

**NOTES FOR USERS OF  
HYDRAULIC  
PRESSES AND OTHER  
HYDRAULIC MACHINERY**

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Notes for Users of Hydraulic Presses and Other Hydraulic Machinery by E. Howard

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**E. HOWARD**

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HYDRAULIC MACHINERY**



## "RIDER'S PATENT HOT AIR ENGINE,"

FOR PUMPING AND DRIVING SMALL MACHINERY.

Possesses the advantages of *Absolute Safety, Simplicity, and Economy* (costing under \$4. per horse power per hour).

SOLE MAKERS, HAYWARD TYLER & Co., ENGINEERS, LONDON.

Awarded SILVER MEDAL of  
the Royal Agricultural  
Society, Birmingham Meet-  
ing, 1875.

Awarded Silver Medal at the  
Kidderminster  
Agricultural Show, 1877.



Awarded the Highest Prize  
at the  
Centennial Exhibition,  
Philadelphia, 1876.

Highly Commended at the  
various Shows where it  
was not eligible to compete  
for prizes.

THE FOLLOWING ARE SELECTED FROM A GREAT NUMBER OF PRESS NOTICES AND  
TESTIMONIALS OF THE ENGINE.—

In this new Caloric Engine ("Rider" Compression Engine) the difficulties encountered by many eminent inventors are successfully overcome. The working parts show the utmost simplicity of arrangement, and for a small power the consumption of coal is not heavy.—*Times*.

Simple, straightforward, and easily managed by untrained hands.—*Engineering*.

Its construction is of the simplest kind, and no skilled labour is requisite to work it, a few simple directions being all that is required.—*Chamber of Agriculture Journal*.

The engine exhibited at work (6 inch) with about 36 to 40 lbs. of coke in the fire box, slightly replenished about once in every hour, was delivering water to a tank about 36 to 40 feet high. This is excellent work for a Hot Air Engine of the size, and at so small a fuel-consumption as 18 to 20 lbs. of coke in the day of eight to ten hours.—*Iron*.

Especially applicable to the supply of gentlemen's mansions, hotels, and public buildings.—*Iron Trade Exchange*.

Re 1/2 H.P. Hot Air Engine, Pumping.

MESSERS. HAYWARD TYLER & Co.

Ewell, Surrey, June 18th, 1877.

Gentlemen,—The "Rider" Hot Air Engine you supplied some months since is working very satisfactorily. The cost of fuel is very trifling. The only attention it has had has been that of the gardener's boy, 18 years of age. I consider it the most economical pumping power I have ever seen. I should be pleased to show it to anyone you may send to see it.

Yours truly, (Signed) WM. KILLICK.

Re 1 H.P. Hot Air Engine, Working Mortar Mixer.

Alnwick Castle, Northumberland, Estates Office, June 12th, 1877.

MESSERS. HAYWARD TYLER & Co., LONDON.

Gentlemen,—The 1 H.P. Hot Air Engine supplied by you has been used for working a mortar mixer, and is still doing so, and I am glad to inform you that it is doing the work well.

Yours, &c., (Signed) G. REAVELL.

Re 1/2 H.P. Hot Air Engine, Pumping.

MESSERS. HAYWARD TYLER & Co., LONDON.

The Elms, Hereford, June 4th, 1877.

Gentlemen,—It gives me much pleasure to state that the Hot Air Engine supplied to me by you affords me entire satisfaction. It works well and easily, and the entire water supply at my house is pumped up several hundred yards by means of this Hot Air Engine.

Faithfully yours, (Signed) CHAMBERS ANTHONY.

Re 1 H.P. Hot Air Engine, driving Printing Machinery.

MESSERS. HAYWARD TYLER & Co., LONDON.

Bergen, Norway, May 1st, 1877.

Gentlemen,—The Engine has worked steadily in the Printing Office of the "Bergen Times" newspaper, driving 1 double-demy printing press, and at that making 36 to 100 revolutions per minute. The proprietor speaks now of buying another 1/2 H.P. Engine, so for his purpose they are very economical, serving as well for a heating stove as for a Motor.

Yours &c., THOS. M. WILSON.

NOTES FOR USERS  
OF  
HYDRAULIC PRESSES

AND OTHER

*Hydraulic Machinery.*

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ILLUSTRATED WITH ENGRAVINGS AND COPIOUS TABLES.

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COMPILED BY E. HOWARD,

OF THE FIRM OF

HAYWARD TYLER & Co.,

HYDRAULIC ENGINEERS,

UPPER WHITECROSS STREET, LONDON. E.C.

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1877.

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## NOTES ON HYDRAULIC MACHINERY.

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Hydraulic Presses, Hydraulic Lifts, Hydraulic Jacks, and numberless other machines of the same class, though differing widely in outward design and in almost every detail of their arrangement, act on the same principle and obtain the required results in the same way. It appears therefore desirable, before describing the forms of hydraulic machines most generally in demand, to explain briefly the principle on which they act, and to define the technical names for various parts which are used in the following catalogue.

### PRINCIPLE OF THE HYDRAULIC PRESS.

The action of all forms of the hydraulic press depends on the property possessed by non-compressible fluids (such as water) of communicating pressure from one part of their body to another, in all directions. Thus if we have a body of water shut into a vessel of any shape, or in several vessels communicating with each other, and if we can apply a pressure to the surface of any one part of this body of water, the same pressure is communicated to every part of the surface of the whole body; say, for instance, that a pressure of one ton can be applied to one particular square inch of the surface, the water being shut in, and not able to escape or to diminish in volume, will press outwards with a force of one ton on every other square inch of the surface. This property of water was discovered by Pascal.

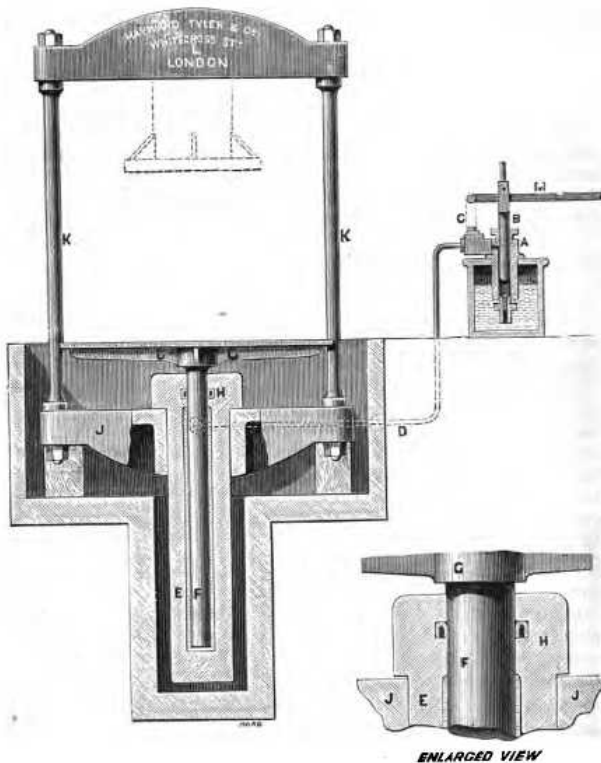
Now, if we have two cylinders of unequal size in communication with one another, and in the smaller cylinder we produce a pressure by any means (whether by a column of water or by pressing down upon the surface with a piston), it will follow that the pressure exerted on the piston of the other cylinder (being the same for each square inch) will be greater in proportion to the greater area of this cylinder.

This fact was laid hold of by JOSEPH BRAMAH in inventing the press which still goes by his name, and all other forms of hydraulic presses have followed in due course.



MEANS OF PRODUCING REQUIRED PRESSURE.

In some the pressure is produced by means of a pump, in some, by a column of water communicating with a high reservoir, sometimes the pressure is stored up by the water being forced into a cylinder, on the piston of which is a heavy weight, while in other cases the smaller cylinder has a piston gradually forced into it by a screw. In some cases the power of a column of water is multiplied by allowing it to act on a large piston, and connecting this piston directly with a small piston: thus, the whole weight of the water on the large piston is concentrated on the small one, which again communicates its power to the press. In our patent "Accumulstor" Pump, the power of steam, acting on a large piston, is in the same way concentrated on two small pistons, which work the press.



Although many improvements have been introduced into various parts of the construction of hydraulic presses, the general principle remains the same, and we sometimes find that even now it is not possible materially to improve upon the patterns which our firm used over 40 years ago. Many of our presses made at that time, are still in full use, and as good as new.

#### DESCRIPTION.

The engraving shows a section of a hydraulic press of a form commonly in use.

A is a pump cylinder of small diameter, say one inch, with plunger B and valves C. This pump communicates by the pipe D, with the larger cylinder E, in which is a plunger (or "ram" or piston) F, the diameter of which is perhaps 10 inches.

To prevent the water escaping from the cylinder E, a recess is made near the top at H, in which is placed a cup leather or leather ring of peculiar construction, which can be easily inserted when the plunger F is drawn out.

On the top of F is the rising table G which distributes the pressure over the surface of the substance to be compressed, and forces it against the head L. The bed J supports the cylinder, and is sometimes cast in one piece with it. The "Tension Bars" or Pillars K K hold the head and bed together, and take the thrust of the press. The dotted portion below the head L is termed the "Mullet," and is not generally required unless the material is pressed in a box, placed on the table G.

In the example above given, it is evident that, as the smaller piston has a diameter of 1 inch, and the larger one of 10 inches, the area of the latter is one hundred times that of the former; therefore by exerting on the smaller piston (by means of a lever M), a weight of one ton, you get a pressure of 100 tons in the larger or press cylinder.

#### RELATION BETWEEN SPEED AND POWER.

It is well to bear in mind, that in all mechanical devices for increasing power, (such as compound Pulleys, Levers, &c., &c., and including the hydraulic press), you lose in speed in exactly the same proportion as you gain in power. Thus, in the above example, your smaller piston will have to travel downwards 100 inches for every inch that it raises the larger piston. This is a point to be borne in mind, as in very many cases it is an important question, how far speed of working, may be sacrificed to additional power. Various means are used to get over this difficulty, but the most usual is to have pumps of two sizes, the larger one (known as the "Speed Pump,") raises the press rapidly at first, but is unable to give the full power required; when the load is partly compressed, the smaller (or "Power Pump") is set to work and exerts the full pressure needed. The direct-acting "Accumulator Steam Pump," which we introduced some years ago, accomplishes the object in another way, by working rapidly while the pressure is slight, and gradually decreasing in speed, until the full power is attained.

THE FOLLOWING FACTS MAY BE INTERESTING TO OUR FRIENDS AND  
CUSTOMERS:—

JOSEPH BRAMAH patented the Hydraulic Press in 1796.\* His pupil, Mr. W. RUSSELL, who appears to have been with him at the time of the invention, began, in 1815, to manufacture these presses (and other machines invented by his Master), at works in Clerkenwell. In 1827, Mr. RUSSELL was joined by Mr. JOHN BRIGGS, who still remains as our valued adviser and assistant. In 1834, Mr. RUSSELL'S business passed into the hands of Mr. HAYWARD TYLER, who continued it with the able assistance of Mr. JOHN BRIGGS, and finally removed it to its present location in Upper Whitecross Street, London. In 1855, Mr. HAYWARD TYLER having died, the business was carried on by Mr. ROBERT L. HOWARD who, with his brother E. HOWARD, are the present proprietors. In the course of time a number of the patterns possessed by the BRAMAHS passed into the hands of our firm, and we believe that we can claim, not only to be the oldest existing makers of Hydraulic Presses and some other branches of machinery, but to possess a larger and more varied stock of patterns than any other firm, to which stock we are constantly adding any improvement that experience can suggest, or modern demands require.

TECHNICAL TERMS USED FOR VARIOUS PARTS OF PRESSES.

In this Catalogue of Hydraulic Presses, &c., the following names are generally used for the various parts:—

- A "Pump."
- B "Pump Plunger."
- C "Pump Valves."
- E "Press Cylinder," or "Cylinder."
- F "Ram."
- G "Rising Table," "Follower," or "Platten."
- H "Cup-leather," or "Press-leather."
- J "Bed."
- KK "Press Bars," or "Pillars," or "Tension Bars."
- L "Head."
- M "Pump Lever."
- N "Mullet," used in presses which work with a box on the Follower.

\* BRAMAH'S patent, dated March, 1796, is very interesting, as showing that he not only had grasped the principle of the hydraulic press itself, but anticipated many of the applications of hydraulic power which have since been perfected. He mentions the application of water or other dense fluids to various engines, so as in some instances, to cause them to act with immense force, in others to communicate the motion and power of one part of a machine to some other part of the same machine, and lastly to communicate the motion and force of one machine to another where their local situations preclude the application of all other methods of connection.