

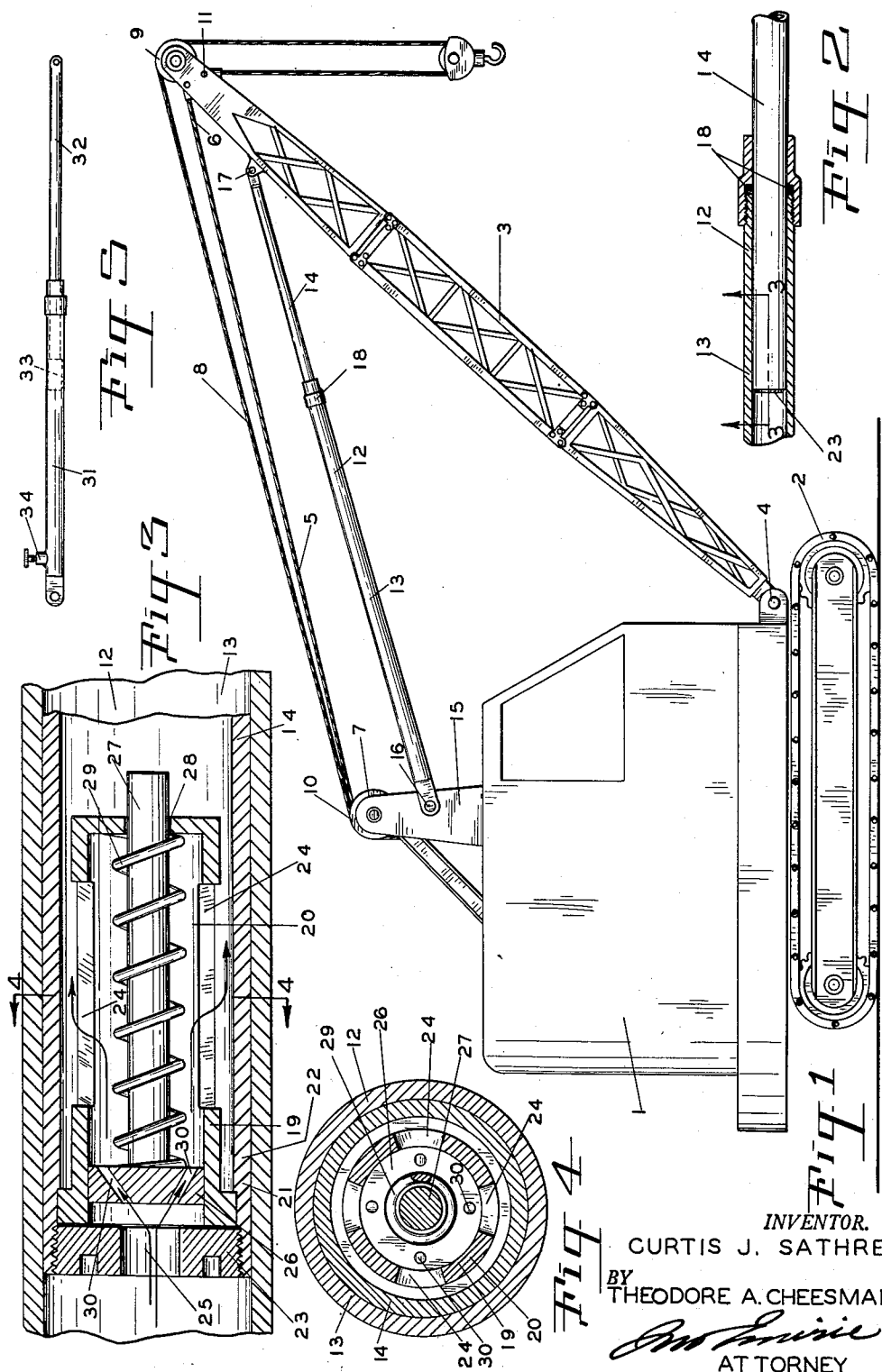
Feb. 10, 1953

C. J. SATHRE ET AL
SNUBBER FOR CRANE BOOMS

2,627,985

Filed Aug. 27, 1951

2 SHEETS—SHEET 1



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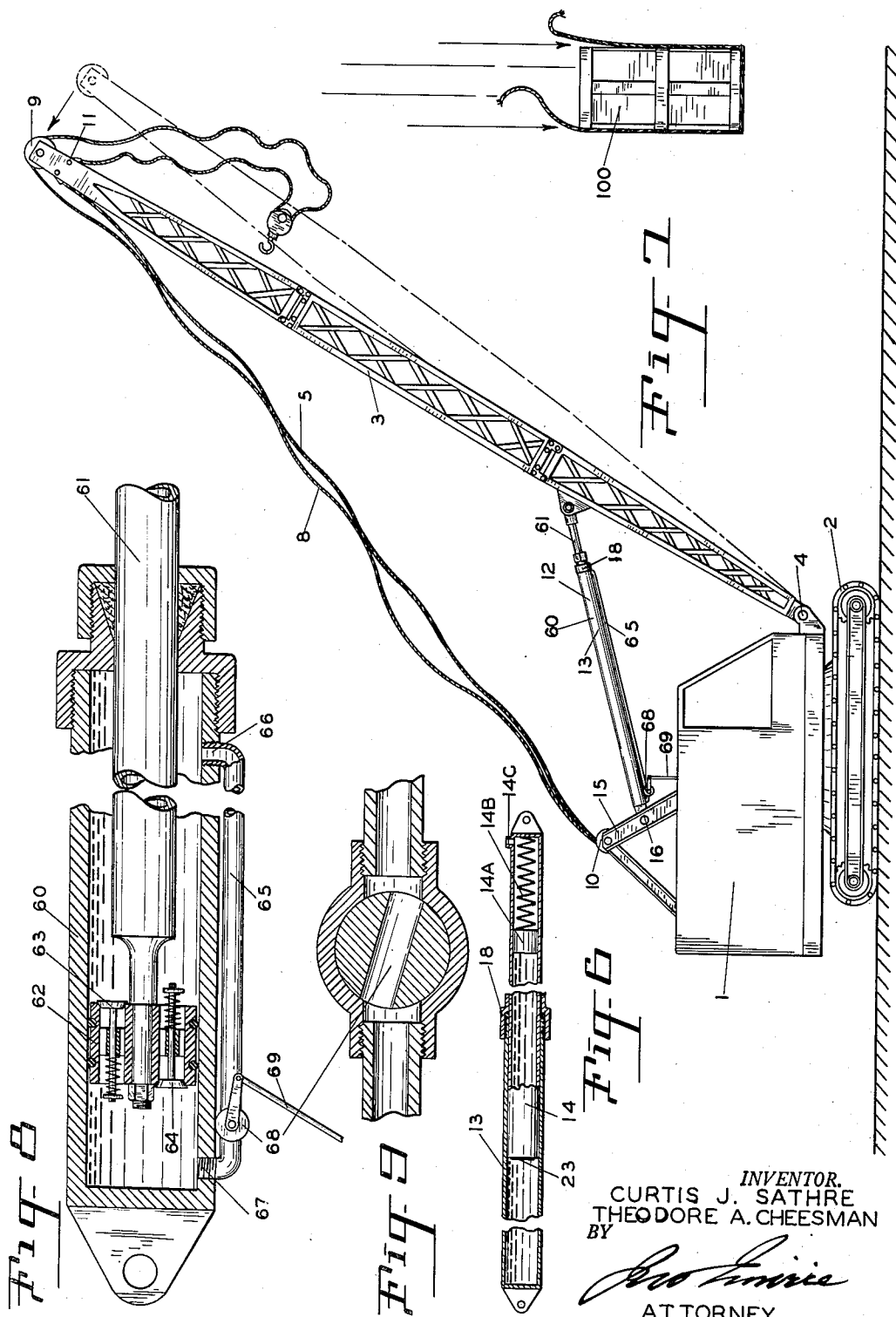
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2 SHEETS—SHEET 2



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2,627,985

SNUBBER FOR CRANE BOOMS

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1

Our invention relates to snubbers for crane booms and is particularly adapted to portable cranes.

The primary object of our invention is to connect a snubber or dashpot mechanism between the boom and the body of the crane to prevent the boom from pivoting back over the cab of the crane in the event of cable or tackle breakage.

Heretofore when a crane was being operated, having its boom lifting a heavy load, and in case the cable or tackle broke loose from the load the lifting boom would recoil or snap back over the lifting crane mechanism causing great damage as to the boom, to the crane and oftentimes injuring or killing the operator.

With our new and improved snubber mechanism, the boom is permitted to be raised and lowered in normal operation, but in the event of a sudden release of the load our snubber prevents the said boom from recoiling or snapping back over the crane mechanism.

These and other incidental objects will be apparent in the drawings, specification and claims. Referring to the drawings:

Figure 1 is a side view of a portable crane having our new and improved snubber mechanism mounted thereon.

Figure 2 is a fragmentary section of a preferred form of dashpot or snubber arrangement.

Figure 3 is an enlarged sectional view of the fluid by-pass valve associated with the snubber cylinders.

Figure 4 is an end sectional view of Figure 3, taken on line 4-4.

Figure 5 is another preferred form of snubber.

Figure 6 illustrates a preferred method of balancing the fluid within the snubber in its operation.

Figure 7 illustrates the section of the snubber when the load is suddenly released.

Figure 8 is another preferred form of telescopic snubber construction, illustrating the use of a piston having by-pass valves therein, including a by-pass for the fluid permitting normal operation of the snubber.

Figure 9 is an enlarged detail sectional view of the by-pass valve.

Referring specifically to the drawings, particularly to Figs. 1 and 7, a typical crane in general is indicated by numeral 1, rotatably mounted upon the usual tracks 2, the boom of the crane being indicated at 3 and pivotally mounted to the crane at 4. The upper end of the boom is supported by the usual cable 5, which is fixedly secured to the boom at 6 and threaded about

2

the sheave at 7 leading down to the hoisting drums, not here shown.

The lifting cable 8 is shown trained about the pulleys 9 and 10 and leading down to the hoisting drums, not here shown. One end of the cable 8 is dead-ended in the usual manner at 11.

Our invention consists of providing a dashpot or snubber 12, consisting of tubular cylinders 13 and 14. The cylinder 14 is pivotally mounted to the upwardly extending frame 15 of the crane 1 at 16, while the cylinder 14 is pivotally mounted to the boom 3 at 17. The cylinder 14 operates with a working fit within the cylinder 13, as best indicated in Figures 2, 3 and 4 through a stuffing box 18.

Located within the lower end of the cylinder 14 is a by-pass valve mechanism 19. This valve mechanism consists of a cylindrical body 20, having a shoulder 21 which fits against the shoulder 22 formed within the end of the cylinder 14, the said valve being locked in place by the threaded plug 23. The body 20 of the valve unit has openings 24 therearound. This portion of the body is slightly smaller than the inside diameter of the cylinder 14. These openings 24 are provided for allowing fluid to pass from the cylinder 13 into the cylinder 14, or vice versa as the snubber operates.

A relative large opening 25 is located centrally of the plug 23 which permits fluid to pass through the said plug against a relief valve or piston 26. The valve 26 has a stem 27 which is guided through the opening 28 of the body 20 of the valve. A spring 29 normally holds the piston or valve 26 in closed position shown in Figure 3. When the boom 3 is being raised or lowered in a normal manner, fluid passes through the openings 30 from the port 25 in or out of the valve body 20, and through the openings 24 from the cylinder 14 or the cylinder 13, without resistance being offered to the said flow of fluid.

In the event the boom 3 should snap back towards the cab by failure of the tackle or line to hold the load being raised, the fluid in the cylinder 13 will be placed under pressure and forced through the port 25 and openings 30. As the openings 30 are restricted in size, fluid passage is limited and this functions to snub the boom. If the surge of fluid is too great to be accommodated by these passages, however, it will exert a pressure against the valve or piston 26 causing it to move towards and open the ports 24, which will allow the fluid to pass directly through these ports rapidly to relieve excess pressure and prevent the boom from being arrested in its re-

coil movement. When the excess pressure is relieved, the valve 26 will be closed by its spring 27, finally bringing the boom to a standstill before striking the cab of the hoisting unit.

Referring to Figure 6, we illustrate a means of maintaining the fluid within the area of the by-pass valve when the snubber is extended or telescoped. A floating piston 14A is located in the tube 14 and is maintained against the fluid by a spring 14B, although the fluid itself would tend to maintain this piston against the fluid due to vacuum created when the snubber is extended and to the pressure against the pistons when the snubber is telescoped. Air within the tube 14 ahead of the piston 14A may escape through the port 14C, also air may enter the port 14C preventing vacuum being created ahead of the piston when the tubes are extended.

Referring to Figure 8, we illustrate the use of a piston 62 working within the main snubber tube 60, the piston being connected to the piston rod 61. Relief valves 63 and 64 are located within the piston to by-pass the fluid in the event that the boom recoils backward in case the load 100 is suddenly released from the rigging, or in the event the cable 5 should break the boom would be arrested in its fall by the action of the valve 64. The object of the valves 63 and 64 is to gradually retard the movement of the boom without causing an abrupt stoppage of its movement.

A by-pass pipe 55 entering each end of the cylinder 60 having a shut-off valve 68 operated by control rod 69 controls the by-passing of the fluid within the cylinder 60 under normal boom operation, or it may stop the movement of the boom entirely. For instance in the event the boom was about to fall, the operator could pull the rod 69 which would shut off the by-passing of fluid through the piping 55, but valve 64 of the piston 62 would be opened due to the weight of the falling boom, absorbing the initial shock. After the initial shock took place, the valve 64 would close stopping the falling of the boom. With this construction it can be readily understood that the recoil of the boom due to release of a heavy load is prevented, also the boom is prevented from falling in the event of cable breakage.

In Figure 5 we illustrate another preferred form that might be used which would be simply a master cylinder 31, having a piston rod 32 slidably mounted therein and having the piston 33 working within the cylinder 31 against the compression of air being used as a fluid and having an adjustable release valve 34 for governing the escape of air while the piston 33 is being operated within the cylinder 31.

We do not wish to be limited to the exact mechanism used in our snubber or dashpot mechanism, but we have found the one first described in this specification is admirably adapted to carrying out the object of our invention, and that is the recoil or snap back of the boom when the load is suddenly released.

What we claim is:

1. A crane comprising a support, a boom pivotally mounted on said support, means on said support and connected with said boom for raising and lowering said boom, and a telescopic strut pivotally connected between said support and said boom, said telescopic strut including an elongated cylinder and an elongated hollow piston rod slidable in said cylinder and jointly forming a fluid reservoir, the inner end of said piston rod including a piston portion having restricted passages therethrough to enable limited fluid passage between said cylinder and piston rod for permitting normal movement of the boom but restricting rapid flow of fluid and snubbing a sudden uncontrolled movement of the boom, and relief valve means in communication with opposite sides of said piston portion to permit rapid limited flow of fluid past said piston portion to relieve excessive pressure due to a sudden uncontrolled movement of the boom.

2. A crane comprising a support, a boom pivotally mounted on said support, means on said support and connected with said boom for raising and lowering said boom, and a telescopic strut having pivot means at one end connected to said boom and pivot means at the other end connected to said support, said telescopic strut including an elongated cylinder forming a fluid reservoir and an elongated piston rod reciprocal in said cylinder, the outer ends of said cylinder and piston rod respectively supporting said pivot means, a piston portion on the inner end of said piston rod and slidable in said cylinder, restricted passage means in communication with opposite sides of said piston portion to enable limited fluid passage past said piston portion for permitting normal movement of the boom but restricting rapid fluid passage and thereby snubbing a sudden uncontrolled movement of the boom, and relief valve means also in communication with opposite sides of said piston portion to permit rapid limited flow of fluid past said piston portion to relieve excessive fluid pressure due to a sudden uncontrolled movement of the boom.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,281,079	Sears	Oct. 8, 1918
1,281,774	Franckaerts	Oct. 15, 1918
2,127,007	Paxton	Aug. 16, 1938
2,144,583	Focht	Jan. 17, 1939
2,485,953	Barth	Oct. 25, 1949
2,509,686	Huston	May 30, 1950

FOREIGN PATENTS

Number	Country	Date
586,065	France	Dec. 22, 1924