To all whom it may concern:

Be it known that I, SAMUEL HUGHES, of the city and county of Charleston, in the State of South Carolina, have invented certain improvements in Power-Presses for Compressing Cotton, Baling Goods, and other purposes, of which the following is a specification:

This invention generally consists in a hydraulic attachment to a direct-acting lever-press operated by steam, whereby the full power of the press may be exerted in every instance, and each succeeding charge of material may be similarly compressed, as regards bulk, without repetition of the compressing action, and whereby time, labor, and expense are economized, and other advantages are obtained.

Prior to describing my invention, it may be observed that in lever-presses—ass for instance, in the kind known as the "progressive-lever" press, used for pressing and baling cotton, and in which the actuating power is steam, brought to bear upon a piston arranged within a cylinder, and connected with the levers by which the moving platen is operated—it is known that, unless the piston of said steam-cylinder travels the whole length of its upward or compressing stroke, the full power of the press is not exerted on the material under compression, and no two succeeding bales or masses can be compressed to the same bulk or density unless they are of the same density and size before being compressed, excepting by removing or adding packing, usually termed "shifting boards" and the compressing action of the platen being repeated on the mass. It accordingly not infrequently takes two, and sometimes three, cylinders full of steam to fully or properly compress a bale of cotton.

By my invention, each bale or mass may be compressed to the same density or bulk at or by a single compression, and the only limit to the power of the press is the strength of the material used in the construction of it. My invention can readily be applied to steam or power presses already in use, and the latter be made more powerful, requiring no double pressing of a single bale or mass, and dispensing, if desired, with all packing or shifting boards to follow up the action of the platen.

In the accompanying drawings, Figure 1 represents a partly-sectional side view of my invention as applied to an ordinary progressive-lever press actuated by steam. Fig. 2 is an end view of the same. Fig. 3 is a plan of the hydraulic-cylinder portion of the attachment. Fig. 4 is a vertical longitudinal section, upon a larger scale, of my hydraulic-power attachment in part; Fig. 5, an end view of the same, with the rear steam and exhaust valve portion thereof in section; and Fig. 6, a plan of the valve-gear of the steam portion of the hydraulic-power attachment.

Similar letters of reference indicate corresponding parts.

A is the steam-cylinder of an ordinary progressive-lever press, the piston-rod of such steam-cylinder having the usual double rack B, which is arranged to gear with the two toothed sectors or levers C C, that are connected by rods or pitman D D with the movable bed or platen E, the upper bed or platen F being stationary. This, with the exception of certain details of construction, as hereinafter referred to, is similar to other presses now in use. G is the steam-cylinder of the hydraulic-power attachment. The piston-rod H of this cylinder passes through a stuffing-box in the head of the steam-cylinder G, and is provided on its outer end with a plunger, I, arranged to work closely within a hydraulic cylinder J. K is a check-valve, opening downward, and connected by a pipe, b, with the hydraulic cylinder J. L is a hydraulic-ram cylinder or chamber, arranged to rest upon a suitable foundation below the moving platen E, and connected with the upper stationary platen F of the press by bolts d d. This cylinder L is connected from below by a pipe, b', with the chamber of the check-valve K, in direct communication with the pipe of the cylinder J, and said cylinder L fitted with a ram M, arranged to project up through it. This ram M is provided at its top with a curved saddle, S, which is fitted to the under side of the moving platen E. The connecting-rods or pitman D D of the press have elongated eyes or slots e e at their lower ends, to admit of the platen E being forced upward after the piston of the steam-cylinder A has completed its upstroke, and
the levers or sectors C C have been moved to
a position which terminates the upward pull of
the rods D D. N is a reservoir, placed above
the level of the hydraulic ram, the check-valve
K, and the cylinder J, and connected by a pipe,
b, with the check-valve chamber above
the valve. O is the pipe by which steam is
supplied to the engine-cylinders A and G, which
are fitted with any suitable valve mechanism,
including separate steam and exhaust valves,
with the check-valve K. Thus the movement of
the levers P P' to an intermediate position
causes all of said valves to be closed. By
moving the levers P P' to the right, the steam-
valves f h and check-valve K are opened, the
exhaust-valves g i remaining closed, and
by moving said levers to their extreme left,
the exhaust-valves g i are opened and the steam-
valves f h closed. The several valves hereinafter referred to are operated
by means of rock-shafts, toes, wipers, and
other suitable connections. The piston G' of
the cylinder G is prevented from striking the
heads of the latter at either end of the stroke,
by coming in contact with rods k k' running
through the cylinder-heads and connected on
the outside with levers, which in their turn are
connected by rods to other levers secured to the
rock-shafts that operate the steam-valves, so
that as either rod k k' is forced outward by the
piston G' it opens the steam-valve at such end of
the cylinder and admits steam to act as a cushion to the piston. The steam-valve l at
the forward end of the cylinder G is closed by
a weight on the end of the valve-stem, and is
opened only when the piston G comes in con-
tact with the rod k. The exhaust-valve m, at
such end of the cylinder, is opened by a lever
and weight, n, and closed only when the pis-
ton G' strikes the rod, which causes the wiper
operating the valve to leave the toe, when a
weight on the end of the valve-stem closes the
valve. The valves and valve mechanism may,
if desired, be of any other suitable kind.

To operate the press, fill the reservoir N with
oil, water, or other suitable liquid, and open the
check-valve K, thereby allowing the liquid to fill
the cylinder J and the pipes connected thereto.
A bale or mass, Q, of the material to be
compressed, having been placed upon the platen
E, steam is admitted to the cylinder A, by
opening the steam-valve k. This causes the
piston of said cylinder to ascend, and, by means
of the rack D, toothed-sectors or levers C C,
and connecting-rods D D, draw up the platen
E until said piston reaches the end of its
stroke, or is stopped by the resistance of the
material being compressed. By reason of the
attachment of the ram M to the platen E it is
caused to act along with the platen, and the
check-valve K being open, the liquid from the
reservoir N flows through the connecting-pipes
into the ram-cylinder L, and fills the space
previously occupied by the ram. A finishing
pressure is then given to the bale by admit-
ting steam to the rear end of the cylinder G
by opening the steam-valves. This causes the
piston G' to move forward, and with it the
plunger I, which forces liquid from the cy-
der J through the connecting-pipes b b' (closing
the check-valve K) into the ram-cylinder L,
thereby forcing the ram M and platen E
still farther up and powerfully compressing
the bale between the platen, the elongated
eyes or slots e e in the rods D D admitting of
such continued action of the platen E. The
bale having been properly tied and ready for
taking out of the press, the steam-valve f is
closed and the exhaust-valves g i and check-
valve K opened. The weight of the movable
platen, sectors, and connecting-rods, together
with the yielding of the compressed material,
causes the platen E and ram M to descend,
forcing the liquid from the cylinder L through
the pipes b' b into the reservoir N, and by
the pipe b into the hydraulic cylinder J, thereby
driving backward the piston G' to the rear
end of the cylinder G. The piston G' may be
assisted in its backward movement by setting
it and its cylinder slightly inclining, as repre-
sented. The same operation is repeated for
the next bale or mass, and so on, successively,
for any number of bales, &c, all of which will
be compressed to the same bulk or density.

The circulation is kept up by the liquid be-
tween the vessel and cylinder J L by the open-
ing and closing of the check-valve K at each
compressing operation, whereby is insured a
constant fresh supply of cooling-liquid to the
exposed packings, rendering them more dur-
able.

I claim as my invention—
1. The combination, with the piston and
steam-cylinder A of a lever power-press, of
the auxiliary hydraulic cylinder or chamber L
and ram M, arranged in relation with the platen
E, substantially as specified.

2. The rods D D of the lever power-press,
provided with elongated eyes e e, in combina-
tion with the platen E and hydraulic jack or
ram M, essentially as described.

3. The combination of the steam-piston G'
and its cylinder with the plunger I, the cy-
der J, the cylinder or chamber L of the ram
M, the pipes b b', the platen E, and the steam-
cylinder A of a lever power-press, essentially
as described.

4. The reservoir N and pipe b', in combina-
tion with the check-valve K and pipes b b'
connecting the hydraulic cylinder J with the
chamber L of the ram, all arranged for opera-
tion in relation with each other, substantially
as specified.

SAMUEL HUGHES.

Witnesses:
HORATIO HUGHES,
H. BOLGER.