

Dec. 25, 1923.

1,478,469

F. S. CARVER

COMPOUND COMPRESSION PUMP

Filed Aug. 12, 1919

3 Sheets-Sheet 1

FIG 2

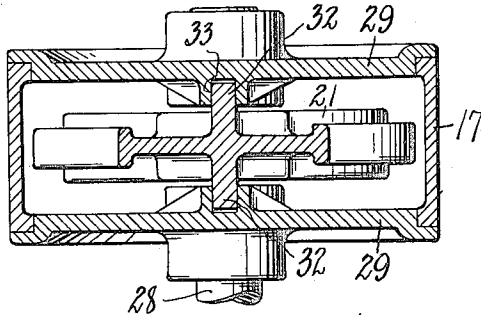
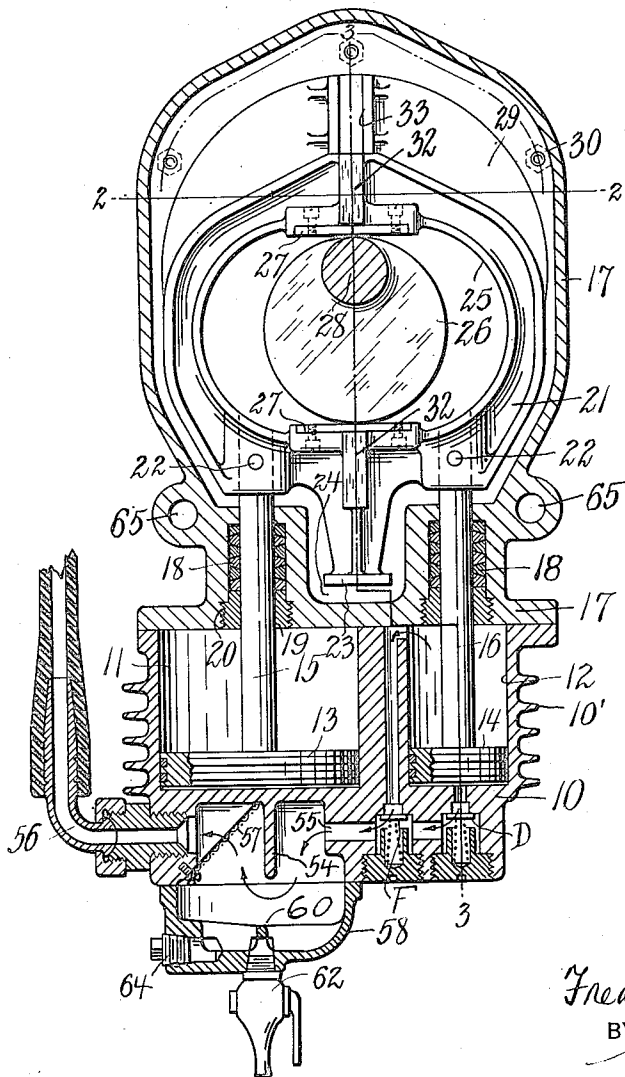


FIG 1



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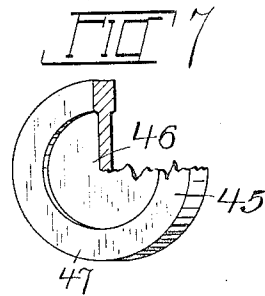
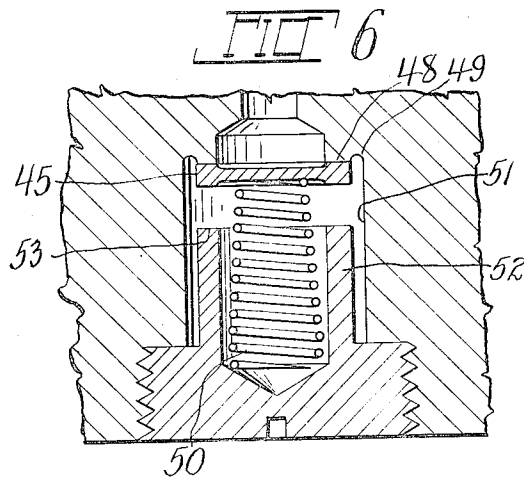
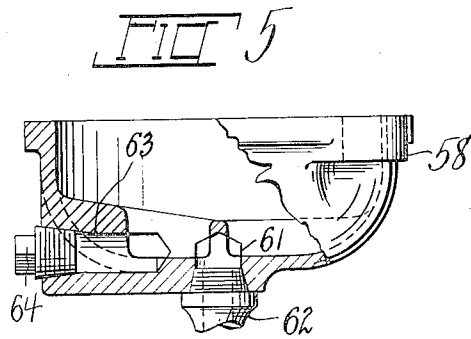
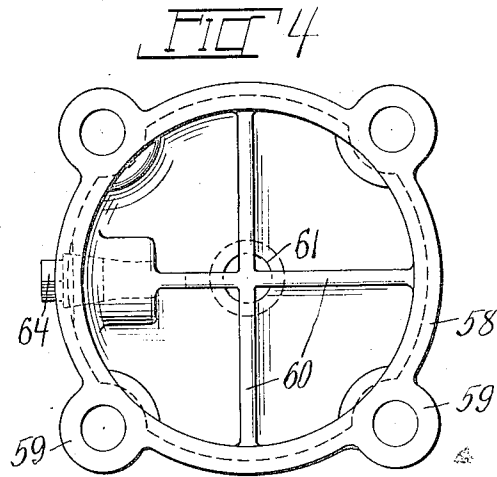
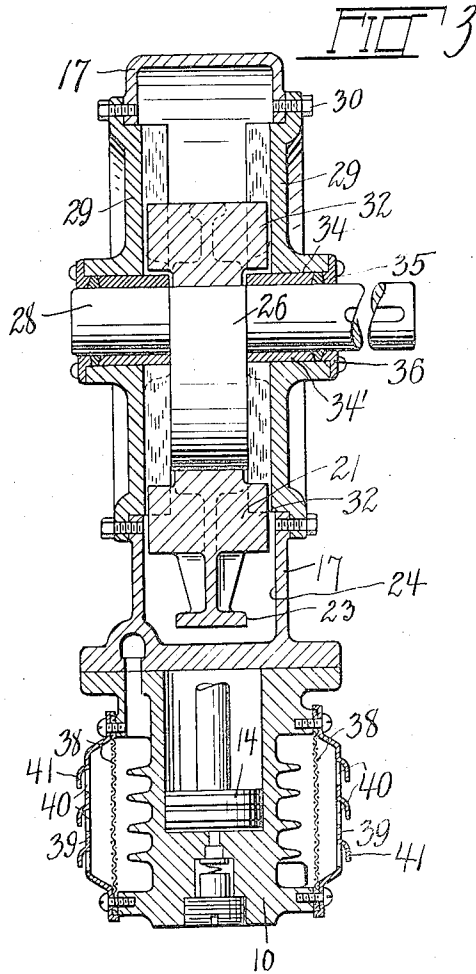
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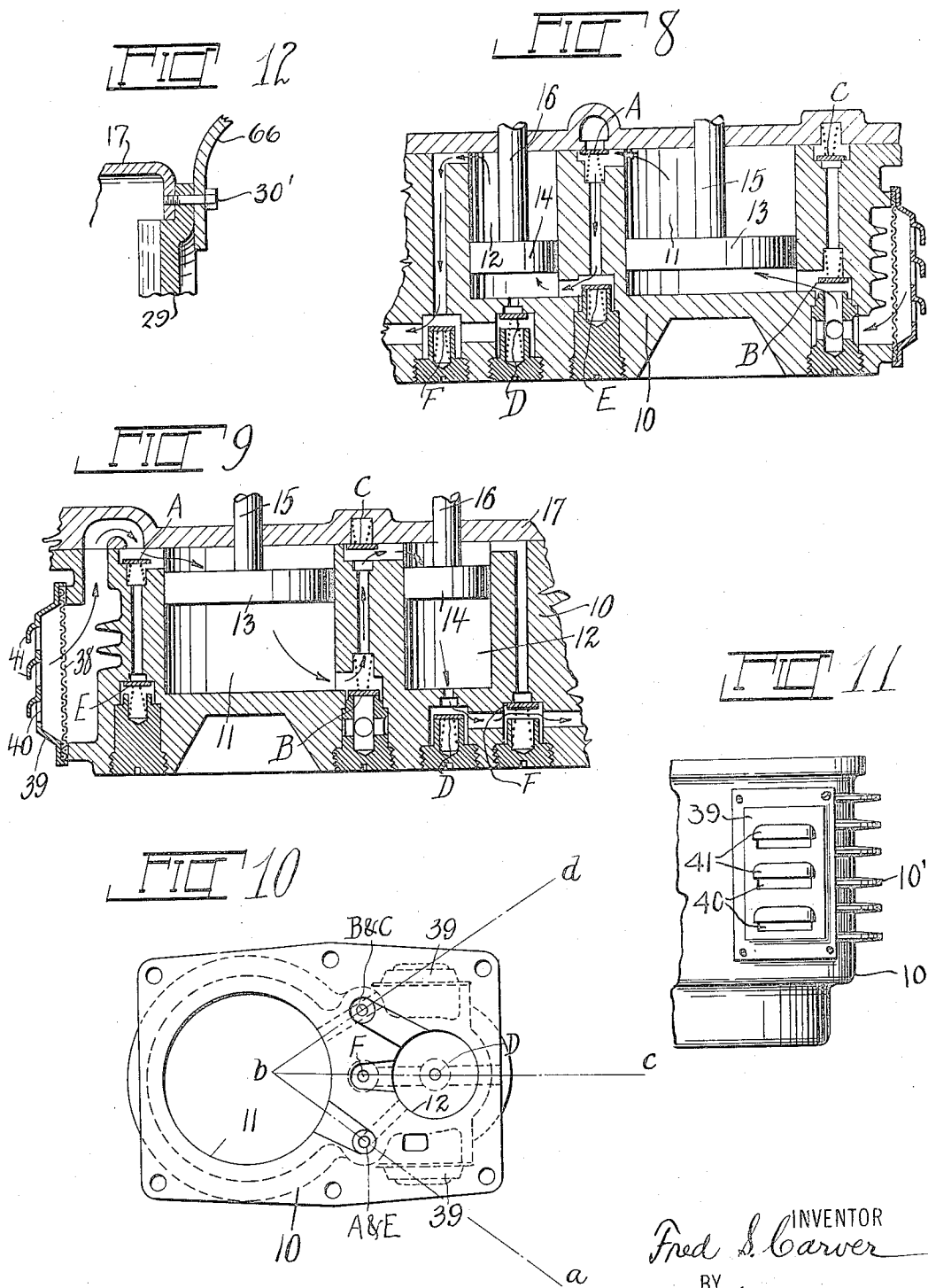
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COMPOUND COMPRESSION PUMP

Filed Aug. 12, 1919

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

FRED S. CARVER, OF NEWARK, NEW JERSEY.

COMPOUND COMPRESSION PUMP.

Application filed August 12, 1919. Serial No. 316,936.

To all whom it may concern:

Be it known that I, FRED S. CARVER, a citizen of the United States, and a resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Compound Compression Pumps, of which the following is a specification.

My invention relates to compound compression pumps. One field in which it is of great utility is in compressing air for automobile tires, particularly the large truck tires which require an air pressure higher than can be satisfactorily obtained by a single stage compression pump. The present application is a continuation in part of my prior application Ser. No. 240,629, filed June 18, 1918, entitled Compression pumps, patented June 13, 1922, #1,419,221.

In the drawings forming a part of this specification, Fig. 1 is a central, vertical sectional view of a pump embodying my invention. Fig. 2 is a sectional view taken on the line 2—2, Fig. 1. Fig. 3 is a vertical sectional view taken substantially on the broken line 3—3, of Fig. 1. Fig. 4 is a plan view of the bottom plate for the oil chamber in the pump base. Fig. 5 is a side view of the plate of Fig. 4 with parts broken away. Fig. 6 is a cross sectional detail view on an enlarged scale, showing a valve and its mounting. Fig. 7 is a perspective view with parts broken away of a valve disc. Figs. 8 and 9 are diagrammatical sectional views arranged to show the operation of the apparatus, Fig. 8 being substantially on the broken line *a—b—c*, of Fig. 10 and Fig. 9 being taken substantially on the broken line *d—b—c* of Fig. 10, the sections so obtained being shown opened out in Figs. 8 and 9 for the purpose of more clearly illustrating the operation of the apparatus. Fig. 10 is a top view of the cylinder casting. Fig. 11 is a fragmentary side view of a portion of the cylinder casting and showing one of the guard plates for the air inlet passages, and Fig. 12 is a detail view showing a mode of attaching an extra supporting member for the pump to give a three-point support.

The cylinder casting 10 is preferably provided with heat conducting ribs 10' and contains the low pressure cylinder 11 and the

high pressure cylinder 12, arranged side by side and parallel to one another. Cylinders 11 and 12 receive pistons 13 and 14, the piston rods 15 and 16 whereof project upwardly beyond the cylinders 11 and 12. Upon the cylinder casting 10 is secured the hollow casting 17. The base of casting 17 closes the upper ends of cylinders 11 and 12. The piston rods 15 and 16 pass through openings in the base of casting 17 and project into the interior thereof. Substantially air tight glands are provided about piston rods 15 and 16, as by means of packing rings 18 and screw rings 19, which when screwed in place in screw threaded recesses 20 serve to compress the packing rings 18.

The hollow casting 17 contains the actuating devices and also contains an oil bath for lubricating purposes.

The upper ends of the piston rods 15 and 16 are connected within casting 17 by a combined cross head and Scotch yoke member 21 to which said piston rods are secured in any desired way, as by means of pins 22 holding the ends of the rods in suitable sockets in member 21. The yoke member 21 is preferably provided with a downwardly extending projection 23, which enters the oil pocket 24 and serves to effectively splash the oil on the working parts, even though the quantity of oil should be greatly reduced and the oil level quite low. The yoke member 21 is provided with an opening 25 in which the cam 26 works, and wear plates 27 are provided at the upper and lower portions thereof. Same may be removable, if desired, so that they can be renewed to compensate for wear at long intervals. Hole 25 is preferably large enough to clear the cam 26 except at the regions occupied by wear plates 27. The bearings for the cam shaft 28 and also the guides for the Scotch yoke member 21 are preferably formed in the discs or plates 29 which are secured to the casting 17, as by bolts 30 around openings 31 provided in opposite sides of the casting 17. These plates or discs 29 are preferably of identical form for the two sides of the pump, and are interchangeable, and so can be conveniently made in quantities, requiring only a single set of jigs, fixtures and the like. Said plates 29 are provided with guide means for the

Scotch yoke. In the form shown, the yoke 21 is provided on each side and at top and bottom with laterally extending guide lugs 32, which are received and guided in grooves 33 formed on the interior of the plates or discs 29. Discs 29 have the central openings 34 therein in which the bushings 34' for the cam shaft 28 are driven, and felt washers 35 are provided and held in place by rings 36 for retaining the oil and preventing its working out to an undue extent along shaft 28.

By providing the guide lugs 32 on the sides of the Scotch yoke and both above and below the shaft 28 it will be seen that a very effective guiding action is secured, and at the same time the over-all height is reduced, which is of great advantage for many uses, as for example, where the pump is attached to a truck engine, and the space is limited.

It will be apparent that the cam and cam shaft are readily reversible from the position shown, and the pump can be driven from either side and in either direction.

The arrangement of the air passages from cylinder to cylinder and out at the discharge opening is substantially as shown in my former application above referred to. There are six check valves, designated respectively A, B, C, D, E and F. The air enters the upper end of the low pressure cylinder 11 through check valve A. The air compressed beneath the piston 13 in the low pressure cylinder 11 passes out back of the check valve B through the check valve C and into the upper end of the high pressure cylinder 12. The air compressed in the lower portion of the high pressure cylinder 12 passes out through check valve D past valve F and thence to the tire or other air container, as will be plain on reference to Fig. 9. Referring to Fig. 8 it will be seen that the air enters the lower end of the low pressure cylinder 11 through check valve B, the air compressed in the upper end of the cylinder 11 passes out back of check valve A and through check valve E, entering the lower portion of the high pressure cylinder 12, and the air compressed in the upper portion of the high pressure cylinder 12 passes out through the check valve F to the pressure receptacle or container. As such arrangement of valves has already been described in my former application, further reference thereto here is unnecessary.

I provide means for preventing ingress of dirt, dust and the like with the inlet air by shielding the passages therefor and straining the air as it is admitted. The incoming air is preferably passed through a wire gauze or the like strainer, as indicated at 38, 38 in Fig. 3 and the air inlets are further guarded by plates 39, 39 having air inlet openings 40 which may be formed by punching out portions 41, 41 from the sheet

metal, such punched out portions having substantially the form of louvres which extend downwardly over the openings 40, directing any material, such as dirt, water, or the like, downwardly and away from the inlet opening 40.

I have provided metal valves of such form as to be highly effective, and not readily get out of order or leak over extended periods of use. The preferred form of valve and mounting therefor is shown in detail in Figs. 6 and 7. The valves have the form of discs 45 having depressed or thinner central portions 46, and marginal thickened or up-standing portions 47. The two sides of the valve are alike so as to require no attention in assembling to see that the right side is up. The valve seats preferably have projecting annular seating surfaces 48 as shown in Fig. 6, and a clearance depression 49 is provided therearound. The valves are held to their seats by springs 50, the ends of the springs adjacent to the valves being received within the recessed portions 46 as shown in Fig. 6.

It will be seen that a valve of the construction described has a number of advantages which are of the utmost importance in the heavy work to which a pump is subjected, for example, on a truck, pumping up heavy pneumatic tires of large diameter. The valve surfaces are entirely of metal, and the wear is not localized, but the valve may move freely within the seat opening 51 which is of greater diameter than the over-all diameter of the valve disc 45 permitting same to move freely from side to side on its seat as it is opened and closed, thereby preventing the localizing of wear on the seat and valve face and providing a practically foolproof valve construction which will stand up in use over extending periods when subjected to the severest treatment. The valve being all metal is not affected by heat as valves including leather, fibre and the like may be. The valve springs 50 are preferably received within guide sleeves 52 upon the ends 53 of which the valves 49 may rest when opened as shown in Figs. 8 and 9, for example, thus limiting the opening movement of valves 45 and serving to assist in keeping same in proper alignment and position. With such arrangement the valve discs remain at all times substantially parallel to their seats and cannot be turned on edge or otherwise gotten into improper position.

The oil from the chamber 24 passes gradually down into the pump cylinders along the piston rods and serves to lubricate the pistons, and means are preferably provided for separating oil from the air discharged from the pump, so as to prevent injury to tires, which might be caused by oil.

In the form shown, I provide a separator plate 54 between the air discharge outlet 55

from the pump cylinders and the tube 56 leading to a tire or other container. For greater certainty of preventing ingress of foreign material into the tire or its valve a strainer 57 is provided for the outgoing air and formed of wire gauze or other suitable material. Below the separator plate 54 an oil well is provided and the same is formed in a separate plate or under cover 58 shown enlarged in Figs. 4 and 5. This plate is substantially of cup form. It is provided with apertured ears or lugs 59 by which it may be bolted in place in a plurality of different rotative positions. It has a pair of crossing ribs 60, 60, one of which extends below and substantially parallel to the separator plate 54 in any rotative position of cup 58 and prevents the air sweeping freely along the bottom of the cup and carrying the oil out with it. A hole 61 is bored centrally upward from the bottom of the cup shaped member 58 and part way through the ribs 60 at their intersection and is tapped for a plug or draw off cock 62. A side hole 63 is provided bored through under one of the ribs 60 and tapped for a draw off cock or plug 64. It will be seen that the opening 61 provides communication between the various corner pockets formed within the cup shaped member 58, so that a draw-off cock connected with either the opening 61 or the opening 63 will serve to effectively drain the oil from the interior of the chamber and from all parts or pockets thereof. When not convenient to put a draw off cock at the bottom as by reason of lack of room, the bottom opening can be plugged and the draw off cock put in the side opening 63, and substantially as good results obtained as with a draw off cock in the bottom. The draw off cock is opened from time to time, to discharge any oil which may have accumulated in the separation chamber.

Bolt holes 65 are provided on each side of the pump for securing it in place. As already stated, the pump may be driven from either side and similarly it may be bolted in place from either side as may be most convenient. A three point connection can be obtained by making one of the bolts for plate 29 longer than the rest and passing it through a suitable strap or other supporting means 66, as shown at 30', Fig. 12.

It may be seen that a pump in accordance with my invention has numerous advantages: It is compact, is readily manufactured and assembled, it can be connected in many ways to suit varying conditions, the valves, pistons and actuating mechanism are thoroughly lubricated and of such structure as not to require attention over long intervals, dirt is kept out, and oil is separated and prevented from reaching the tires.

I claim:

1. In a pump, a cylinder containing member, pistons and piston rods for the cylinders, a hollow member secured to the first named member and into which the piston rods project from the cylinders, a combined cross-head and Scotch yoke and a rotatable actuating device therefor in the hollow member, and a pair of oppositely positioned plates secured about openings formed in the hollow member and containing bearings for the rotatable actuating device, and guiding means carried by the plates to guide the Scotch yoke member in rectilinear movement.

2. In a pump, a plurality of cylinders, pistons therefor, piston rods on said pistons, a combined cross-head and Scotch yoke attached to said piston rods, a shaft having an eccentric therein for actuating said Scotch yoke, and guide means for the Scotch yoke, arranged on the side thereof, and in substantially the same plane with the axis of the shaft.

3. In a pump, a shaft, an eccentric thereon, a Scotch yoke actuated from the said eccentric, a plurality of pistons and their cylinders, all the pistons being attached to the same side of the Scotch yoke, and a pair of members containing bearings for the shaft and each of said members being provided with guide means for the Scotch yoke.

4. In a pump, a pair of high and low pressure cylinders arranged parallel and side by side, pistons and piston rods for said cylinders, a Scotch yoke to which the piston rods are rigidly connected, an eccentric turning in said Scotch yoke on an axis at right angles to the plane of the piston rods, and arranged substantially midway between the piston rods, and guides on opposite sides of the Scotch yoke and at substantially the middle thereof for guiding the Scotch yoke and piston rods to move rectilinearly, the cam being positioned between the cylinders and the guides.

5. In a pump, a plurality of cylinders arranged side by side and parallel pistons and piston rods for the cylinders, a hollow casing containing an oil bath into which the piston rods project, a cross-head therein to which the pistons are rigidly secured, oppositely positioned removable plates secured to said casing, rotary means in said hollow casing for imparting reciprocatory movement to said cross-head and pistons, a pair of guide lugs on each face of the cross-head, and guideways formed in the plates for receiving and guiding said lugs and thereby confine the cross-head and pistons to rectilinear movement.

6. In a pump, high and low pressure cylinders, a pair of pistons for said cylinders,

a Scotch yoke to which said pistons are secured, both on the same side of the Scotch yoke, an eccentric on its shaft for driving said Scotch yoke and pistons, guide means 5 on the sides of the eccentric substantially in the same plane with the axis of the eccentric shaft for guiding said Scotch yoke, an oil bath wherein said Scotch yoke is located, said oil bath being above the pistons and adapted to supply oil thereto, and an 10 oil separator on the discharge side of the pump and located below the pistons.

In testimony that I claim the foregoing, I hereto set my hand, this 11th day of August, 1919.

FRED S. CARVER.