Aug. 1, 1967 C. A. SCAPEROTTO 3,333,717

ATTACHMENT FOR LOAD-HANDLING MACHINERY

Filed Dec. 15, 1965 2 Sheets-Sheet 1

FIG. 1.

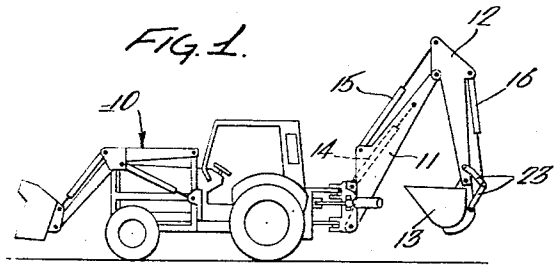

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FIG. 2.

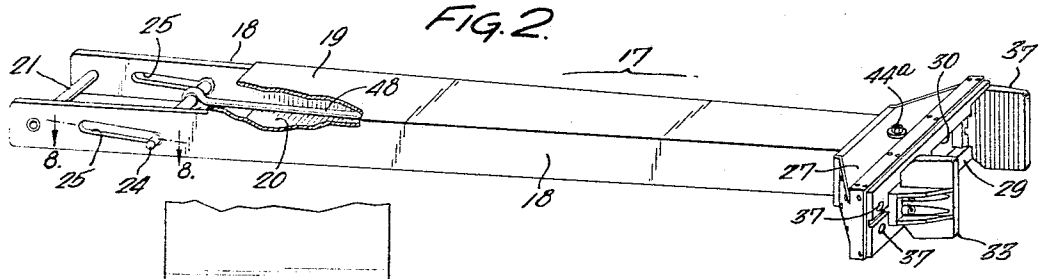


FIG. 8.

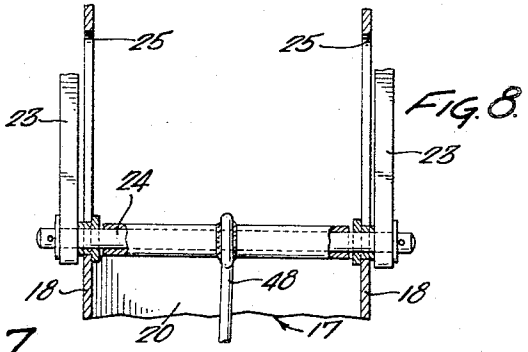


FIG. 5.

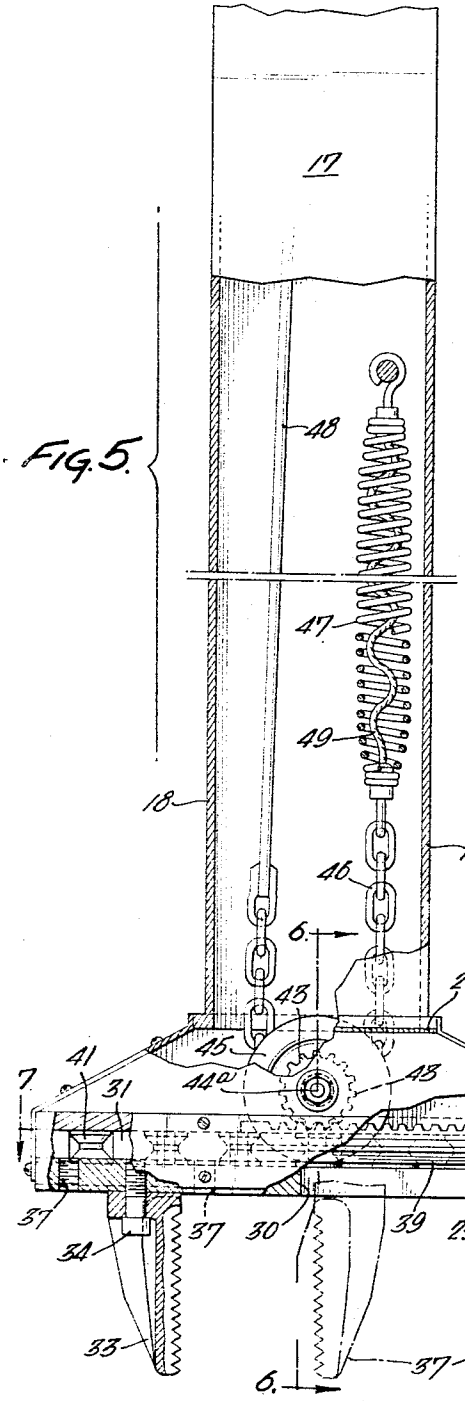


FIG. 7.

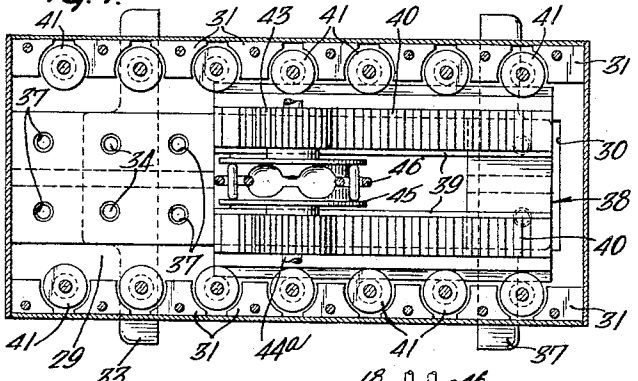
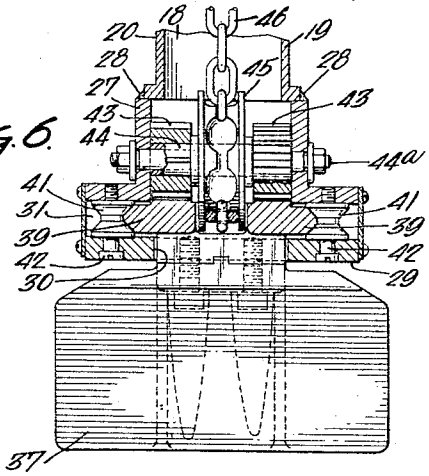


FIG. 6.



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ATTACHMENT FOR LOAD-HANDLING MACHINERY

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ABSTRACT OF THE DISCLOSURE

A crane boom for attachment to the end of the bucket arm of a backhoe. The crane boom has a pair of gripping jaws at its outer end which can be moved toward or away from one another to grab or release an article and are connected by means of linkage mechanism to the bucket cylinder so that actuation of the bucket cylinder will cause movement of the jaws.

The present invention relates to new and useful improvements in attachments for load-handling machines such as backhoes and more particularly to new and useful improvements in a boom structure which may be attached to a load-handling machine such as a backhoe to increase the utility and versatility of the machine.

At the present time, backhoes are used extensively for excavation in construction work. In many instances while the excavating is being done, the site is being prepared for later construction by the delivery of material and supplies and performing certain of the building operations. When this occurs, the contractor normally has to transport a small crane or hoist to the building site to help with the unloading of material and supplies and the initial construction work even though he might have one or more backhoes or similar equipment available at the site.

With the foregoing in mind, a primary object of the present invention is to provide a novel attachment for load-handling machinery such as backhoes which may be readily and easily attached to the machine to permit the performance of a variety of lifting and hoisting functions.

Another object of the present invention is to provide a novel boom structure which may be secured to a backhoe in place of the usual bucket, may be easily controlled by the operator of the machine and which may be used to grab, lift and move heavy loads.

A still further object of the present invention is to provide a novel boom which may be used in conjunction with a backhoe or similar machine and which is of relatively simple construction and may be manufactured easily and cheaply.

These and other objects of the present invention and the various features and details of the operation and construction thereof are hereinafter more fully set forth and described with reference to the accompanying drawings, in which:

FIG. 1 is a schematic view of a conventional backhoe prior to attachment of the boom structure of the present invention;

FIG. 2 is a perspective view of a boom made in accordance with the present invention;

FIG. 3 is a fragmentary view of a portion of a backhoe with the boom of the present invention secured thereto and utilized to lift a piece of construction material;

FIG. 4 is a fragmentary side elevational view similar to FIG. 3 showing the boom of the present invention used in conjunction with a backhoe for moving and placing a piece of construction material;

FIG. 5 is an enlarged fragmentary longitudinal sectional view showing the construction of the outer end of one form of boom made in accordance with the present invention;

FIG. 6 is a fragmentary sectional view taken on line 6—6, FIG. 5;

FIG. 7 is a transverse sectional view taken on line 7—7, FIG. 5; and

FIG. 8 is a fragmentary longitudinal sectional view taken on line 8—8, FIG. 2.

Referring more specifically to the drawings and FIG. 1, there is shown a conventional backhoe comprising a tractor **10** having a boom **11** mounted thereon in such a manner that the operator may effect pivotal movement of the boom **11** about both horizonal and vertical axes. A bucket arm **12** is mounted at the outer end of the boom **11** for pivotal movement about a horizontal axis. The bucket **13**, in turn, is mounted at the outer end of the bucket arm **12** for pivotal movement about a horizontal axis. Pivotal movement of the boom **11**, bucket arm **12** and bucket **13** about their horizontal axes is accomplished by a hydraulic boom cylinder **14**, a hydraulic bucket arm cylinder **15** and a hydraulic bucket cylinder **16**, respectively, all of which may be controlled by the operator from conventional controls on the tractor **10**.

In accordance with the present invention, a crane boom **17**, as shown in FIG. 2, is provided which may be secured to the outer end of the bucket arm **12** in place of the bucket. The crane boom **17** may have a box frame structure comprising longitudinal side panels **18**, **18**, a top panel **19** and a bottom panel **20**. Extending between the inner ends of the side panels **18** is a tube **21** which provides a bushing for a pivot pin **22** by means of which the crane boom **17** is pivotally secured to the outer end of the bucket arm **12** as shown in FIG. 4. A pair of bucket cylinder links **23**, **23** extending from the end of the piston rod of the bucket cylinder **16** are pivotally secured as shown in FIG. 8 to opposite ends of an actuating pin **24** which extends transversely between the opposite side panels **18**, **18** of the crane boom **17**. The ends of the actuating pin **24** project outwardly beyond the side panels **18**, **18** through substantially longitudinal slots **25**, **25** formed in the side panels **18**, **18**. This provides, in effect, a lost motion linkage between the bucket cylinder and the crane boom. During normal operation, as the piston of the bucket cylinder **16** is retracted, the actuating pin **24** will be pulled toward the ends of the slots **25**, **25** adjacent the inner end of the crane boom **17** and upon engagement of the actuating pin **24** with the ends of the slots **25**, **25**, the crane boom will be pivoted upwardly about its pivot pin **22**. If desired, a lifting hook **26** may be secured to the bottom panel of the crane boom **17** to permit the lifting and moving of bulk loads of material by engaging cables or chains surrounding the load with the hook **26**.

An important feature of the present invention is the provision of novel gripping jaws at the outer end of the crane boom which may be caused to close about an article being lifted or moved and which are controlled by the operation of the bucket cylinder **16**. This jaw structure includes a stationary and a movable jaw, with the movable jaw being interconnected by operating mechanism as more fully described hereinafter to the actuating pin **24** so that the initial retraction of the bucket cylinder **16** will cause the movable jaw to move inwardly toward the stationary jaw to securely grip the article to be moved. Thereafter, further retraction of the piston of the bucket cylinder **15** will cause the desired movement of the crane boom **17**. Conversely, if an article has been gripped and lifted by the jaw structure at the outer end of the crane boom, the jaws may be caused to release the article by advancing the piston of the bucket cylinder **16**.

The jaw structure at the end of the crane boom **17**, as illustrated in FIGS. 5, 6 and 7 of the drawings, includes a pair of flanged side plates **27, 27** welded or otherwise secured to the ends of the top and bottom panels **19** and **20** as indicated at **28**. A base plate **29** having a central opening **30** therein is riveted or otherwise secured to the flanges of the side plates **27, 27** with the base plate being spaced from the flanges of the side plates by a plurality of spacer lugs **31** as shown in FIG. 7. The stationary jaw **33** extends transversely of the base plate **29** and is bolted or otherwise secured directly to the base plate as indicated at **34**. If desired, a series of bolt holes **37** may be provided in the base plate **29** to permit longitudinal adjustment of the stationary jaw **33**, permitting the jaw structure to grip a wide variety of sizes of material. The movable jaw element **37** is bolted or otherwise secured to the base of a U-shaped supporting yoke **38** which is slidably mounted between the base plate **29** and the flanges of the side plates **27**. The yoke **38** includes a pair of spaced parallel side arm portions **39, 39** which have a series of uniformly spaced teeth **40** in the upper surface thereof forming a rack extending the full length thereof. The outer side edges of each of the arms **39** are beveled as shown in FIG. 6 and are received within a series of concavely tapered guide rollers **41** which are rotatably mounted as indicated at **42** between the upper surface of the base plate **30** and the lower surface of the flanges of the side plates **27**. These rollers **41** support the yoke **38** and permit free longitudinal movement of the yoke **38** and the movable jaw **37** relative to the base plate **30** and the stationary jaw **33**.

Longitudinal movement of the yoke **38** and movable jaw **37** is effected by a pair of pinions **43, 43** keyed or otherwise fixed to a sleeve **44** rotatably mounted on a pinion shaft **44***a* which extends between the side plates **27, 27**. The pinions are positioned in engagement with the teeth **40** on the arms of the yoke **38** and carry between them a chain sheave **45** about which a conventional link chain **46** passes. The link chain **46** has one end thereof connected to a tension spring **47** carried by the frame of the crane boom **17** and the other end thereof secured to a connecting rod **48**. The connecting rod **48**, in turn, is secured to the actuating pin **24**, as shown in FIG. 8.

With this construction, as the actuating pin **24** is moved by means of the bucket cylinder toward the inner end of the crane boom **17**, the link chain **46** causes rotation of the chain sheave **45** and pinions **43, 43** in the clockwise direction relative to FIG. 5. This in turn moves the yoke **38** and the movable jaw **37** to the left relative to FIG. 5, toward the stationary jaw **33**. Upon release of any pressure on the actuating pin due to the weight of the crane boom and upon outward movement of the piston rod of the bucket cylinder **16**, the tension spring **47** will pull the link chain **46** around the chain sheave **45** thereby causing counterclockwise rotation of the chain sheave and pinions moving the movable jaw **37** to the right relative to FIG. 5 away from the stationary jaw and releasing the article supported by the jaw. If desired, a safety cable **49** may be positioned centrally of the tension spring **47** to prevent the chain from becoming disengaged from the chain sheave should the tension spring break or otherwise become distorted.

FIGS. 3 and 4 illustrate one of many possible uses of this invention. In the application of this invention as shown in FIGS. 3 and 4, a backhoe including a crane boom **17** is being used to lift shoring boards **50** from a stack of boards and stand the shoring boards in a vertical position within a trench which has previously been dug by the backhoe.

In performing this operation, the operator of the backhoe will move the backhoe to a position adjacent the stack of shoring boards and lower the jaw structure of the crane boom **17** to a position in engagement with the uppermost board of the stack of shoring boards. The operator will then advance the piston of the bucket cylinder **16**, causing the jaws to open with the movable jaw on one side of the shoring board and the stationary jaw at the opposite side of the shoring board. The operator will thereafter retract the piston of the bucket cylinder **16** causing the movable jaw to move toward the stationary jaw until the shoring board is securely gripped.

Thereafter, further retraction of the bucket cylinder will pivot the crane boom **17** in the counterclockwise direction relative to FIG. 3. Simultaneously with this, the crane operator will also pivot the bucket arm **12** upwardly by retracting the piston of the bucket arm cylinder until the shoring board **50** is in the desired vertical elevated position.

The operator will then transport the shoring board to the desired position and by the proper manipulation of the controls of the backhoe, lower the shoring board into the trench as shown in broken lines in FIG. 4. After the shoring board is in the desired position, the operator will advance the piston of the bucket cylinder so that the weight of the shoring board is supported by the trench permitting the tension spring **47** to move the movable jaw out of engagement with the shoring board. This procedure may then be repeated to place subsequent shoring boards into the trench.

From the foregoing it will be observed that the present invention provides a novel attachment for load-handling machines such as backhoes which substantially increases the utility and versatility of the machine and permits the machine to perform a variety of lifting and hoisting functions.

While a particular embodiment of the present invention has been illustrated and described herein, it is not intended to limit the invention to such a disclosure and changes and modifications may be incorporated and embodied therein within the scope of the following claims.

I claim:

1. A crane boom for pivotal attachment to an existing boom having a selectively controlled operating member thereon; said crane boom comprising a boom arm, means at the inner end of said arm to pivotally mount said arm to the outer end of said existing boom, a pair of jaw members carried by the outer end of said arm, at least one of said jaw members mounted for relative movement toward and away from the other jaw member, a pin slidably mounted for limited movement substantially longitudinally of said arm, said operating member being connected to said pin, and a link having one end thereof connected to said pin and the other end thereof interconnected with said one jaw member to cause movement of said one jaw member relative to said other jaw member upon movement of said operating members.

2. A crane boom in accordance with claim **1** including a rotatable member interconnected with said jaw to cause sliding movement of said jaw upon rotation of said rotatable member, and means connecting said other end of said link to said rotatable member to cause rotation of said rotatable member.

3. A crane boom in accordance with claim **2** wherein spring means are connected to said rotatable member to normally urge said rotatable member to rotate in a direction to cause said one jaw to move away from said other jaw.

References Cited

UNITED STATES PATENTS

2,814,396	11/1957	Neale	214—3
2,831,589	4/1958	Way	214—147
3,221,908	12/1965	Larson	214—147
3,273,729	9/1966	Holopainen	214—138
3,275,172	9/1966	Smith	214—138
3,278,058	10/1966	Symmank	214—147

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