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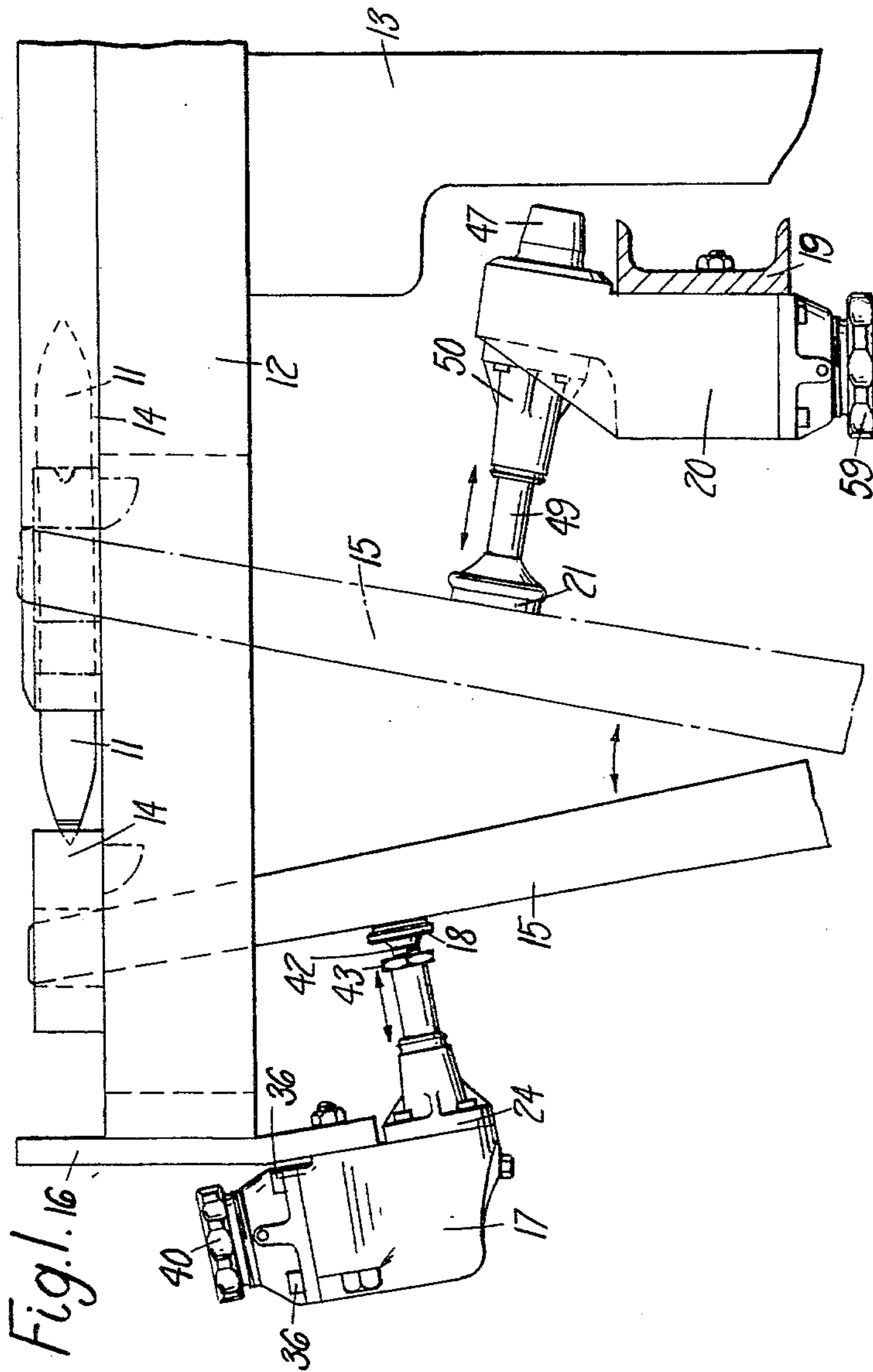
R. R. LEADER ET AL

3,180,369

FLUID CHECK

Filed Oct. 13, 1961

3 Sheets-Sheet 1



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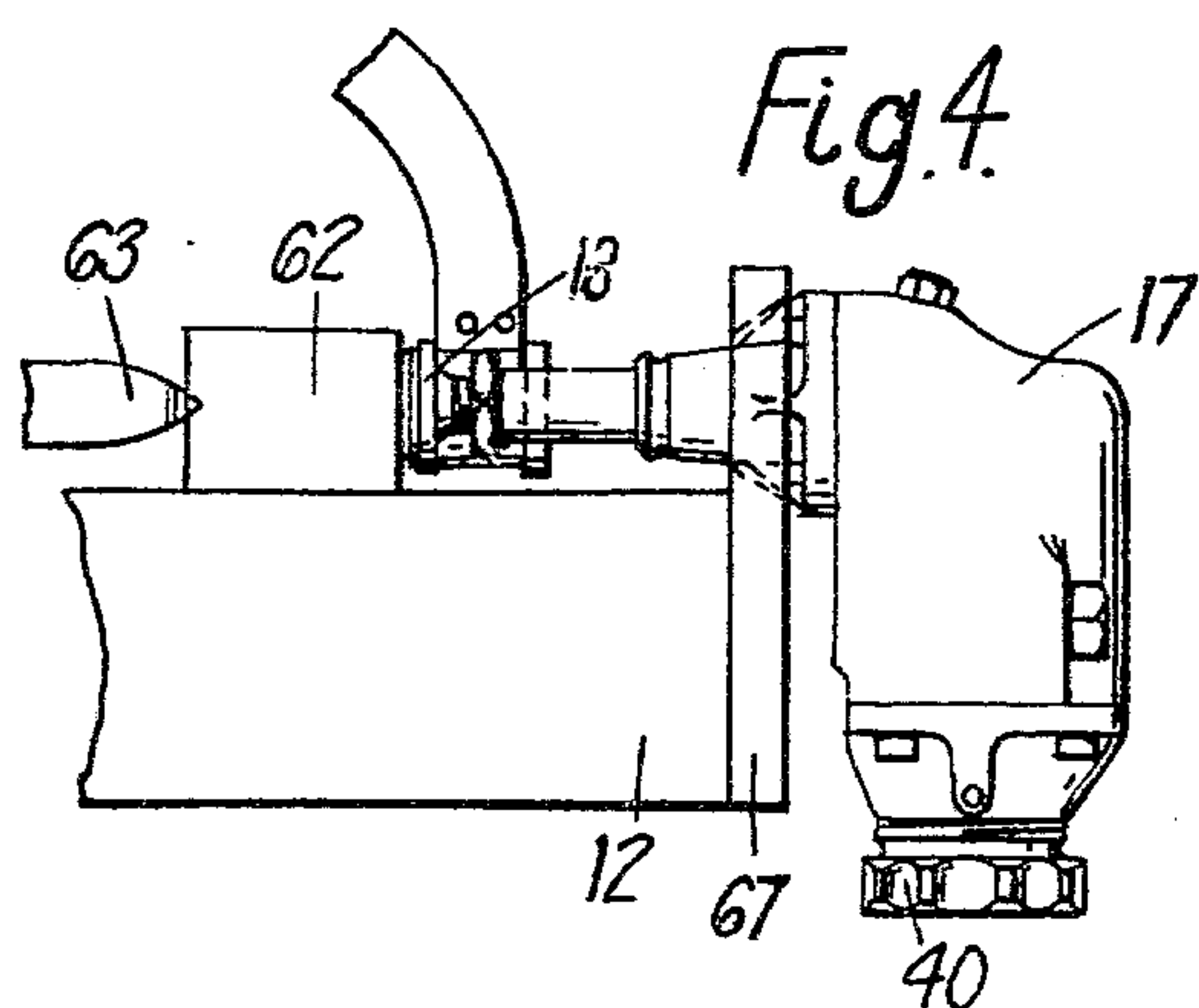
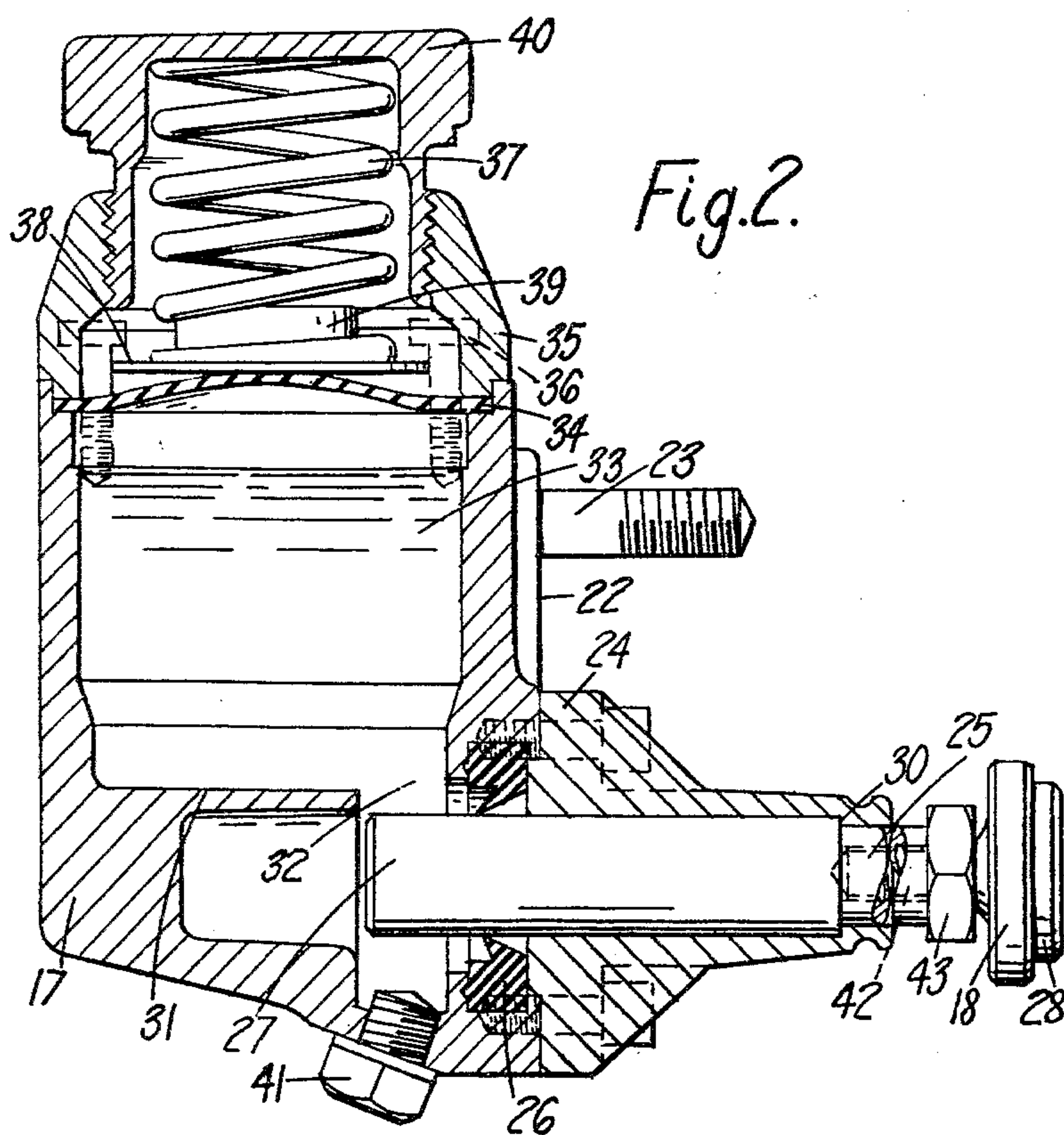
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3 Sheets-Sheet 2



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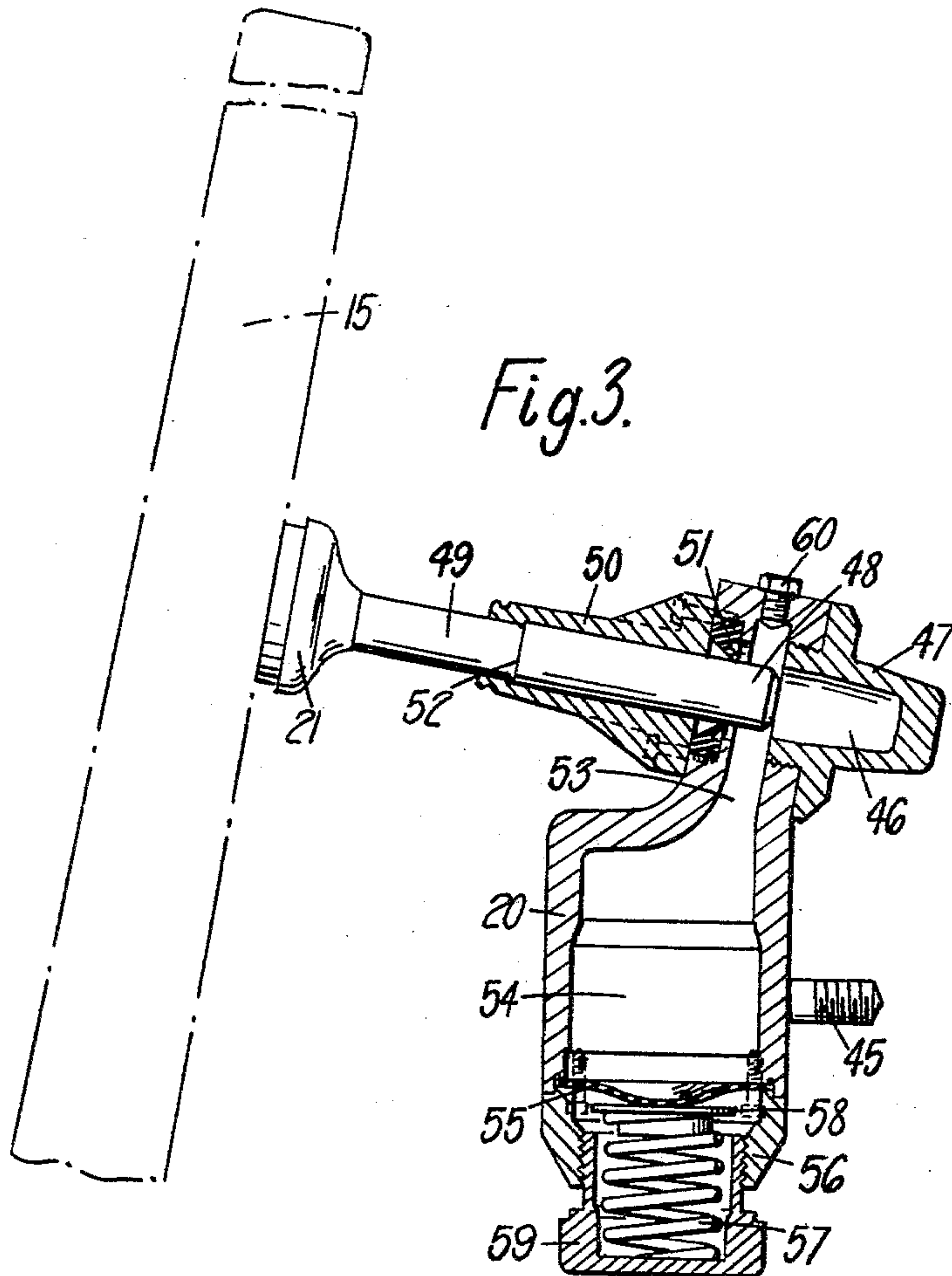
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3 Sheets-Sheet 3



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9 Claims. (Cl. 139—161)

This invention comprises improvements in or relating to shuttle and like control devices for looms. In an automatic loom the shuttle is thrown by picker sticks from side to side through the warp threads at high speed and it is necessary to employ a form of buffer for the shuttle on the receiving end of the movement to cushion the shock of bringing the shuttle to rest. It has been proposed to employ an oleo-pneumatic device as the buffer for this purpose but such devices require to be accurately inflated to the requisite pressure and under the practical conditions which obtain in mills it is difficult to ensure that the inflation pressure will be correctly maintained. It is an object of the present invention to provide an alternative and more easily regulated device.

Moreover, in an automatic loom the picker stick when it is operated to throw the shuttle is accelerated very fast by a cam controlled device at the appropriate moment in the cycle of operations. As the picker stick engages the shuttle it has to accelerate it and when it has accelerated the shuttle to its maximum speed the stick itself must be arrested in a short distance and without damage. Usually this has been effected by a stretched leather thong arranged across the path of movement or by a rubber buffer ring but when loom speeds are high leather thongs are inadequate and the life of buffer rings is short. It is therefore a further object of the present invention to provide means for more effectively arresting the picker stick. The invention provides a form of buffering device which has been found valuable both for arresting the shuttle and for arresting the picker-stick. Accordingly the invention includes a shuttle or picker-stick control device for a loom comprising a buffer element adapted to be disposed in line with the shuttle or picker-stick, a buffer-piston operatively connected to the buffer to move therewith, a buffer cylinder in which the piston works and which serves as a buffer-liquid container, a movable closure to the buffer-liquid container with which in use the buffer-liquid is in direct contact, and spring-means urging the closure inward.

It will be appreciated that the spring keeps the oil under pressure and after the shuttle or the picker-stick has been arrested the oil pressure returns the buffer to its initial position.

The area of the movable closure may be several times greater than that of the buffer piston so that the buffer piston may have an adequate stroke to cushion the moving part without causing the spring to have undue deflection. In the preferred form the movable closure consists of a flexible diaphragm and the spring is outside the diaphragm, where if desired it may be easily adjusted.

Preferably the buffer piston operates in the cylinder with clearance, the part of the cylinder behind the piston being partially closed by the narrow clearance on the inward stroke so that the device acts as a dashpot.

The following is a description, by way of example, of one construction in accordance with the invention:

In the accompanying drawings FIGURE 1 is a general arrangement of part of a loom showing a buffer for the shuttle to bring it to rest and a buffer for the picker-stick to bring it to rest after the shuttle has been shot,

FIGURE 2 is a vertical section through the buffer for arresting the shuttle,

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FIGURE 3 is a similar section through the buffer for arresting the picker-stick, and

FIGURE 4 shows an alternative shuttle control buffer.

Referring to FIGURE 1, 11 represents the shuttle which runs on a slay 12 of a loom, part of the framework of which is indicated at 13. The shuttle engages at the end of its movement a picker 14 which is operated by a picker-stick 15. All these parts are normal loom parts and in FIGURE 1 of the drawings there is shown an under-pick loom in which the picker-stick 15 engages the picker 14 from below. When the shuttle is thrown the picker-stick 15 is moved rapidly from the position shown in full lines to the position shown in chain lines. It is necessary to arrest the shuttle when it engages the picker 14 and moves the picker-stick with the picker to the full line position and it is necessary to arrest the picker-stick 15 at the moment when it has shot the shuttle back to the right, as viewed in the figure. In the construction shown in FIGURE 1, on the end of the slay 12 there is a bracket 16 which carries a buffer cylinder casting 17 on which is mounted a buffer 18 to engage the back of the picker-stick and bring the shuttle to rest. There is also provided, mounted on a cross-member 19 of the loom, a second buffer cylinder 20 which operates a buffer 21 in front of the picker-stick to arrest the pick after it has shot the shuttle.

FIGURE 2 shows the interior of the buffer cylinder casting 17. The cylinder has a face 22 carrying bolts 23 by which it may be secured to the bracket 16.

The end of the cylinder 17 which faces the back of the picker-stick 15 has a face which is closed by a removable cover 24. Through the cover there passes a stout stem 25 which forms a piston rod and a suitable packing ring or gland 26 is provided. The ring 26 is clamped between the cover 24 and the bottom of a recess in the face 22. Within the cylinder the stem terminates in a piston face 27 and outside it carries a screwed head 28 which forms a buffer and is covered with a rubber pad 29 to engage the back of the picker-stick. Outward movement of the piston rod 25 is limited by a shoulder 30. The piston face 27 is smaller in diameter than the cylinder part of the cylinder casting 17 into which it enters. This cylinder part is delimited by a wall 31 which is tapered so that as the buffer 28 is forced inwardly the clearance between the cylinder wall 31 and the piston 27 decreases. In front of the tapered portion 31 which surrounds the piston there is a large port 32 which extends upwardly into an oil chamber 33 which is entirely filled with oil or other suitable buffer-liquid and covered in at the top with a flexible rubber diaphragm 34. Therefore a blow on the buffer will force the piston 27 rearwardly but in moving rearwardly the oil has to escape around the clearance between the piston 27 and the cylinder wall 31 and the force required to effect this increases as the buffer is pushed rearwardly.

The diaphragm 34 is clamped in place around its edges by a spring box 35 which is secured to the cylinder casting 17 by screws 36 and which contains a strong helical spring 37. Between the spring and the rubber diaphragm there is a steel washer 38 having a center spigot 39 which serves to centre the spring relatively to the washer and the diaphragm. In the upper end of the spring box is a screwed plug 40 which is co-axial with the spring and is supported in a threaded aperture in the top of the spring box. The plug 40 has a fluted head whereby it can be adjusted. A plug 41 for filling the oil chamber with oil is provided. The diaphragm 34 is shaped so as to bulge upwardly before pressure is applied to it.

In use, after the oil chamber 33 has been filled with oil, the oil is put under pressure by adjusting the plug 40 to compress the spring 37. This forces the piston 27 with its buffer 28 outwardly to the end of its movement.

As the buffer is in line with the movement of the picker-stick it will hold the stick forward from its rearmost position by an amount equal to the stroke of the buffer as shown in FIGURE 1. When the picker 14 is hit by the shuttle the buffer 18 will be forced back and will ensure that the shuttle is brought to rest with minimum shock and the spring 37 will then move the buffer outwardly again to its normal position, where the picker-stick is ready to throw the shuttle back as soon as the loom mechanism operates it.

The movement made by the spring 37 and the diaphragm 34 is small compared with that of the piston 27 due to the large difference in the cross-sectional areas of the piston 27 and diaphragm 34.

The pressure on the oil is readily adjusted by means of the plug 40 without requiring any inflation. The exact position of the buffer 18 can be adjusted by reason of the fact that the head is mounted in the piston rod 25 by a screwed stem 42 and fastened by a lock nut 43.

Referring now to FIGURE 3 of the drawings it will be seen that the buffer cylinder 20 is substantially similar in general construction to the buffer cylinder 17 already described but is inverted. It carries studs 45 for securing it to the cross-member 19 of the loom and it comprises a tapered cylindrical portion 46 in a cap 47 secured to the cylinder body 20 by a threaded spigot. The tapered cap 47 is in line with a piston 48 which forms the back end of the stem 49 of the buffer and the stem works in a removable cap 50 which also serves to hold in place a rubber sealing ring 51. As before, there is a shoulder 52 for limiting outward movement of the piston rod 49. There is a port 53 leading laterally from the piston 48 into the main part of the oil chamber 54 within the cylinder block 20. The bottom of the oil chamber 54 is closed in by a diaphragm 55 which is clamped in place by a spring box 56 containing a spring 57 which bears on the diaphragm 55 through a washer 58 and is adjustable by means of a screwed cap 59. There is a filling plug 60. All these parts operate in the same way as with the buffer 18 but it will be appreciated that the strength of the spring 57 and its position of adjustment may be varied from that of the buffer 18 to allow for the fact that the picker-stick, when it is to be arrested in the shot position, after the shuttle has left it, will be travelling at a great speed and will have considerable momentum.

Referring to FIGURE 4, this shows an alternative arrangement for the dashpot 17 for use in an over-pick loom. In this case the slay 12 carries an end plate 61 and the cylinder 17 is bolted to it in an inverted position with the buffer head 18 in line with the picker 62 and with the axis of the shuttle 63. The general operation is however the same as before.

Instead of using a rubber diaphragm as the movable closure for the oil chamber a spring-pressed piston could be employed.

We claim:

1. A control device for shuttles and picker-sticks in looms comprising in combination a buffer element adapted to be disposed in line with the shuttle or picker-stick, a buffer-piston operatively connected to the buffer element to move therewith, a container having a cylinder part in which the buffer-piston works, buffer liquid completely filling the container and the cylinder part, a flexible closure to the container with which in use the buffer liquid is in direct contact, the container, the closure and piston being totally sealed against passage of liquid into and out of the container and the cylinder part, spring means urging the closure inward.

2. A control device as claimed in claim 1 wherein the flexible closure consists of a flexible diaphragm.

3. A control device as claimed in claim 2, wherein the

spring means consists of a spring located outside the diaphragm and provided with adjustment means.

4. A control device as claimed in claim 1, wherein the buffer piston operates in the cylinder part with clearance, a part of the cylinder part behind the piston being partially closed by the narrow clearance on the inward stroke so that the device acts as a dashpot.

5. A control device for moving parts, namely shuttles and picker-sticks in looms, comprising in combination a buffer cylinder casting having a cylinder part and a chamber communicating with the cylinder part, a gland in one wall of the cylinder part, a buffer-piston operating in the gland and cylinder part and carrying a buffer head adapted to be set in line with the moving part to be controlled, a flexible closure which seals the chamber against access of air, spring means outwardly of the flexible closure to urge the flexible closure into the chamber, and buffer-liquid completely filling the chamber and cylinder part.

6. A control device as claimed in claim 5 wherein the area of the closure is several times greater than the area of the piston.

7. A control device for moving parts, namely shuttles and picker-sticks in looms, comprising in combination a buffer cylinder casting having a cylinder part and a chamber communicating with the cylinder part, a gland in one wall of the cylinder part, a buffer-piston operating in the gland and cylinder part and carrying a buffer head adapted to be set in line with the moving part to be controlled, a flexible diaphragm which extends across and seals the chamber against access of air, spring means outwardly of the diaphragm to urge the flexible diaphragm into the chamber, and buffer-liquid completely filling the chamber and cylinder part.

8. A control device for moving parts, namely shuttles and picker-sticks in looms, comprising in combination a buffer cylinder casting having a cylinder part and a chamber communicating with the cylinder part, a gland in one wall of the cylinder part, a buffer-piston operating in the gland and cylinder part and carrying a buffer head adapted to be set in line with the moving part to be controlled, a flexible diaphragm which extends across the chamber and seals it against access of air, a plate bearing on the exterior of the diaphragm, a spring bearing on the plate to urge it toward the chamber, and buffer-liquid completely filling the chamber and cylinder part.

9. A control device for moving parts, namely shuttles and picker-sticks in looms, comprising in combination a buffer cylinder casting having a cylinder part and a chamber communicating with the cylinder part, a gland in one wall of the cylinder part, a buffer-piston operating in the gland and cylinder part and carrying a buffer head adapted to be set in line with the moving part to be controlled, a flexible diaphragm which extends across the chamber and seals it against access of air, a plate bearing on the exterior of the diaphragm, a spring bearing on the plate to urge it toward the chamber, adjustable means to back up the spring, and buffer-liquid completely filling the chamber and cylinder part.

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