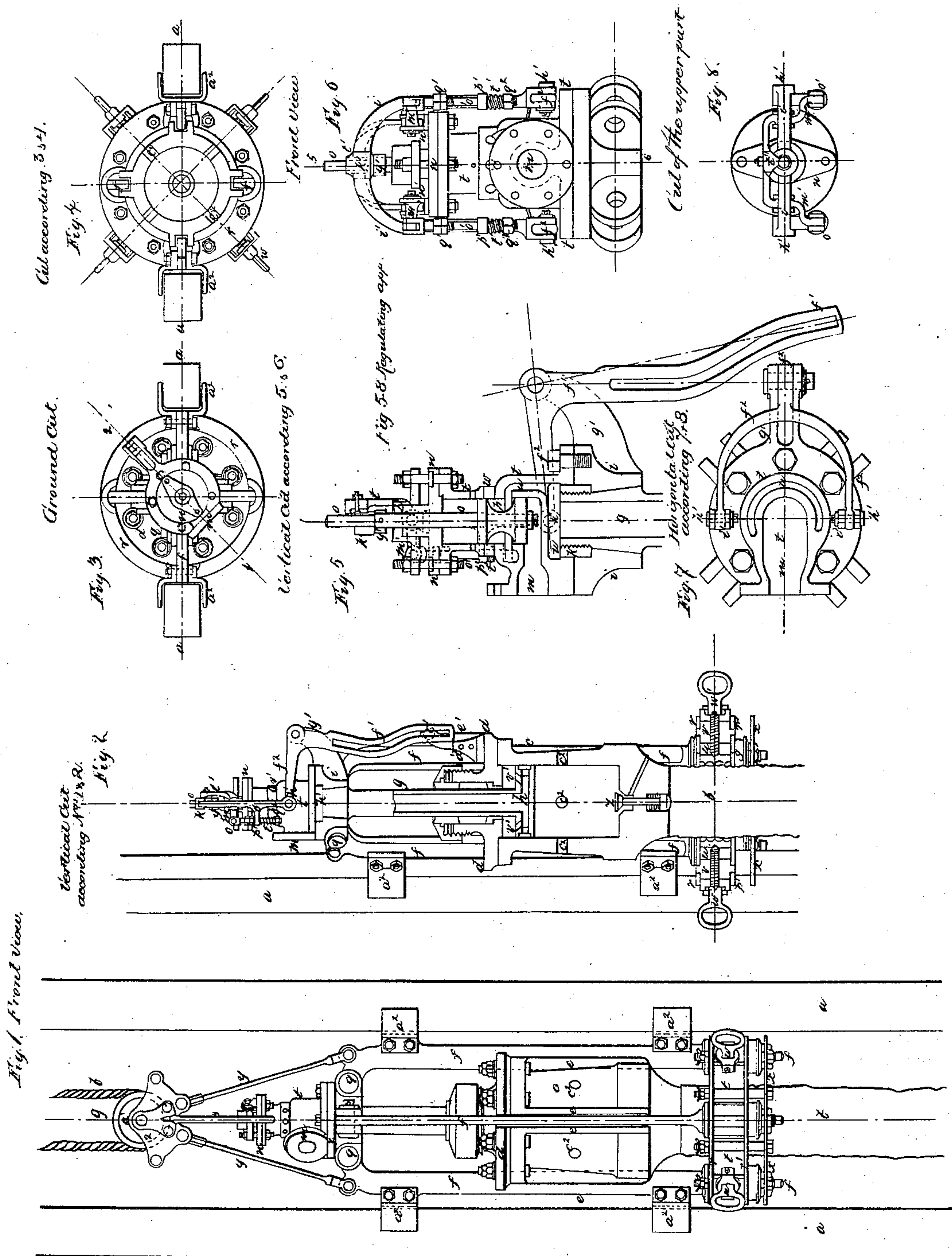


J. J. Studer.

Pile Driver.

N^o 59,476.

Patented Nov 6, 1866.



Witnesses.
C. Hansen
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Inventor.
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UNITED STATES PATENT OFFICE

JOHAN JACOB STUDER, OF RICHMOND, INDIANA.

IMPROVED PILE-DRIVER.

Specification forming part of Letters Patent No. 59,476, dated November 6, 1866.

To all whom it may concern:

Be it known that I, JOHAN J. STUDER, of Richmond, in the county of Wayne and State of Indiana, have invented a new and useful Improvement in Steam Pile-Drivers; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a side elevation. Fig. 2 is a vertical section; Fig. 3, a horizontal section; Fig. 4, a horizontal section; Fig. 5, a vertical section of part of the machine; Fig. 6, a front elevation of a part; Fig. 7, a horizontal section of another part; Fig. 8, also a horizontal section.

The same letters of reference are employed in referring to identical parts.

This pile-driver is supported between posts *a*, to which it is fastened by dogs *a*². These posts are supported upon rollers, allowing its being moved as desired. The cylinder *C* is also the driver. It slides vertically on the guides *f*, which are inserted in grooves *c* on the exterior of the cylinder. The cylinder is made sufficiently heavy to act as a pile-driver.

The cylinder receives the stationary piston-head *h*, attached to the fixed piston-rod *g*, passing through a suitable stuffing-box. The piston-rod is attached to the piece *i*. Both the piston-rod and head are hollow, so as to permit the steam to pass through the rod into the head, and then through the opening *e*' into the chamber of the cylinder, between the piston-head and upper cylinder-head.

Steam is admitted through the flexible steam-pipe into the opening *m*, whence it passes through the pipe *u* into the upper end of the piston-rod *g*, thence into the cylinder *C*, by which said cylinder is raised. On the escape of the steam by means to be hereinafter explained, the cylinder falls by its own gravity. The steam entering at *M* passes into a valve-chamber inclosing the piston-valve *p*, which is fitted into a cylinder and is formed with a space left around its middle part between the two ends, as shown in Fig. 5. When the valve is down it cuts off all communication with the cylinder *C*, but when raised by the pressure of the steam beyond the port *u*, the

steam flows below the valve into the cylinder *C*. The cylinder is thus raised immediately on the introduction of the steam. As it rises it carries with it the arm *d*' sustaining the wrist-pin *C*¹, which fits within a slot in the curved arm of the oscillating bell-crank lever *f*¹, which is pivoted at its elbow to the arm *g*'. The other end of this lever is bifurcated, forming the yoke *f*², the ends of which are pivoted to the vertical yoke *i*, the top of which has an eye through which passes the stem *O* of the valve *p*.

On the sides of the yoke *i* are arms *i*', in the ends of which are eyes through which pass vertical rods which have stay-nuts above and below, and the spiral spring *t* pressing downward on the rods. These rods are pivoted to the ends of another yoke, *t*', oscillating on a pivot by which it is suspended, so that the upper point shall oscillate from and toward the valve-stem *O*. At the top is a wedge-shaped projection, *t*'', Fig. 8, which fits into a corresponding notch cut out of the eye of the yoke *i*, as shown in the same figure.

The piston-valve *p* being chambered about its middle, as described, when the piston is down, the port *u* being opposite this recess, the steam will flow back from the cylinder into the chamber around the piston-valve *p*, whence it escapes through the ports *w* in the valve-chamber into the air. The valve being raised by the admission of the steam, as described, the cylinder *C* is raised by the steam thus admitted above the stationary piston-head. The wrist *c*¹ throws outward and upward the vertical part of the slotted lever *f*¹ drawing down the opposite end, causing the jaw *t*'' to close on the collar *K* on the valve-stem *O*, and forcing the valve-stem and valve downward, thus opening the communication between the ports *u* and *w*, and allowing the escape of the steam from the cylinder *C*, and its consequent descent. The descent of the cylinder relaxes the hold of the jaw *t*'' on the valve-stem, so that the valve being free to rise the steam is again admitted to the cylinder and its rapid reciprocating motion effected.

*C*² are holes left in the cylinder below the piston-head for the free passage of air. *Z* is a valve in the bottom of the cylinder, which being raised by each descent of the same, per-

mits the escape of any water that may be formed by the condensation of steam in the cylinder.

The ways *f* are fastened below to circular plates *r r'*, and have india-rubber pads, on which the entire apparatus is supported, so as to relieve the machinery from the force of concussion.

The sliding clamps *n*, actuated by set-screws *w'*, are placed between the plates *r r'*, and may be made to seize the head of the pile to be driven, thus holding all parts in their proper relative positions.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the valve-stem *O*,

yokes *i* and *t'*, lever *f¹*, wrist *C¹*, and cylinder *C*, substantially as and for the purpose set forth.

2. The arrangement of the valve *p*, with its chest, and the ports *u* and *w*, substantially as set forth.

3. The arrangement of the plates *r r'*, set-screws *w*, and clamps *u*, substantially in the manner and for the purpose set forth.

4. Supporting a pile-driver on elastic cushions, substantially as and for the purpose set forth.

JOHAN JACOB STUDER.

Witnesses:

JOHN H. POPP,
ANTON EGLI.