

S. A. MOSS.  
REGENERATOR.

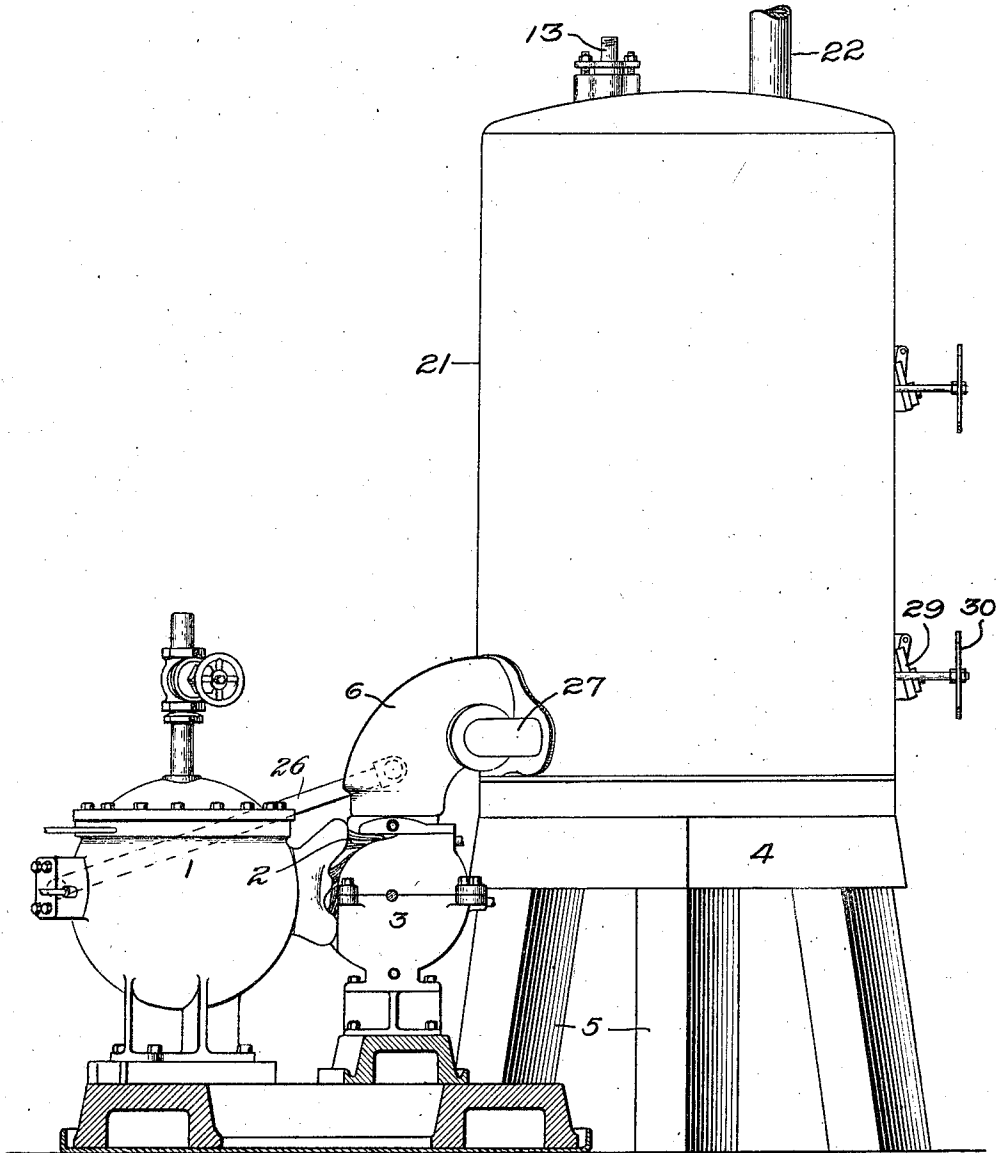
APPLICATION FILED APR. 4, 1906

1,000,969.

Patented Aug. 15, 1911.

3 SHEETS-SHEET 1.

Fig. 1.



Witnesses:

*Marcus L. Berg.*  
*Alex. F. Macdonald.*

Inventor,  
Sanford A. Moss,  
By *Albert G. Davis*  
att'y

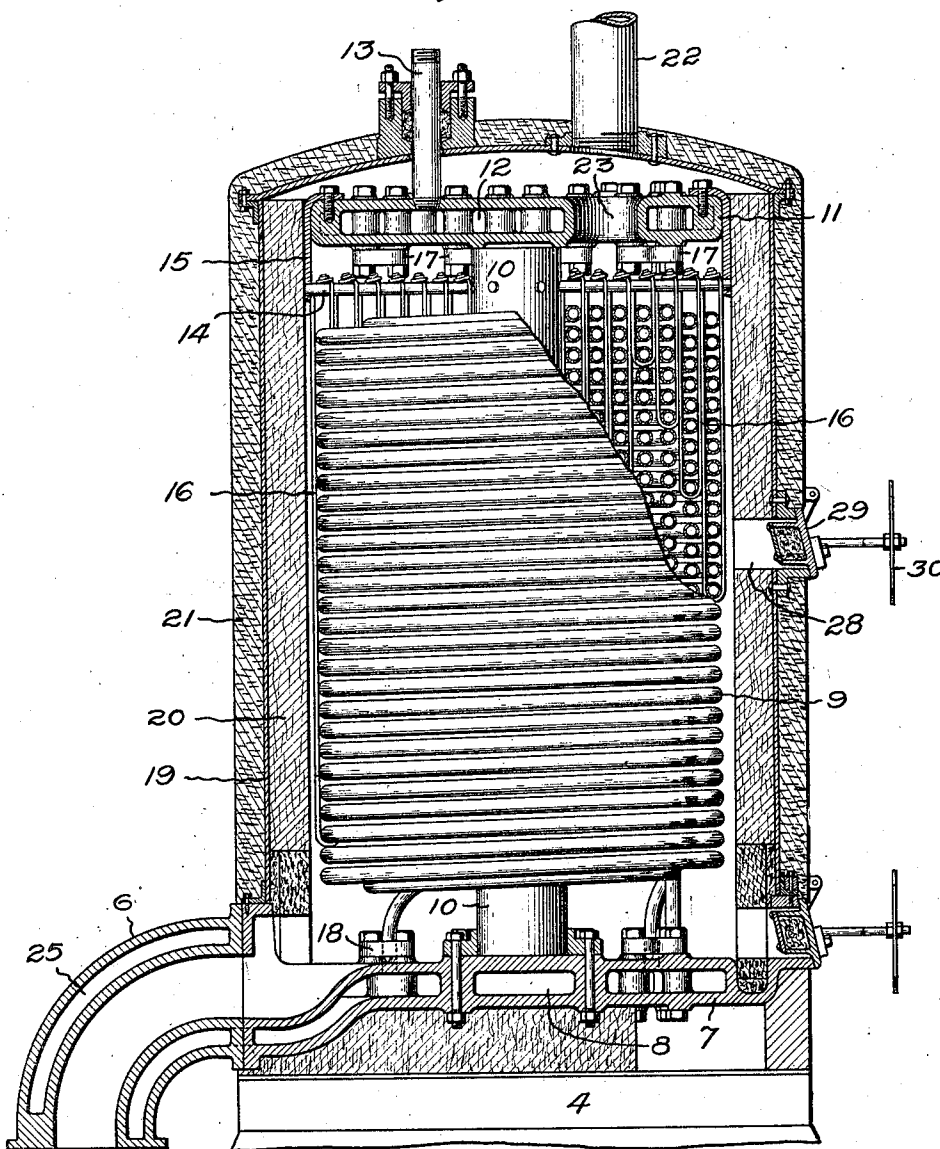
S. A. MOSS.  
REGENERATOR.  
APPLICATION FILED APR. 4, 1906.

1,000,969.

Patented Aug. 15, 1911

3 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

*Marcus L. Byng.*  
*Alex. F. McDonald.*

Inventor  
Sanford A. Moss,  
By *Albert G. Davis*  
Att'y.

Fig. 3.

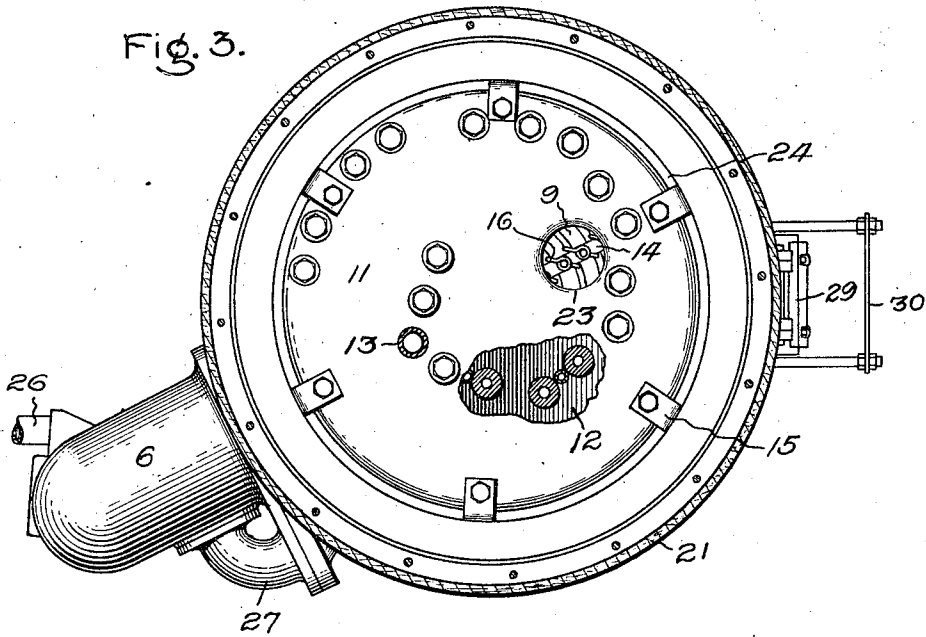
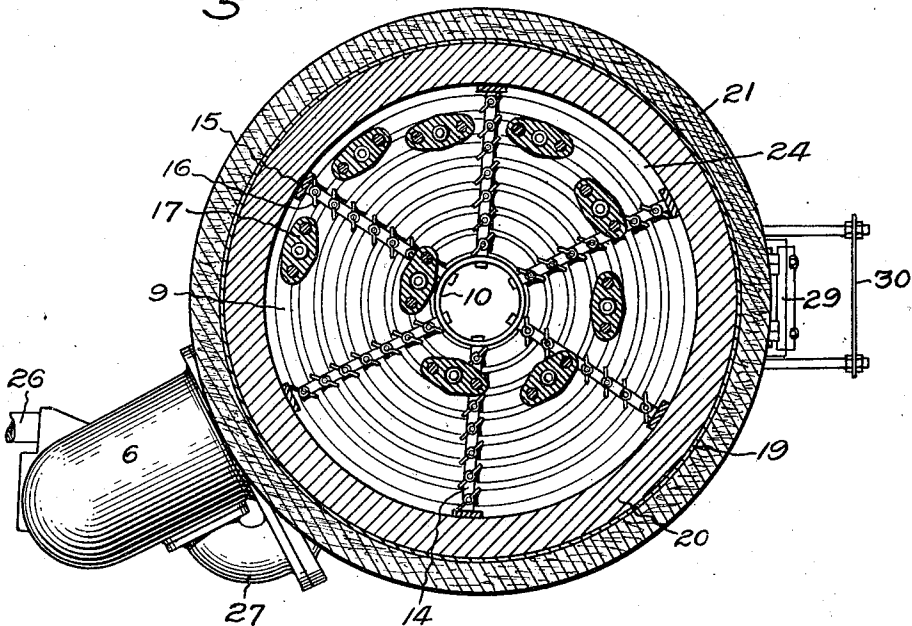


Fig. 4.



Witnesses:

*Marcus L. Byng*  
*Alex. J. Macdonald*

Inventor,  
Sanford A. Moss,  
By *Albert G. Davis*  
Att. y.

# UNITED STATES PATENT OFFICE.

SANFORD A. MOSS, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## REGENERATOR.

1,000,969.

Specification of Letters Patent. Patented Aug. 15, 1911.

Original application filed December 31, 1904, Serial No. 239,089. Divided and this application filed April 4, 1906. Serial No. 309,836.

To all whom it may concern:

Be it known that I, SANFORD A. MOSS, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Regenerators, of which the following is a specification.

The present invention is a division of my application Serial No. 239,089, filed Dec. 31, 1904, which division is made at the requirement of the United States Patent Office under the provisions of Rules 41 and 42.

The invention relates to regenerators wherein the heat contained in one body of fluid is transferred to another, the fluids being provided with separate conduits or passages to prevent mixing.

The object of the invention is to provide a regenerator of the character specified which will efficiently transfer the heat from one body of fluid to another, and is simple and rugged in construction.

In the accompanying drawings illustrating one of the embodiments of the invention, Figure 1 is a side elevation of a combustion chamber, gas turbine and regenerator; Fig. 2 is a vertical section of the regenerator; Fig. 3 is a view of the regenerator with the cover removed; and Fig. 4 is a sectional view taken on a line just below the head which supports the air carrying tubes.

1 represents a chamber in which combustion under pressure takes place continuously while the apparatus is in operation. The products of combustion from the chamber pass through nozzles or other discharging devices 2 into the turbine 3 and rotate the bucket wheel. The exhaust gases escape by a conduit into the regenerator and there heat the incoming air before it enters the combustion chamber.

Referring to Figs. 2 to 4, inclusive, the construction of the regenerator will be described. 4 represents a support which is mounted upon suitable standards 5 so that the exhaust-receiving conduit 6 will be in a position to receive the exhaust gases directly

from the turbine, and this without undue loss of heat from radiation. Mounted within the casing of the regenerator is a cast-metal base 7 that is provided with a chamber 8 to receive the air after it has been passed through the coils of pipe 9. Rising vertically above the base is a tubular column 10 which acts as a support for the head 11, the latter containing a chamber 12 with which the pipe 13 leading from an air receiver, not shown, is connected. The upper end of the upright column 10 is provided with a number of radially extending arms 14 which act as supports for the coils 9 to prevent them from sagging. The outer ends of the arms are supported by downwardly extending pieces 15 that are secured to the head 11, the latter resting directly on the top of the column. In the present illustration a number of metal loops 16 are provided which extend between the concentric turns of the coils and at their lower ends form a support for a section of the coil by engaging one of its turns. As shown in Fig. 4, the coils 9 are connected to the head 11 by connectors 17. The coils may be connected in any suitable manner. In the present instance they are connected in multiple between the base 8 and the head 11, although other arrangements can be provided if desired. The connection between the lower ends of the coils and the base is by means of connectors 18. Located between the coils and the metal casing 19 is a lining 20 of heat-resisting material. The outside of the casing is preferably covered by a lagging 21 of suitable material to retain the heat within the inclosure. The upper end of the casing is provided with a conduit 22 for discharging the exhaust gases after they have given up a considerable amount of their heat to the compressed air contained in the coils 9. Situated directly below the conduit 22 is an opening 23 in the upper head which conveys exhaust products from the interior of the casing to the exhaust conduit. In addition to this opening the products can pass through the spaces 24 as shown in Figs.

3 and 4. It is to be noted that the air enters the regenerator at its coolest point and flows toward the point of greatest temperature, namely toward the exhaust-receiving conduit 6. The exhaust conduit 6 is surrounded by a chamber 25, the latter communicating by means of a conduit 27 with the chamber 8 in the base of the regenerator, and through the discharge pipe 26, Figs. 1, 3 and 4, with the combustion chamber.

It sometimes happens that a mixture rich in carbon will be accumulated in the regenerator which unduly increases the temperature and pressure therein. To guard against explosions due to this I provide one or more devices which in effect form outwardly opening safety valves responding to increases in pressure in the regenerator. In the construction shown an outwardly opening passage 28 is provided which is normally closed by the hinged plate 29, the latter being weighted to a greater or less extent so that it will close by gravity. The inner face of this plate or valve is protected by a suitable facing of heat-resisting material. Situated in front of the opening and carried by posts or other supports from the casing, is a plate 30 which restricts the zone of the flames issuing from the passage 28. As many of these arrangements may be provided as are necessary to properly protect the apparatus, and they may be located as shown or at different points.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In a regenerator for gas turbines, the combination of a chambered receptacle, a conduit for conveying the exhaust gases from the turbine into the receptacle, a second conduit arranged to form an elongated passage for the gas to be heated, and a chamber surrounding the exhaust-conveying conduit through which the gas passes prior to being discharged.

2. In a regenerator, the combination of a chambered base, a support mounted thereon, a coil of pipe carried by the support and discharging into the chambered base, a casing inclosing the coil of pipe, and a double-walled conduit having passages for conveying hot gases to the interior of the casing to heat the coil of pipe and also for conveying the contents of the coil outwardly.

3. In a regenerator, the combination of a casing, a conduit arranged to circulate the

gas to be heated within the casing, means for supplying exhaust from an engine to the interior of the casing to flow over the outside of said conduit and increase the temperature of its contents, a safety device which discharges outwardly from the casing when the pressure therein becomes excessive, and means mounted on the casing for deflecting said discharge.

4. In a regenerator, the combination of a casing, a conduit within the casing through which a medium to be heated circulates, a conduit for conveying exhaust gases from a prime mover into the interior of the casing, a chamber surrounding the exhaust conveying conduit through which said medium passes as it leaves the regenerator, and a safety device which relieves the pressure within the casing when it exceeds a predetermined amount.

5. In a regenerator, the combination of a casing, a chambered base therefor, a centrally located column supported by the base, a chambered head mounted on the column, a coil of pipe for conveying fluid, arms projecting from the column by which the coil is supported intermediate the head and base, means connecting the ends of the coil to the chambers in the head and base, a conduit for conveying hot gases to the interior of the casing, and a conduit for discharging the gases after they have given up heat to the fluid passing through said coil.

6. In a regenerator, the combination of a cylindrical casing, a chambered base therefor, a column projecting upwardly from the center of the base, a chambered head mounted on the top of the column, radial arms on the column adjacent the lower side of the head, a plurality of concentrically arranged helical coils of piping surrounding the column intermediate the base and the head, means for suspending the coils from the arms, the ends of the coils being connected to the chambers in the base and head respectively, a conduit for supplying hot exhaust gases to the interior of the casing, and a conduit supplying gas or air to one of said chambered members to be heated in the coils by said exhaust gases.

7. In a regenerator, the combination of a casing, a chambered base therefor, a chambered head, pipes having their ends connected to the chambers in the base and head, a conduit connected to the interior of the casing for conveying fluid to said interior, a conduit surrounding the first conduit and connected to the chamber in the base, a conduit connected to the chamber in the head, and a conduit leading from the interior of the casing.

8. In a generator, the combination of a casing, a chambered base therefor, a centrally located column supported by the base,

a chambered head mounted on the column, pipes arranged intermediate the base and the head that connect the chambers therein, conduits for conveying fluid to and from the interior of the casing, a conduit connected to the chamber in the base, and a conduit connected to the chamber in the head.

In witness whereof, I have hereunto set my hand this third day of April, 1906.

SANFORD A. MOSS.

Witnesses:

JOHN A. McMANUS, Jr.,  
ROBERT SHAND.

---

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

---