No. 715,715. Patented Dec. 9, 1902.

F. C. WEBER.

TELESCOPIC HOIST.

Application filed July 31, 1902.

(No Model.)

FIG. 1.

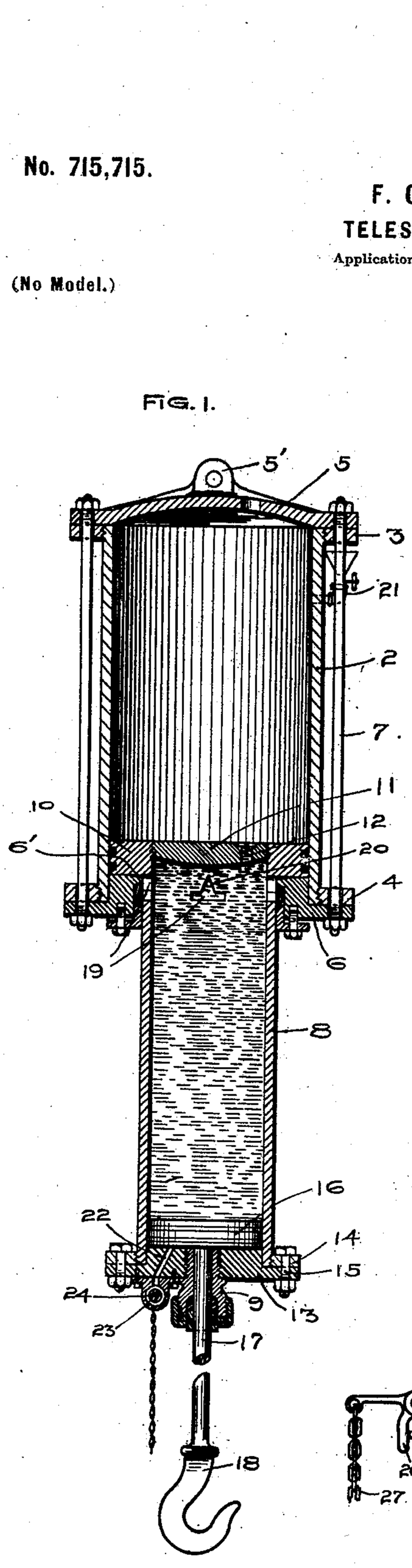


FIG. 2.

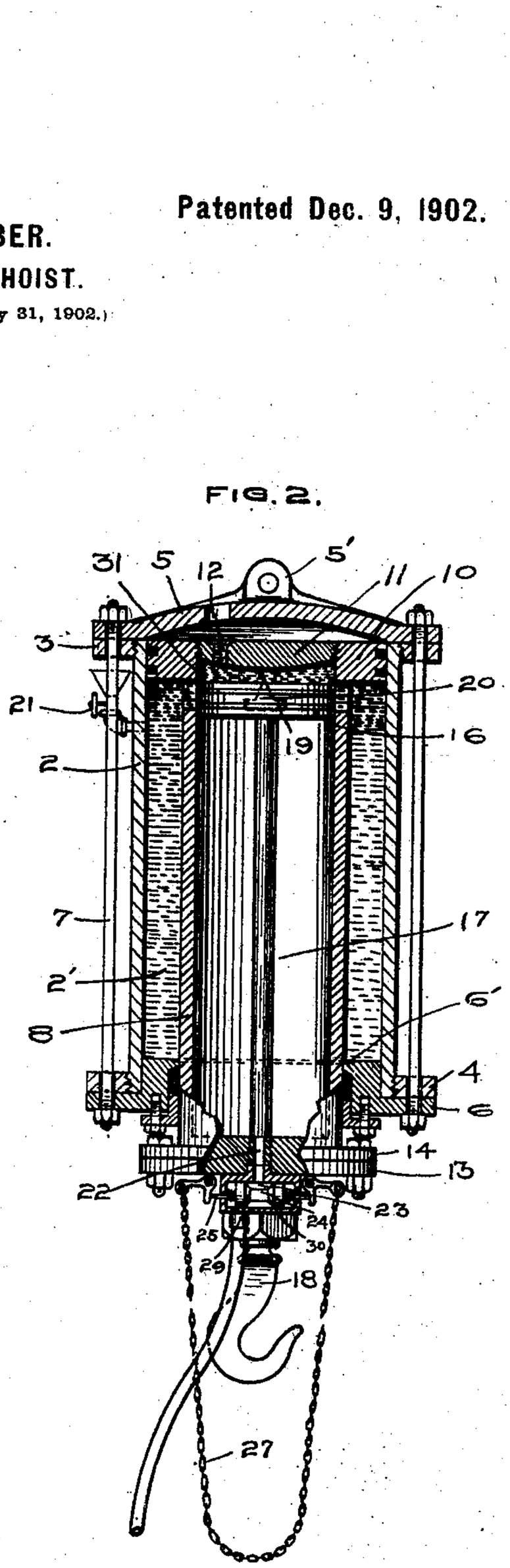
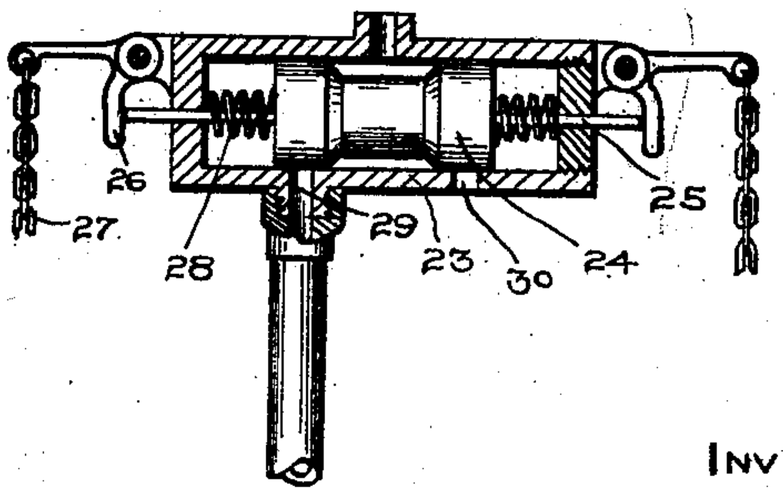


FIG. 3.



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UNITED STATES PATENT OFFICE.

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TELESCOPIC HOIST.

SPECIFICATION forming part of Letters Patent No. 715,715, dated December 9, 1902.

Application filed July 31, 1902. Serial No. 117,800. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK C. WEBER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Telescopic Hoists, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention pertains to air-hoists, and has particular reference to a double or telescopic hoist of improved construction which may be used interchangeably either as a single or double hoist without increase of head room over that required for the ordinary single hoist.

In its present adaptation the invention finds embodiment in two telescoping cylinders, one within the other, with the primary or load-lifting piston operating in the inner piston; and one object of the invention is to provide for elevating the inner cylinder at the same time the load-lifting piston is being raised.

A further object is to provide an effective cushion for the load-lifting piston operative at the beginning and completion of the strokes, whereby jolts incident to starting and stopping are avoided.

A further object is to so construct the hoist as to provide for perfect and absolute control of the load at all stages of the lifting and lowering operations, thus precluding possibility of a premature drop.

A further object is to provide improved valve mechanism, also to provide for constant lubrication of the working parts.

In the accompanying drawings, Figure 1 is a vertical sectional view of a hoist embodying my invention, the same being distended ready for hoisting. Fig. 2 is a similar view, all portions of the hoist being in raised or elevated position. Fig. 3 is a detail sectional view of the valve.

Referring to the drawings, 2 indicates the outer cylinder threaded at the exterior of its extremities to receive rings 3 and 4, respectively forming flanges against which bear the peripheral extremities of top and bottom cylinder-heads 5 and 6, respectively, with clamping-rods 7 passing through the heads and rings, as shown. Top head 5 is formed with the usual suspension-lugs 5′.

8 is the inner cylinder, operative through stuffing-box in head 6 and at its inner end enlarged annularly to form piston 10, fitting cylinder 2 and closing space 2′ intermediate the cylinders. The upper end of cylinder 8 is closed by threaded head 11, and this head is formed with a port closed by plug 12 for the purpose presently to be stated. Bottom head 13 of cylinder 8 is preferably flanged peripherally to overlap ring 14, threaded on the cylinder extremity, to which it is united by bolts 15.

16 is the piston operative in cylinder 8, 17 the rod depending therefrom through stuffing-box 9 in head 13, and 18 the load-sustaining hook at the extremity of the rod.

Below the plane of piston 10 cylinder 8 is formed with a suitable number of ports 19, each of which is preferably narrow vertically and elongated horizontally, with an inverted-V-shaped extension 20 on the upper side, reaching to the bottom plane of piston 10. By means of these ports the cylinder 8 and space 2′ between the cylinders are in constant communication. These communicating spaces, each having a mobile end wall—to wit, the pistons—combine to form a space which is filled with oil or other flexible inelastic fluid, whereby the area of the fluid-space is constant. The parts are so proportioned that with cylinder 8 raised space 2′ is of nearly the same area as the space within said cylinder, with piston 16 in lowermost position, the cylinder having slightly-greater area for accommodating a small body of oil, which serves to cushion the stroke at its uppermost limit, as will be presently explained. The oil-space may be filled through the valved funnel-inlet 21, near the upper end of cylinder 2. It will be observed that all the working parts and surfaces are thoroughly and constantly lubricated by the body of oil contained within the hoist.

For the admission of air to the under side of piston 16 cylinder-head 13 is formed with port 22, which communicates with the center of valve-case 23, secured to the under side of the head. A spool-shaped valve 24 is movable longitudinally in the case, being pro-

vided with stems 25, which project through the case ends, where they are engaged by the oppositely-positioned angular latches 26, and depending from these latches are operating-chains 27, preferably connected at their lower ends to form a balance. Normally the valve is held centered by springs 28, confined on stems 25, with one head of the valve covering inlet-port 29 and the other head covering exhaust-port 30. Obviously movement of the valve in one direction will place ports 22 and 29 in communication, admitting air to the cylinder, while an opposite movement opens the exhaust.

In operation when the mechanism is lowered for hoisting, as in Fig. 1, piston 10 rests on cylinder-head 6, with all the oil contained in cylinder 8 and with ports 19 covered by head 6, save the points of port enlargements 20, which are in the plane of the meeting faces of piston 10 and head 6. Air being admitted to the under side of piston 16, upward pressure of the latter starts the oil through the ports and between said meeting faces, and the start may be facilitated by beveling head 6 at 6′. The start is gradual, however, owing to port contractions 20, through which the oil first emerges; but as piston 10 rises, and with it cylinder 8, the full areas of the ports are uncovered and the hoist attains its maximum speed, the oil flowing from cylinder 8 into space 2′ and operating to lift piston 10 simultaneously with the upward movement of piston 16 in cylinder 8. The speed under given air-pressure and load is determined by the number and area of ports 19, as will be understood. Approaching the uppermost limit of its movement piston 16 gradually moves over and closes ports 19 and cushions against a small body of oil 31, confined between the same and cylinder-head 11, thereby arresting the motion easily and without jar. At the beginning of the downward stroke oil is admitted in gradually-increasing amount as they are uncovered by lowering of piston 16, affording an easy start, and at the completion of said stroke gradual covering of said ports by cylinder-head 6 checks and cushions the stop. At all stages of the lift the load is positively supported by the air under pressure and oil or other fluid and whether raising or lowering is under complete control of the operator, with means acting automatically to effect a gradual stop devoid of jolts at either limit of movement. Two independent yet absolutely-balanced movements are accomplished simultaneously—viz., the raising of piston 16 in cylinder 8 and the upward movement of the latter bodily within cylinder 2. Thus piston 16, in effect, comprises a primary load-lifting device, cylinder 8 a movable carrier in which the piston moves, and cylinder 2 a support in which the carrier moves, with the movements of the load-lifting device and carrier accomplished simultaneously and at like speeds.

With the mechanism here shown and described a hoist is provided having double-stroke capacity, which when contracted occupies no more head-room than a single-stroke hoist.

The mechanism may be converted into a single-stroke hoist by removing plug 12, so that when piston 16 rises the oil is exhausted into cylinder 2, with cylinder 8 inactive.

While I have here shown and described the preferred embodiment of my invention, I do not confine myself thereto, as within the scope of the appended claims the hoist may be varied in many particulars and structural details without departing from the spirit of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. Improved hoisting mechanism comprising two cylinders—one movable within the other, a load-carrying piston operative in the inner cylinder, a fluid-inlet connected to and movable with the inner cylinder for admitting fluid under pressure which actuates said load-lifting piston, and means actuated by the movement of the load-lifting piston for simultaneously moving the inner cylinder in the outer cylinder.

2. Improved hoisting mechanism comprising two communicating cylinders—one movable within the other, a load-lifting piston operative in the inner cylinder, a piston rigid with the inner cylinder fitting the outer cylinder, a body of liquid common to both cylinders and filling the space between the two pistons, and a fluid-inlet connected to and movable with the inner cylinder for admitting fluid under pressure which actuates said load-lifting piston.

3. Improved hoisting mechanism comprising an outer cylinder adapted to be sustained in upright position, an inner cylinder movable vertically as a piston through the bottom head of the outer cylinder, a piston-head on the inner upper end of the inner cylinder fitting the outer cylinder, a piston movable vertically in the inner cylinder, a load-sustaining rod depending from said last-named piston and movable vertically through the bottom head of the inner cylinder, the inner cylinder being open to the outer cylinder beneath the plane of the piston-head working in the outer cylinder, a body of liquid common to both cylinders and filling the space therein between said piston-heads, and a fluid-inlet connected to and movable with the inner cylinder for admitting fluid under pressure to the under side of the piston-head working in the inner cylinder.

4. Improved hoisting apparatus comprising a cylinder provided with ports, a load-lifting piston operative therein, a body of liquid within the cylinder and adapted to be discharged through said ports by the advance of the piston and means constructed and ar-

ranged to retard the flow of said liquid as the piston approaches the inward limit of its movement thereby cushioning the piston.

5. Improved hoisting mechanism comprising two communicating cylinders—one movable within the other, a piston rigid with the inner cylinder fitting the outer cylinder, a load-carrying piston operative in the inner cylinder, and means constructed and arranged to retard the flow of liquid from one cylinder to the other as the inner cylinder either approaches or recedes from its positions of extreme adjustment.

6. Improved hoisting mechanism comprising two communicating cylinders—one movable within the other, a piston rigid with the inner cylinder fitting the outer cylinder, a load-carrying piston operative in the inner cylinder, and means constructed and arranged to retard the flow of liquid from one cylinder to the other as the inner cylinder approaches its downward limit of travel.

7. Improved hoisting mechanism comprising two communicating cylinders—one movable within the other, a piston rigid with the inner cylinder fitting the outer cylinder, a load-carrying piston operative in the inner cylinder, and means constructed and arranged to retard the flow of liquid from one cylinder to the other as the piston within the inner cylder approaches its upward limit of travel.

8. Improved hoisting apparatus comprising a cylinder provided with side ports adjacent one end, said ports being of irregular outline with their parts of smallest capacity nearest said cylinder end, a load-lifting piston operative in the cylinder and adapted to cover or partially cover said ports, and a body of liquid within the cylinder and adapted to be discharged through said ports by the advance of the piston, the piston approaching and first covering the larger portions of the ports, thereby diminishing the discharge of liquid therethrough and cushioning the stroke of the piston.

9. Improved hoisting mechanism comprising an outer cylinder, an inner cylinder movable through a head of the outer cylinder, a piston-head on the inner cylinder fitting the outer cylinder and adapted to rest on the outer-cylinder head when the inner cylinder is distended, the inner cylinder being formed with side ports having contracted upward extensions extending to the bottom plane of said piston for the purpose described, a load-carrying piston operative in the inner cylinder, and a body of liquid common to both cylinders and filling the space between said pistons.

10. Improved hoisting mechanism comprising an outer cylinder, an inner cylinder of smaller diameter movable through a head of the outer cylinder, a piston at the inner end of the inner cylinder fitting the outer cylinder and adapted to rest on the outer-cylinder head when the inner cylinder is distended, the inner cylinder being formed with side ports having inverted-V-shaped upward extensions extending to the bottom plane of said piston for the purpose described, a load-carrying piston operative in the inner cylinder, and a body of liquid common to both cylinders through said ports and filling the space between said pistons.

11. Improved hoisting mechanism comprising an outer cylinder, an inner cylinder movable through a head of the outer cylinder, a piston on the inner cylinder fitting the outer cylinder, the inner cylinder having side ports placing in communication the inner cylinder and the space between the cylinders, a valved port in the inner end of the inner cylinder, a piston operative in the inner cylinder, and a body of liquid common to both cylinders through said side ports and filling the space between the pistons.

12. Improved hoisting mechanism comprising a cylinder, a load-carrying piston operative therein, a valve-case having a central port communicating with the cylinder and also formed with inlet and exhaust ports at either side of said cylinder-port, a spool-shaped valve, springs acting to normally hold the valve with the inlet and exhaust ports covered by the valve-heads, and valve-actuating means.

13. Improved hoisting mechanism comprising a cylinder, a load-carrying piston operative therein, a valve-case having a central port communicating with the cylinder and also formed with inlet and exhaust ports at either side of central port, a spool-shaped valve, springs acting to hold the valve with the inlet and exhaust ports closed, stems projecting from the valve ends through opposite ends of the case, and actuating-latches operatively engaging the projecting ends of the stems.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK C. WEBER.

Witnesses:
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ALEX. S. MABON.