion.

11. A hydraulic check device for the picker staff of a loom comprising a cylinder closed at one end, the other end being in communication with a liquid reservoir, a piston in said cylinder, passageway means through the end of said cylinder to provide liquid communication between the closed end of said cylinder and the reservoir, by-pass means between said passageway and cylinder, a movable orifice plate in said passageway for closing said by-pass means, metering means projecting from the piston in said cylinder and in alignment with said orifice plate, said metering means and orifice plate arranged to restrict liquid flow from the closed end of said cylinder through the cylinder passageway and to the reservoir as the piston approaches the closed end on the return stroke, said orifice plate being arranged to open said by-pass means and permit liquid to enter the closed end of the cylinder on the other stroke.

12. In a loom, the combination of a picker staff, means to move said picker staff in a power stroke, return spring means to move said picker staff in a return stroke, spring means to oppose said return spring means, said springs balancing after a substantial portion of said return stroke is completed, said picker staff receiving the inertia of the shuttle during the remaining portion of the return stroke, a hydraulic check device cooperating with said picker staff and means in said check device to hydraulically check a substantial portion of the return stroke during which the inertia of the shuttle acts upon the picker staff, said checking action being proportioned to the position of the picker staff.

13. In combination in a loom, lay mechanism, a shuttle picker, power means associated with said picker to move it inwardly to cast a shuttle, return means to move said shuttle outwardly to a shuttle-receiving position, and a hydraulic check device for said picker, said check device including a liquid reservoir and a cylinder, a piston in said cylinder, a liquid metering passageway connecting said cylinder and reservoir, means linking the piston to the picker at all times to cause the piston to advance into the cylinder and displace fluid through the metering passageway into the reservoir as the shuttle strikes the picker and moves the picker further outwardly from said shuttle-receiving position, said check device absorbing the energy of the shuttle to bring the picker and shuttle to a dead stop without rebound, said return means including a pair of opposed springs arranged so that they always tend to return said picker to the same predetermined shuttle-receiving position regardless of the resistance offered by the check device.

14. In combination in a loom, lay mechanism, a shuttle picker, means mounting said picker for motion between an outward position and an inward position, power means associated with said picker to move it toward its inward position to cast a shuttle, return means applying a force tending to move said picker toward its outward position, means for applying a force to said picker balancing the force of said return means when the picker is returned to a predetermined shuttle-receiving position intermediate said inward and outward positions, and a hydraulic check device for said picker, said check device including a liquid reservoir and a cylinder, a piston in said cylinder, a liquid metering passageway connecting said cylinder and reservoir, means linking the piston to the picker arranged to cause the piston to advance into the cylinder

and displace fluid through the metering passageway into the reservoir as the shuttle strikes the picker and moves it further outwardly from said shuttle-receiving position, and means to adjust the net resistance offered by the check device after the picker is carried outwardly of said shuttle-receiving position so that said check device absorbs the energy of the shuttle to bring the picker and shuttle to a dead stop without rebound.

15. A checking device for a shuttle in flight across a loom, comprising impact means engageable by the shuttle approaching the terminus of said flight, a cylinder member, a piston member in said cylinder member, a reservoir, liquid in said reservoir and completely filling said cylinder around said piston member at all times, means operatively connecting said piston member to said impact means, the impetus of said shuttle striking said impact means advancing said piston against a substantially isolated component body of said liquid disposed in the path of said piston, means formed on said piston and cylinder members cooperating to form an escape port for transfer of said isolated body of liquid from the cylinder to the reservoir, relative motion of said cylinder and piston members progressively reducing the flow area of said escape port as said members telescope together, to decelerate the forward motion of the shuttle after it strikes said impact means in the course of said flight and bring the shuttle and impact means to a dead stop without rebound, said escape port providing the sole passageway for liquid transfer as the impact means and shuttle come to rest.

16. A checking device for a shuttle in flight across a loom, comprising impact means engageable by the shuttle approaching the terminus of said flight, a cylinder element, a piston element in said cylinder element, a reservoir, liquid in said reservoir and completely filling said cylinder element around said piston element at all times, the impetus of said shuttle striking said impact means advancing said piston against a substantially isolated component body of said liquid disposed in the path of said piston element, and passageway means formed in one of said elements for controlling the rate of displacement of said isolated body of liquid from in front of said piston element to the reservoir, said passageway means being progressively reduced as said piston element advances into the cylinder

element after the shuttle strikes the said impact means, the restriction afforded by said passageway means for a given relative position of the cylinder and piston elements being independently adjustable, the restriction to liquid transfer afforded by said passageway means providing substantially the entire checking action that brings the shuttle to a stop.

17. In combination in a loom, lay mechanism, a shuttle picker, means mounting said picker for motion between an outward position and an inward position, power means associated with said picker to move it toward its inward position to cast a shuttle, return means applying a force tending to move said picker toward its outward position, means for opposing the force of said return means and preventing said return means from further moving the picker when the latter is returned to a predetermined shuttle-receiving position intermediate said inward and outward positions, a hydraulic check device for said picker, said check device including liquid reservoir, piston, and cylinder elements, a liquid metering passageway connecting said cylinder and reservoir, means linking one of said elements to the picker and the other element to a loom part and arranged to cause the piston to advance into the cylinder and displace fluid through the metering passageway into the reservoir as the shuttle strikes the picker and moves it further outwardly from said shuttle-receiving position, and means to adjust the net resistance offered by the check device after the picker is carried outwardly of said shuttle-receiving position so that said check device absorbs the energy of the shuttle to bring the picker and shuttle to a dead stop without rebound.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
677,562	Comins	July 2, 1901
831,615	Lammert	Sept. 25, 1905
1,765,314	Stuart	June 17, 1930
2,160,339	Moessinger	May 30, 1939
2,315,531	Lucht	Apr. 6, 1943
2,354,340	Utter	July 25, 1944
2,426,971	Kottemann	Sept. 2, 1947
2,433,764	Kottemann	Dec. 30, 1947