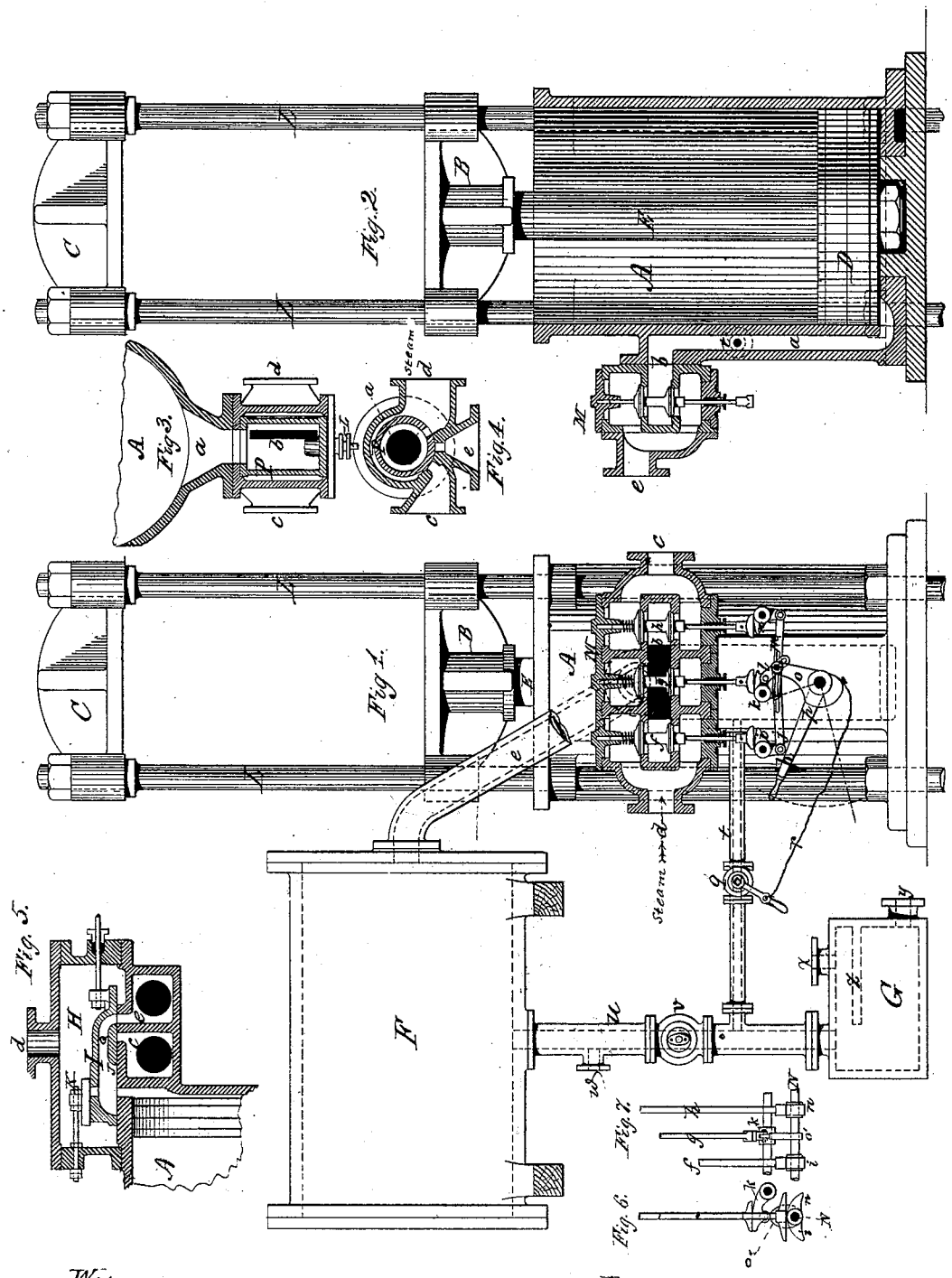
C. E. EMERY.

Steam-Engine for Cotton-Presses.

No. 201,397. Patented March 19, 1878.



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IMPROVEMENT IN STEAM-ENGINES FOR COTTON-PRESSES.

Specification forming part of Letters Patent No. **201,397**, dated March 19, 1878; application filed September 1, 1877.

To all whom it may concern:

Be it known that I, CHARLES E. EMERY, of Brooklyn, in the county of Kings and State of New York, (office New York city,) have invented a new and useful Improvement in Steam Cotton-Presses; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, making part of this specification.

The invention has for its object economy in the use of steam and fuel.

In most presses the pressure required to accomplish the purpose is comparatively small at the beginning of the stroke, and increases rapidly as the bulk of the body operated upon diminishes. It is common, therefore, to interpose between the steam-piston or other motor and the bed or platen used to apply the pressure some means of progressively augmenting the pressure—such, for instance, as the levers in the well-known Tyler press; but even in these presses a comparatively small steam-pressure is required at the beginning of the stroke and a very high one at the end, terminal pressures of one hundred pounds per square inch and upward being common. Ordinarily the entire cylinder full of this high-pressure steam is exhausted into the air and wasted, though occasionally the exhaust-steam is used for heating the feed-water under the atmospheric or a higher pressure, substantially as on western river steamers.

My invention consists in placing a cylinder full of high-pressure steam, which has performed its work, in communication with a large conserving-chamber, so that the steam will expand from the cylinder to the chamber until the pressure in both becomes substantially the same, then to close the communication and permit the remaining steam in cylinder to exhaust freely, so that the piston will retract and open the press to receive another bale. The next bale is then compressed as much as possible by admitting steam from the conserving-chamber to cylinder, when, communication with chamber being again closed, live-steam is admitted to finish the compression, after which, the cylinder being again full of high-pressure steam, the operation is repeated.

The invention is applicable to any engine operated by an elastic fluid in which the pressure necessary to do the work increases from the beginning toward the end of the stroke, as in air-pumps and the like.

In the drawing the invention is shown applied to a direct-acting press, of which—

Figure 1 is a front view with steam-chest in section, containing puppet-valves, and Fig. 2 a side view with steam-chest and cylinder in section. Fig. 3 is a horizontal, and Fig. 4 a vertical, cross-section of a cylindrical valve adapted to distribute the steam in manner desired. Fig. 5 is a longitudinal section of a slide-valve for a similar purpose. Fig. 6 is a side view, and Fig. 7 a front view, of a modified gear for operating the puppet-valves shown in Figs. 1 and 2.

B and C, Figs. 1 and 2, are, respectively, the bed and platen of the press, the former, in this arrangement, being operated directly through a rod, E, by the piston D in the main steam-cylinder A. The steam-cylinder A and platen C are shown connected by tie-rods L L, serving as guides for bed B.

This arrangement of the details of the press proper is not essential. The cylinder may be above the pressing-plates, and connected to one of same indirectly through quadrant-levers, &c., as in the Tyler press, or any other well-known arrangement applied.

M is the steam-chest, arranged here to contain three puppet-valves, each of which may, however, be in a separate chest. A nozzle, *b*, common to all the valves, connects with the cylinder below the piston—for instance, by a pipe or passage, *a*.

Steam from the boiler enters the steam-chest at *d*, and is admitted to nozzle *b* and the cylinder by opening steam-valve *f*. The exhaust-valve *h* opens communication from the cylinder through *c* to the atmosphere or a condenser, and the intermediate valve *g* puts the cylinder in communication with a conserving-chamber, F, which is preferably made three to five times the capacity of the cylinder, though there is a slight gain by making it still larger; but it will cause a prominent saving when only of same capacity as main cylinder.

The valves are preferably moved to produce the operations first above described by a single lever. One method of doing this is shown in Fig. 1, *p* being the operating-lever.

The stems of the valves *f*, *g*, and *h* are lifted respectively by cams *i*, *k*, and *n*, and retracted

by weight of parts, and the springs shown above the valves, or any similar means.

Let us suppose all parts in position shown. Upon raising lever *p*, a pin on a vertical arm, *o*, strikes the end of a slot in a link, *j*, moves cam *i*, thereby raising valve *f* and admitting steam to the cylinder until the piston rises to the top. Upon depressing the lever the steam-valve *f* will first be closed, then a pin in arm *o*, striking top of slot in link *l*, will move cam *k* and lift the intermediate valve *g*, thereby permitting steam in cylinder A to expand into conserving-chamber F until the pressures in the two become substantially equal. Continuing the motion of lever *p* downward, the arm *o* passes its vertical position, and lowers valves *g*, after which a pin in end of arm *o* strikes the end of a slot in link *m*, thereby moving cam *n* and raising valve *h*, and permitting remaining steam in cylinder to escape freely and the piston to return to the bottom. Upon again raising lever *p* the exhaust-valve *h* will first be shut; then, evidently, the valve *g* will again be opened, admitting steam from chamber F to cylinder A, and forcing piston up as far as it will move with the pressure therein available, when, continuing motion of lever *p* upward, valve *g* will be lowered, and steam-valve *f* be lifted, as before, until the full pressure desired is obtained in cylinder, and under these conditions, on the next and every succeeding stroke, upon lowering lever *p*, a portion of the steam in cylinder will be received in conserving-chamber F, and be thereby conserved or saved so as to be available in moving the piston part of the desired distance on the next upstroke. The greater the volume of steam that the cylinder will receive from chamber the less will be required from the boiler.

The arrangement of levers and links shown in Fig. 1 is convenient, as it can be adapted when the valves are much separated. Another arrangement is shown in Figs. 6 and 7. An operating-lever would be attached to a rock-shaft, N, provided with two lifting-cams, *i* and *n*, to operate valves and stems *f* and *h*, and an intermediate oval-shaped cam, *o'*, to operate intermediate valve *g*, the successive movements being the same as described previously in relation to parts on Fig. 1.

In Figs. 3 and 4 a cylindrical valve, P, opens at one end to a passage, *a*, connecting with cylinder A, and has a bearing-face surrounding the opening. The bottom of valve has a face-bearing in a valve-seat. Through this face is the opening *b*, which therefore communicates with cylinder, and may be brought beyond the valve-seat to admit steam to cylinder from *d*, as shown, or successively to the openings *e* and *c*, communicating with the conserving-chamber and exhaust respectively. In Fig. 5 an opening, Q, in a slide-valve, communicating at all times with cylinder, may in similar manner be brought into communication with an exhaust-opening, *c*, an opening to conserving-chamber *e*, or by sliding the valve beyond the seat, or so that a plate, K, will not cover an opening on top of valve, steam may be admitted to cylinder from pipe *d*. The small plate or valve K may also be operated independently.

G represents a feed-water heater. The feed-water preferably enters a pipe, *x*, is distributed by a plate, *z*, and removed at *y*. A pipe, *u*, connects the heater with the chamber F by opening valve *v*, when the operations of storing steam for work and for heating feed-water go on simultaneously. An outlet, *w*, is provided, so that steam from F can be withdrawn for heating purposes, or to perform any other work, such, for instance, as driving a hoisting-engine or the like. If the pressure be reduced in the chamber by this means, more steam will enter from the cylinder, and more therefore be utilized.

To enable steam to be taken regularly from *w* for other purposes, a connection may be made to F from the boiler, with a valve therein, regulated by hand or automatically, to maintain the necessary pressure when the press is stopped; or the engine, &c., may have a source of supply in addition to that from F. A valve, *q*, is also provided to connect the heater or chamber directly with the cylinder, which valve may be operated at any time, but preferably when securing the compressed bale on the bed.

During the operation last named it is often necessary or possible to let a little steam out of the cylinder, which is by this arrangement utilized. Any automatic arrangement may be used to close valve *q* when the cylinder is exhausted. A flexible cord, *r*, attached to the handle of the valve, and to a projection on lever *p*, is shown for the purpose.

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

1. A conserving-chamber, in combination with a steam-cylinder and piston, the latter connected to overcome a progressively-increasing load, and the cylinder and chamber provided with suitable valves and connections to secure conserving action, substantially as shown and described.

2. The combination of a conserving chamber, operating as described, and a heater with a steam-cylinder, substantially in the manner shown and described.

3. In combination with a conserving-chamber, operating as described, and a steam cylinder and necessary attachments and connections to secure conserving action, the outlet *w* in the chamber, whereby the steam saved may be used both in the cylinder supplying it and for other purposes.

4. The combination of a lever-arm, *o*, and links *l*, *j*, and *m* with mechanism operating steam, intermediate, and exhaust valves to perform the successive operations mentioned.

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Witnesses:

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