Nov. 15, 1955 W. V. CORNETT 2,723,803

PNEUMATICALLY OPERATED HAMMER DEVICE

Filed April 20, 1953 4 Sheets-Sheet 1

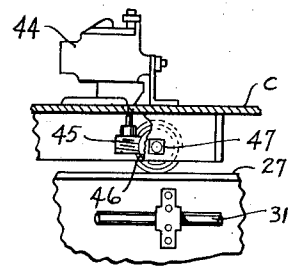


FIG. 3

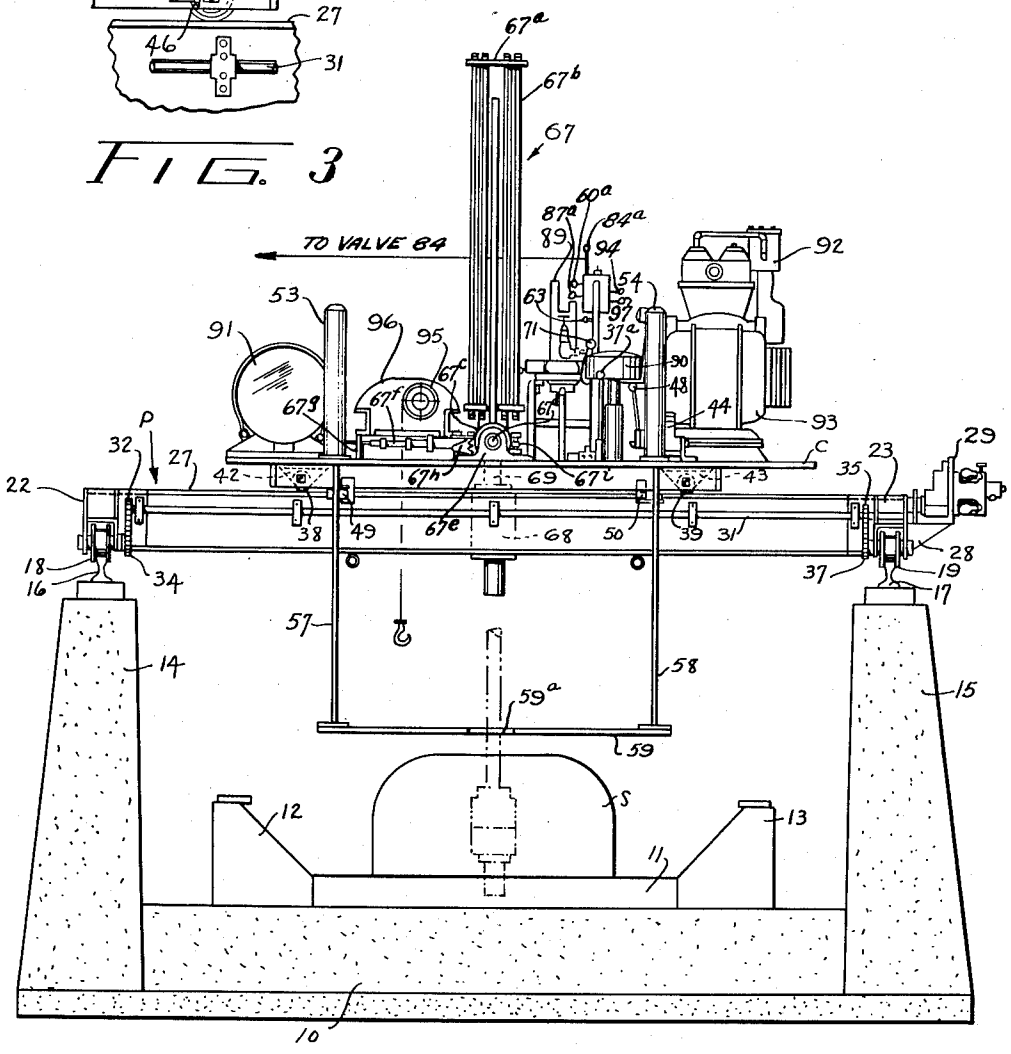


FIG. 1

INVENTOR.
WALTER V. CORNETT

BY
Van Petten & Shively

ATTORNEYS

Nov. 15, 1955 W. V. CORNETT 2,723,803

PNEUMATICALLY OPERATED HAMMER DEVICE

Filed April 20, 1953 4 Sheets-Sheet 2

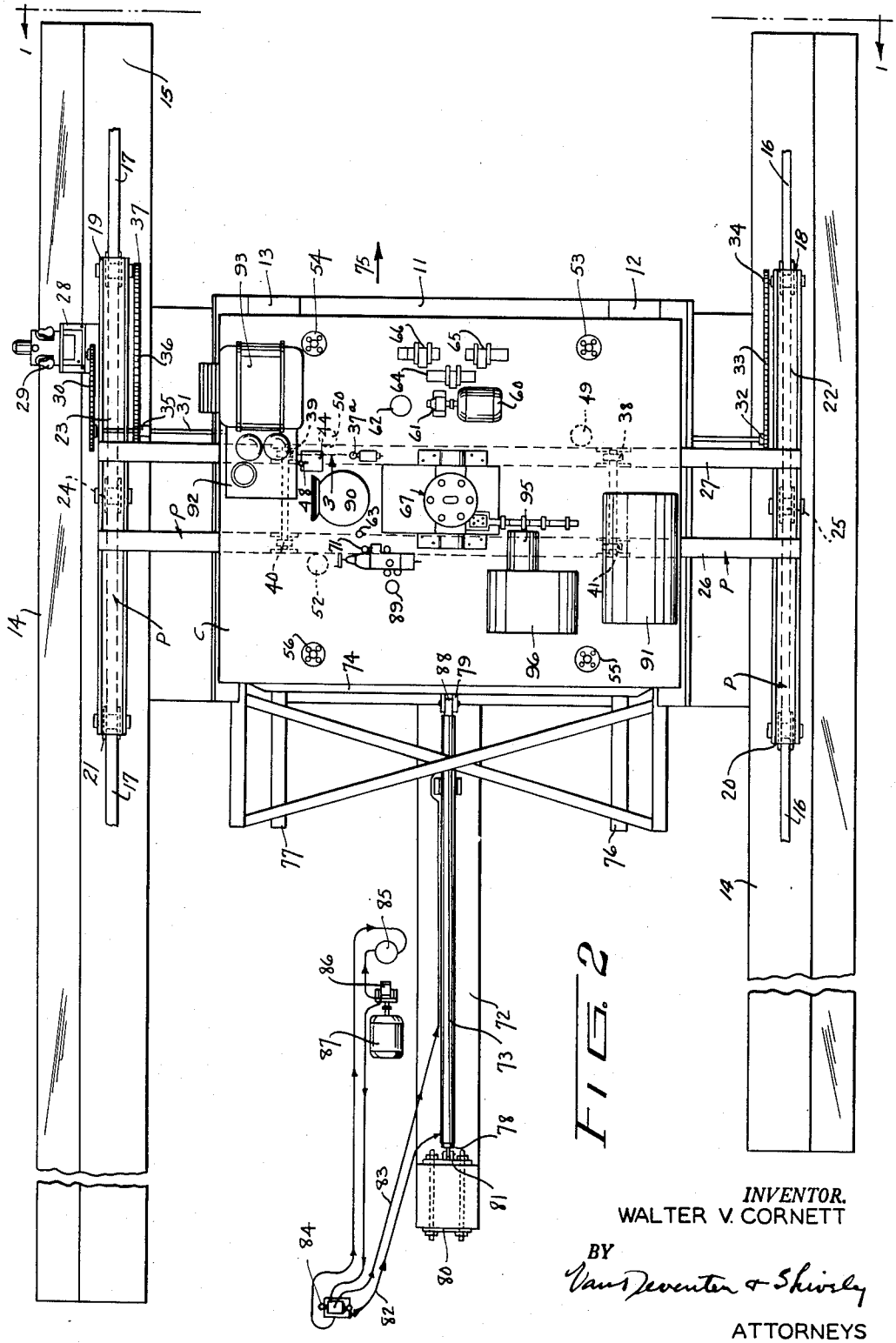


FIG. 2

INVENTOR.
WALTER V. CORNETT

BY Van Deventer & Shively

ATTORNEYS

Nov. 15, 1955 W. V. CORNETT 2,723,803

PNEUMATICALLY OPERATED HAMMER DEVICE

Filed April 20, 1953 4 Sheets-Sheet 3

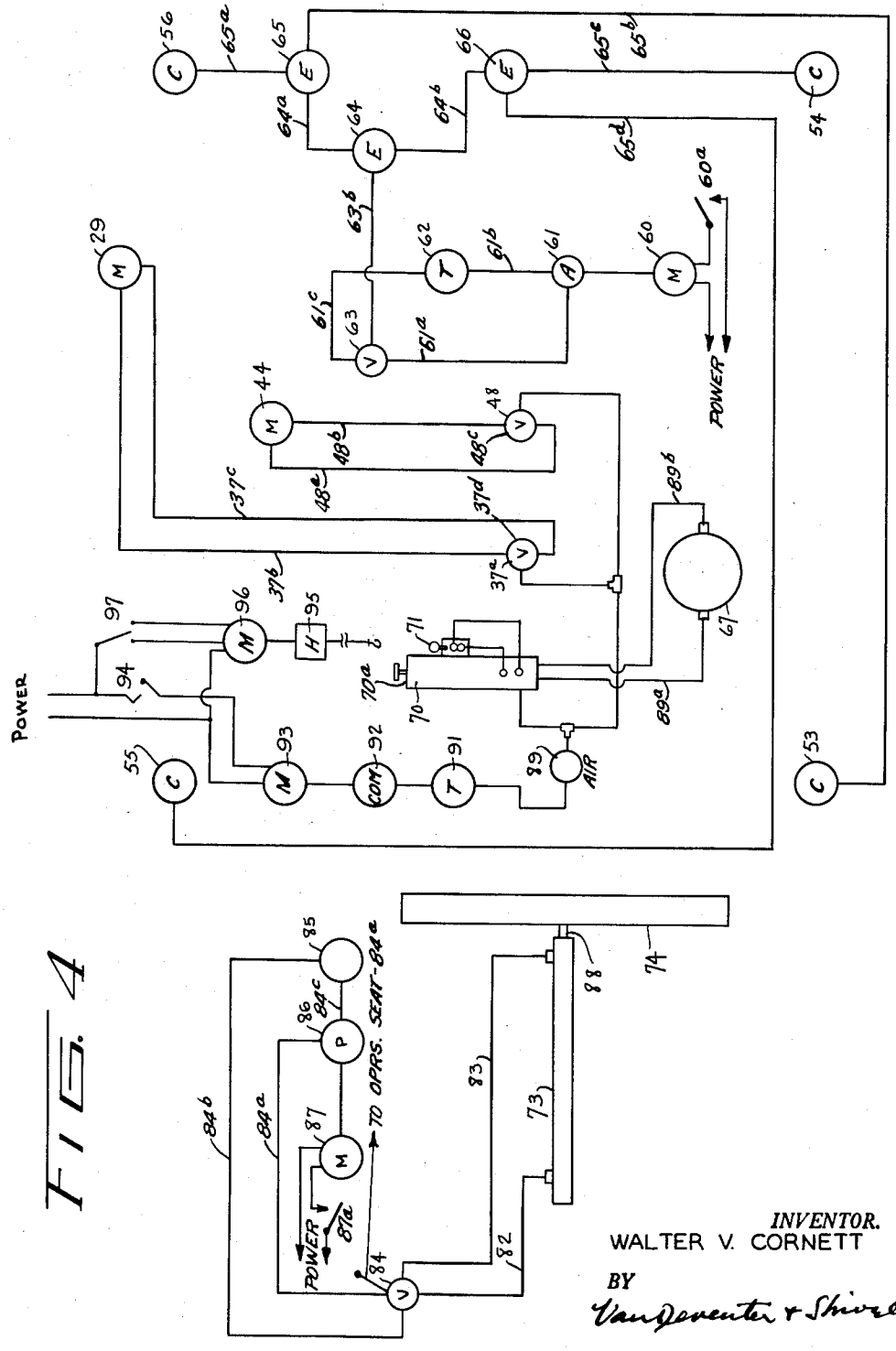


FIG. 4

INVENTOR.
WALTER V. CORNETT
BY
Van Deventer & Shively
ATTORNEYS

Nov. 15, 1955 W. V. CORNETT 2,723,803

PNEUMATICALLY OPERATED HAMMER DEVICE

Filed April 20, 1953 4 Sheets-Sheet 4

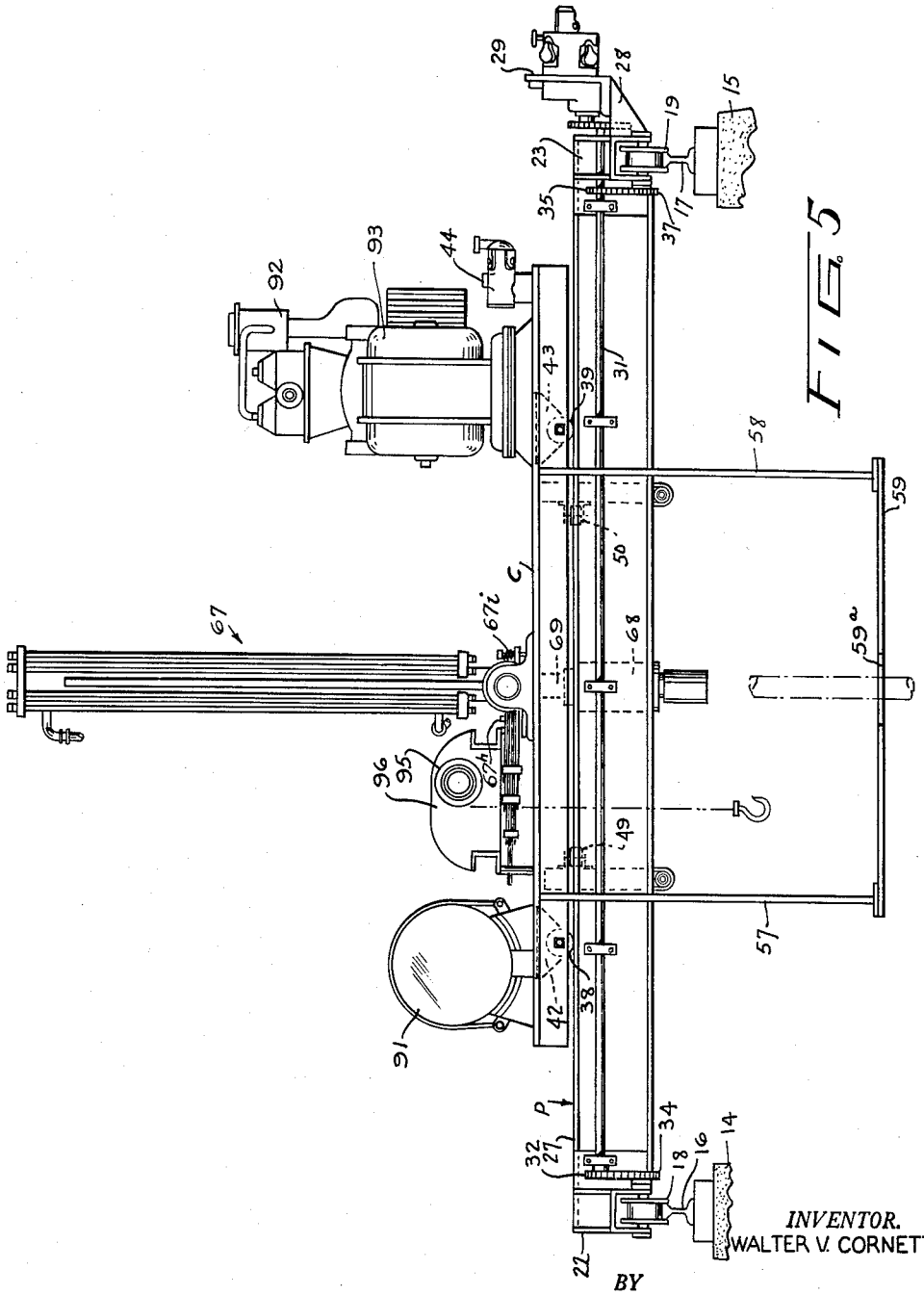


FIG. 5

INVENTOR.
WALTER V. CORNETT

BY
Van Deventer & Shively

ATTORNEYS

United States Patent Office 2,723,803 Patented Nov. 15, 1955

2,723,803

PNEUMATICALLY OPERATED HAMMER DEVICE

Walter V. Cornett, Los Angeles, Calif.

Application April 20, 1953, Serial No. 349,689

3 Claims. (Cl. 241—101)

This invention relates to a pneumatically operated hammer device, and this application is a continuation-in-part of the co-pending application Serial Number 308,681, filed on September 9, 1952. It has for its object the provision of a device having a pneumatic hammer mounted on a carriage, said carriage being movably mounted on a platform, said platform being movably mounted on rails to permit longitudinal adjustment of said platform over a material to be broken. As the carriage is movable transverse the platform, the hammer carried by said carriage can, by the conjoint positioning of said carriage and platform, be positioned to strike at any point within the area of a fixed breaking table positioned below said platform and upon which the material to be broken is placed.

Another object is to provide a hammer device of the class described in combination with a bulldozer, the latter used to position and remove material on the breaking table of the hammer device.

A further object is to provide a hammer balanced by being in the center of its supporting carriage.

A further object is to centralize all the controls in easy reach of the operator.

A further object is to provide an air compressor and a motor for driving the same to supply air to the pneumatic hammer together with a pressure tank, all moved on the carriage with said hammer to form a unit therewith, thereby eliminating the separate compressor tank and motor heretofore necessary and requiring flexible hose connections between the tank and hammer.

A further object is to provide an electrically driven hoist moved on the carriage with the hammer for use in moving the billets, slabs, or other objects worked on by the hammer.

In the accompanying drawings:

Figure 1 is a front elevational view of the hammer device with parts **60**, **61**, **62**, **64**, **65**, **66**, removed for the sake of clarity, this view being taken looking in the direction of the arrow marked "Fig. 1" in Figure 2;

Figure 2 is a plan view of the device shown in Figure 1, including a bulldozer in combination therewith;

Figure 3 is a detail view of the air motor **44** and associated parts for moving the carriage C shown in Figures 1 and 2 and is taken approximately on the line **3** of Figure 2

Figure 4 is a diagram showing the piping and connections of the apparatus used in connection with the apparatus shown in the accompanying figures; and

Figure 5 is a front elevational view of the hammer device, like Figure 1, except with parts such as *37a*, **53**, **54**, **89** and **90** removed to permit the mounting of the compressor and its motor, the pressure tank and the electric hoist to be seen.

This specification and the drawings disclose a preferred embodiment of the device to illustrate the invention; however, when the inventive concept herein described is understood, it is obvious that many changes can be made in the construction and arrangement of the parts without

departing from the invention as defined by the appended claims.

Referring to Figure 1, numeral **10** denotes a substantial concrete base carrying a breaking table **11** of cast iron having upwardly extending sides **12**, **13**, and having a trough-like formation running the full length of the base. Table **11** is adapted to carry any kind of material such as slabs, billets and the like S requiring a heavy impact blow to break them into smaller pieces. The machine is designed to handle either hot or cold material. The base **10** has upstanding supports **14**, **15**, running the full length of the base, and carrying secured thereto rails or tracks **16**, **17**, supporting the wheels or rollers **18**, **19**, **20**, **21**, of the longitudinally movable platform generally denoted as P or framework, the side members of which are shown at **22**, **23**. Such platforms are about 17 feet wide, as seen in Figure 1, and are of heavy construction. Additional wheels **24**, **25**, as many as desired, may be used to support said platform.

The platform is of any suitable construction, and in addition to the side members **22**, **23**, has cross members **26**, **27**.

Secured to side member **23** is a bracket **28** supporting a suitable motor **29**, which via chain **30** drives the shaft **31** extending across the platform and journaled on side member **22**. This shaft carries sprocket **32**, driving chain **33** to sprocket **34** on the shaft of pulley **18** to drive the latter. A sprocket **35** on shaft **31** via chain **36** drives sprocket **37**, secured to the shaft of pulley **19**.

By the foregoing means motor **29** operated in the proper direction by valve controls *37a* to be presently described, will move the platform previously described in either direction along rails **16**, **17**.

When valve 37^a connected to the main air supply **89** is operated, it admits air to pipe 37^b to the motor **29** for rotation in one direction and vents pipe *37c* to atmosphere through the usual vent *37d* in the valve. When valve *37a* is moved to its other position, air is admitted to pipe *37c* and the direction of the motor is reversed, pipe *37b* being vented to atmosphere via vent *37d*. This is a well known method of operating air-motors such as **29** and is shown merely for the sake of illustration, as any suitable arrangement of the valve, motor and piping can be used.

The platform P carries thereon a carriage, generally denoted by "C," constructed in any suitable manner, supported on four wheels or rollers **38**, **39**, **40**, **41**, which are suitably removably attached to the underside of carriage C by any suitable means such as brackets, two of which are shown at **42**, **43**, Figure 1. Rollers **38** to **41** are supported on the upper face of cross members **26**, **27**.

As best seen in Figure 3, a suitable motor **44**, mounted on platform C drives via worm **45**, gear **46** and shaft **47**, the wheels **39** and **40**. Motor **44** is controlled by the two-way valve **48** so that the motor can be operated in either direction to move carriage C to the right or left, Figure 1, over platform P when said platform is in any position on rails **16**, **17**.

When valve **48** connected to the main air supply **89** is operated it admits air to pipe *48a* and to the motor **44** for rotation in one direction and vents pipe *48b* to the atmosphere via the vent *48c* in the valve.

When valve **48** is moved in the opposite direction, air is admitted to pipe *48b* and the direction of the motor is reversed, pipe *48a* then being vented to the atmosphere via the vent *48c*. This valve arrangement is well known and in common use.

To prevent carriage C from moving laterally in respect to members **26**, **27**, four wheels **49**, **50**, **51**, **52**, suitably supported in brackets secured to carriage C bear in sidewise relation against members **26**, **27**. If necessary, these wheels may be grooved to engage the outstanding edges or flanges on **26**, **27**, to prevent vertical motion of car-

riage C as well as lateral motion thereof; any other suitable means may be employed to prevent vertical and lateral motion of carriage C so that its motion is confined to the right-left motion on platform P, as previously described.

Mounted upon carriage C are four vertical cylinders **53, 54, 55, 56,** containing pistons and piston rods, two of which are shown in Figure 1 at **57, 58** . The lower ends of these four rods connect to a baffle plate **59** near the corners thereof, said plate having an aperture **59***a* therein to permit a hammer to extend therethrough as later described.

Cylinders **53** to **56**, inclusive, are connected to a hydraulic system, as best seen in Figure 4, comprising a suitable motor **60** (preferably an electric motor), driving pump **61** connected to a surge and supply tank **62** and to the two-way valve **63** and to a main equalizer **64**, and auxiliary equalizers **65** and **66**. The cylinders **53** to **56** are connected to the equalizers in the usual manner. The motor **60** is provided with a switch **60***a* located near the operator's seat.

Referring to Figure 4, when the handle of valve **63**, shown at the immediate right of the operator's seat in Figure 2 is moved in one direction, hydraulic fluid flows from pump **61** via pipe **61***a* to valve **63** and from the valve via pipe **63***b* to the main equalizer **64** from which the fluid flows via pipes **64***a*, **64***b* to the auxiliary equalizers **65** and **66**. From the auxiliary equalizers the fluid flows via pipes **65***a*, **65***b*, **65***c*, **65***d* to the cylinders **53, 54, 55** and **56** and raises the pistons connected to plate **59** to raise the plate. Where the handle of valve **63** is in its center or neutral position, the valve is closed and the pistons held in the adjusted position and the pipe **63***c* is closed off in the usual manner and the pistons are held immovable with the plate raised as high as desired. Pipe **61***a* is then connected via valve **63** to pipe **63***c* and tank **62**. To lower plate **59** the handle of valve **63** is moved in the opposite direction and hydraulic fluid flows via pipes **65***a*, **65***b*, **65***c* and **65***d* from cylinders **53** to **56** inclusive to the auxiliary equalizers **65** and **66** and from these and from **65** and **66** to the main equalizer **64** and via pipe **63***b* to valve **63** and then via pipe **63***c* to tank **62**. This permits the liquid to drain from the cylinders and plate **59** is lowered to the desired extent. During the lowering operation, pipe **61***a* is connected to pipe **63***c* and valve **63** in the usual manner and the liquid from pump **61** is delivered to tank **62** via pipe **61***c* and from the tank to the pump. The capacity of pipe **63***c* and the tank is sufficient to take the return flow from the cylinders **53** to **56** inclusive as well as the liquid circulated by the pump. This is a well known method of operating cylinders such as **53** to **56** inclusive and is shown merely for the sake of illustration, as any suitable arrangement of pump, valve, tank, equalizers and cylinders can be used.

The parts **53** to **56**, and the pistons and rods and plate **59**, parts **60** to **66**, inclusive, are all carried by carriage C and move therewith, and by manipulating valve **63**, the plate **59** may be raised and lowered to accommodate slabs or billets S of varying thicknesses and held in any desired position.

A suitable pneumatic hammer assembly generally denoted by the numeral **67**, and which may be of the type described in detail in the copending application Serial Number 705,446, filed October 24, 1946, now U. S. Patent No. 2,613,923, dated October 14, 1952, is mounted on carriage C, which has an opening therein to permit the passage of the hammer head **68** and the piston rod **69** therethrough. The stroke of said hammer is as shown in dotted lines Figure 1. For this present application, it is sufficient to describe the hammer mechanism as powerful enough to reciprocate a heavy hammer head and to strike a regulated blow of 500 to 2500 foot pounds. As shown in Figure 1 the hammer assembly **67** includes a cylinder **67***a* having therein a piston having a rod **69** to which is attached the hammer head **68** to reciprocate same. The cylinder **67***a* is supported in any suitable manner as by side rods **67***b* which are supported at their lower ends in the trunnion block **67***c* which has laterally projecting shafts **67***d* mounted on bearings in the journal block **67***e* secured to the carriage C. A spring **67***f* has one end secured to the hammer assembly and the oposite end secured to the carriage C at **67***g*. Additional springs, shown at **67***h* and **67***i* in Figure 1 are placed on each side of the journal block to aid the longer and more flexible spring **67***f*. It will now be apparent that the hammer assembly **67** is in effect spring-mounted in relation to platform C in such a manner that the shock of recoil, when the hammer strikes a blow, is mostly absorbed by springs **67***f*, **67***h* and **67***i* and the rest of the assembly may vibrate from left to right Figure 1, thereby dissipating the shock which would otherwise be transmitted without diminution to platform C and other parts of the entire device. Further details of the construction of the aforesaid hammer assembly and spring mounting are shown and described in the copending application before mentioned. Long experience has shown that such spring mountings in a device of this character are necessary to prevent the device from knocking itself to pieces and must be employed with any suitable hammer mechanism per se in place of that shown.

A two-way valve mechanism **70** is connected to the hammer as best seen in Figure 4 and by means of handle **71**, said valve may be manipulated to vary the speed of the blows of said hammer and their intensity.

When handle **71** is in the vertical position for example in the center in the type of valve shown in Figure 4 the air supply **89** is shut off.

When handle **71** is moved upwardly valve **70** connects the air from **89** to pipe **89***a* and to the cylinder of the hammer assembly **67** below the piston and raises the piston therein. At the same time the pipe **89***b* is vented to atmosphere at **70***a* by the valve in the usual manner. To move the piston downwardly, handle **71** is moved downwardly, admitting air via pipe **89***b* above the piston, and at the same time venting pipe **89***a* to atmosphere at **70***a*. This is a well known method of operating pneumatic hammers of the class described, and is shown merely for the sake of illustrating as any suitable arrangement of valve **70**, air supply **89**, hammer assembly **67** and piping can be used.

A bulldozer attachment may be employed with the device previously described, and may comprise an extension **72** to base **10** carrying the long cylinder **73** having a piston and piston rod, and upon the outer end of the rod is mounted the pusher blade **74** of the bulldozer, said blade being adapted to fit the trough-like breaking table **11** so as to push slab S onto said table from the rear of the device and out of the front **75** thereof. The bulldozer may, therefore, be used to load and unload the table **11.**

The blade **74** is on an angle, the bottom thereof projecting forwardly, and there may be runners **76, 77,** extending rearwardly to guide said blade. The cylinder **73** is pivoted at **78, 79,** to permit it to move vertically.

The plates **80** and **81** are secured to extension **72** of the base, or in any other manner, so as to remain fixed to support the rear end of cylinder **73** to take the thrust of the bulldozer.

By means of a flexible hose **82, 83,** the cylinder **73** is connected via the four-way valve **84** to tank **85** and pump **86** driven by motor **87** controlled by switch **87***a*. By manipulating valve **84** as usual, the piston rod **88** may be caused to move blade **74** toward the front of the device, and withdraw the blade therefrom.

When blade **74** is moved to the right Figure 4, the pipe **82** connected to the rear end of cylinder **73** is connected to valve **84** and to pipe **84***a* to receive liquid from pump **86**. At the same time pipe **83** is connected by valve **84**

to pipe 84*b* to receive the liquid ahead of the piston in cylinder 73 and conduct it to tank 85 from which it returns to pump 86 via pipe 84*c*. When the process is reversed, to move blade 74 to the left, valve 84 is moved to the opposite position, and then liquid flows from the pump 86 via pipe 84*a* to valve 84 and via pipe 83 to the front end of cylinder 73—pushing the piston therein to the left. At the same time pipe 82 is connected by valve 84 via pipe 84*b* to tank 85. This arrangement of cylinder 73, valve 84, motor 87, pump 86 and tank 85 and the connecting piping shown in Figure 4 is well known and in extensive use and is here shown merely by way of illustration, as any suitable means can be employed to move the blade 74 as described.

To use the device, the main air supply 89 is connected to a pressure tank 91 and connected in any suitable manner to the air compressor 92 driven by the electric motor 93. Parts 91, 92 and 93 are mounted on carriage C and therefore move and form a unit therewith. Motors 87 and 60 are started, operating oil pumps 61 and 86. The operator now occupies seat 90 where he can easily reach control valves 37*a*, 48, 63 and 71 and the switch 94 for the motor 93 and switch 60*a* for the motor 60, and switch 87*a* for the motor 87, and switch 97 for the motor 96.

By operating valve 84, the bulldozer blade 74 is moved left as far as it will go, and by operating valve 37*a* the operator runs platform P carrying carriage C to the left over the bulldozer blade to expose the breaking table 11. The material S is now placed on table 11 and may be positioned thereon by using the bulldozer in a manner that will be obvious.

The operator by valve 37*a* now moves platform P over the material S so that hammer 68 will strike the same. If lateral adjustment is necessary, the operator manipulates valve 48 thereby moving carriage C across platform P until the hammer 68 is properly positioned to do its work.

The operator now manipulates valve 71 striking as many blows as desired, and manipulating valves 37*a* and 48 to position the hammer relative to the work S, to strike a blow at any point within the area of work table 11.

The operator, therefore, can at all times move the hammer longitudinally on tracks 16, 17, and transversely by carriage C on platform P, and if necessary can adjust baffle plate 59 to overlie the work S to prevent fragments thereof from striking the bottom of the platform P.

When the slab S is sufficiently broken, the operator by means of valve 37*a* runs platform P to the extreme left, and stooping over without leaving his seat, operates valve 84 to cause the bulldozer blade 74 to push the fragments of S to the right, off the table 11 and into a hopper or bin provided at the right, Figure 2.

It will be obvious that valve 84 if located remote from the operator's seat may be connected by a cable to a handle 84*a* near the seat 90 whereby an operator can manipulate said valve without leaving his seat. Also the necessary starting switches 60*a* and 87*a* for motors 60 and 87 can be positioned near said seat.

The electric hoist 95 is driven by motor 96 having a switch 97 within reach of the operator on seat 90 and this hoist may be used to lift billets S and other material from points adjacent the device, onto work table 11, and the hoist moves with the carriage C and can be used with said carriage in any position.

What is claimed is:

1. In a device of the class described, a platform adapted to be moved longitudinally; means for moving said platform carried thereby; a carriage mounted on said platform and adapted to be moved transversely across same at a right angle to the direction of movement of said platform; means for moving said carriage carried thereon; a pneumatically operated hammer mechanism mounted on said carriage and including a piston rod having a breaking tool extending below said carriage and platform and adapted to strike a blow on work positioned below said platform, said hammer mechanism including a cylinder mounted above said carriage; a trunnion block mounted on the carriage and supporting said cylinder therein; springs between said block and said carriage whereby said hammer is spring-mounted; an air compressor mounted on said carriage; and a motor mounted on said carriage and connected to said compressor to operate the same.

2. The combination as claimed in claim 1, including a hoist mounted on said carriage and extending below said carriage and platform; and a motor mounted on said carriage and connected to said hoist to operate the same.

3. In a device of the class described, a platform adapted to be moved longitudinally; means for moving said platform carried thereby; a carriage mounted on said platform and adapted to be moved transversely across same at a right angle to the direction of movement of said platform; means for moving said carriage carried thereon; a pneumatically operated hammer mechanism mounted on said carriage and including a piston rod having a breaking tool extending below said carriage and platform and adapted to strike a blow on work positioned below said platform, said hammer mechanism including a cylinder mounted above said carriage; a trunnion block mounted on the carriage and supporting said cylinder therein; springs between said block and said carriage whereby said hammer is spring-mounted; an air compressor mounted on said carriage; a motor mounted on said carriage and connected to said compressor to operate same; a hoist mounted on said carriage and extending below said carriage and platform; a motor mounted on said carriage and connected to said hoist for operating the same; an operator's seat on said carriage; a first control means for controlling said platform moving means; a second control means for controlling said means for moving said carriage; a third control means for controlling said pneumatic hammer mechanism; a fourth control means for controlling said air compressor motor; and a fifth control means for controlling said hoist motor; said control means being positioned on said carriage within reach of an operator seated on said seat.

References Cited in the file of this patent

UNITED STATES PATENTS

2,335,171	Cornett	Nov. 23, 1943

FOREIGN PATENTS

13,900	Australia	Mar. 7, 1934
28,479	Sweden	Mar. 5, 1910