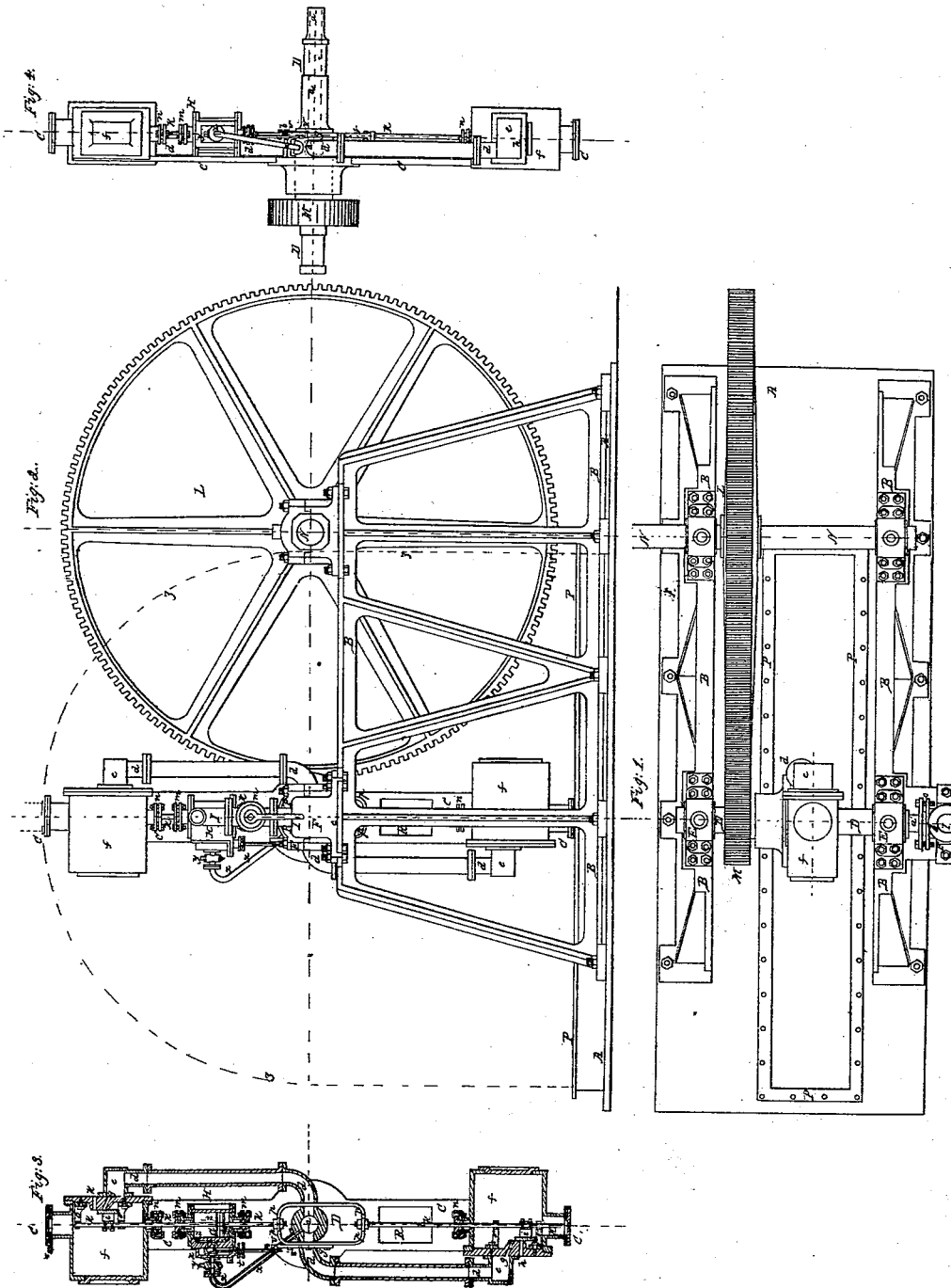


L. BRUNIER.
ROTARY STEAM ENGINE.

No. 2,830.

Patented Oct. 25, 1842.



UNITED STATES PATENT OFFICE.

LOUIS BRUNIER, OF NEW YORK, N. Y.

REACTING STEAM-ENGINE, CALLED A REACTING STEAM-GYRATOR.

Specification of Letters Patent No. 2,830, dated October 25, 1842.

To all whom it may concern:

Be it known that I, LOUIS BRUNIER, civil engineer, a citizen of the Kingdom of France, but now residing in the city of New York, in the State of New York, have invented a new and useful Apparatus, to be Moved by the Power of Steam, which I denominate "Brunier's Reaction Steam-Gyrator;" and I do hereby declare that the following is a full and exact description thereof.

The main acting part of my engine consists of two arms of equal length, which are to be made to revolve in a vertical plane, said arm being placed upon an axis running horizontally, on suitable bearings. One of the revolving arms carries a small steam engine which is to be supplied with steam from any suitable boiler, or generator. At the outer end of each of these arms is what I denominate a steam receiver; into each of which, steam is to be alternately admitted, and from which it is to be discharged in successive jets, instead of in a continuous stream, as has been the practice with other reacting steam engines. The small steam engine which is carried by one of the arms, is a cylinder engine, and serves to open and close the orifices by which steam is admitted into, and those by which it is discharged from, the receivers, each of them having one orifice for its admission, and another for its discharge; the whole being furnished with slides so arranged as that when the steam is being admitted into one of the receivers, the orifice for its discharge shall be closed, and that the action of the two receivers shall be reciprocal in this respect. The steam is supplied to them from the same boiler which supplies the small engine.

One end of the shaft which sustains and carries the revolving arms is made hollow, for the admission of steam to the engine cylinder, and to the receivers, its hollow end being received within a steam chamber which is supported on the frame work of the machine, and is connected, by a steam pipe, with the boiler.

In the accompanying drawing, Figure 1, is a horizontal projection of the whole machine. Fig. 2, is a side elevation of it. Fig. 3, a vertical section of the revolving arms, and of the principal apparatus connected with them, and Fig. 4, is a lateral view of the said arms.

In each of these figures where like parts are shown, they are designated by the same letters of reference.

A, A, A, is the base plate, upon which the whole superstructure rests, and which is best made of cast-iron.

B, B, B, are the side frames, that support the pillow blocks in which the gudgeons of the shafts run.

C, C, are the revolving arms, which are affixed to the horizontal shaft D, D, and E, E, the pillow blocks, or bearings, of said shaft.

In Fig. 4, the dotted lines *a, a, a'*, show the hollow part of the shaft D, extending from its end *a'*, to the revolving arms. Its outer end *a'*, revolves in a stuffing box *b*, Fig. 1, which makes a part of the steam chamber F; said steam chamber being supported by the frame B, B, there being a platform attached to said frame for that purpose.

I, Fig. 2, is a steam pipe leading from the boiler into the steam chamber F; and K, a cock, in said tube, to govern the admission of steam.

The steam receivers at the outer ends of the arms are shown at *f, f*; and into these, steam is admitted through the tubes *d, d*, which extend from the opening *a*, in the hollow shaft D, to the said receivers.

e, e, are small steam chambers, appended to the receivers, and serving as attachments to the pipes *d, d*; from each of the chambers *e, e*, there is an opening *g*, into its receiver *f*, which opening is governed by a slide valve *i*, said valve being moved by the steam engine in a manner to be presently explained. Each of the receivers is provided, also, with a second opening shown at *h*, for the discharge of steam therefrom; which opening is likewise governed by the slide valve *i*.

H, is the cylinder of the small steam engine, which is used for operating the valves *i, i*. This engine may be, in its general construction, similar to the ordinary reciprocating engine, and it is, as before remarked, attached to one of the revolving arms; G, is its piston, and *k, k*, its piston rod, which passes through each of the heads of the steam cylinder, and is elongated so as to constitute the rods of the slide valves *i, i*, in each of the receivers. The piston rod works through stuffing boxes *m, m*, on each head of the cylinder, and its elongated ends through stuffing boxes *n, n*, at their entrance into the

receivers; they also pass through guides *o, o*, within said receivers.

p, p, is a frame which surrounds, and works clear of, the shaft *D*, and serves to connect the two portions of the rod *k, k*. A small steam pipe, *x*, leads from the hollow in the shaft *D*, to the steam chest of the engine, *y* being a cock to regulate the supply.

t, is the slide valve of the engine.

u, u, are the steam ways leading from the steam chest into the cylinder, and *v*, the escape.

The rod of the steam valve *t*, works through a stuffing box *t'*, and its outer end has on it a tappet, which is received within a slot in a piece of metal *q*, that is firmly attached to the frame *p, p*. The slot in the piece *q*, is shown in Fig. 4, as extending from *r*, to *r*, and the tappet *t*, on the lower end of the stem of the valve *t*, which is received within this slot, when acted upon by its upper and lower ends, causes the steam valve to slide within the chest. By this connection, it will be seen that the action of the valve *t*, of the engine, and of the valves *i, i*, which govern the openings *g*, and *h*, for the admission of steam into, and its escape from, the receivers, will be simultaneous and uniform; and that at the time when it is being admitted into one receiver, it will be in the act of escaping from the other.

R, is a counterpoise to the steam engine, serving to render the momenta of the two arms equal. The power of the engine may be transmitted from the shaft *D*, by a small cog-wheel *M*, gearing into the large wheel *L, L*, or by such other gearing as may adapt it to the particular service which it is intended to perform. When the machine is applied to the purpose of navigation, or to any other in which it may be desirable that the motion of the arm should be reversed, I intend to use four arms instead of two. Both ends of the shaft *D*, may, in this case, be made hollow, and the steam may then be supplied to either of the pairs of arms, as may be desired; the respective parts of the apparatus being so arranged as to effect the purpose intended. The arms are to be inclosed in a case, which may be made of sheet iron, its lower part resting on, and being secured to, a flanch *P, P*, on the base plate *A, A*; its elevation is shown by the dotted lines *z, z*, and a pipe, or opening, for the escape of steam at *z'*.

The discharge of steam from the orifices *h, h*, will, in this engine, be made in rapid succession; I contemplate the making of from four to six discharges in a second, and admitting the latter number to take place, and a greater number may be attained, the power derived from reaction will be nearly the same as that which would result from a continued flux of steam, while the keeping

up of its elastic force in the boiler will be greatly facilitated. That a great economy in the expenditure of steam will result from this arrangement, will appear from the following considerations. We will suppose the steam in the boiler to be kept at a pressure of six atmospheres, the orifices *h*, for the escape of steam to be equal to six square inches, and the capacity of each receiver to amount to one cubic foot and a half; if there be six discharges made in a second, this would give a volume of nine cubic feet of such steam to be supplied in that time, but as each receiver would, after every discharge, remain filled with atmospheric steam, it will follow that the volume of steam of a pressure of six atmospheres, which will be expended in each discharge, will amount to about seven and a half cubic feet only. We will now suppose the steam in the boiler to be kept up at the same pressure of six atmospheres, and the orifice of discharge to be equal to six square inches, as before, and that the discharge was continuous, the velocity with which the steam would issue would not be less than sixteen hundred feet per second, and the volume discharged would be sixty cubic feet; the expenditure of steam would in this case, therefore, be eight times as great as that required for the successive discharges; and it will not be pretended that, in the case of the continuous discharge, the effect would be commensurate with the volume of steam employed.

Having thus fully described the manner in which I construct my reacting steam gy-rator, and shown the operation of the same, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The obtaining of the rotary motion of the arms of said machine by the successive and rapid discharges of steam through orifices, such as are represented at *h, h*, in the accompanying drawings, which orifices are made in steam receivers, and governed by valves; the supply of steam, and the reciprocal action of said valves, being effected, and regulated, by an arrangement of parts substantially the same with that herein made known.

2. I also claim the employment of a small steam engine, attached to one of the revolving arms, and so connected and combined with the valves in the receivers as to cause them to regulate the admission of steam into, and its discharge from said receivers for the purpose and in the manner described.

I will here observe that I have, in the first instance, claimed the manner in which I have constructed the receivers, with their valves, for the supply and discharge of steam in successive instants, separately and distinctly from the claim to the employment

of the small steam engine for opening and closing the valves in the receivers; and this I have done, because I am aware that by means of tappets, or other devices, attached
5 to the frame-work of the engine, or to the case which surrounds it, the said valves might be made to open and close without the aid of said steam engine, though not, as I believe, with equal advantage.

LOUIS BRUNIER.

Witnesses:

E. ABLON,
JOHN P. CROOLEY.