

**No. 640,151.**

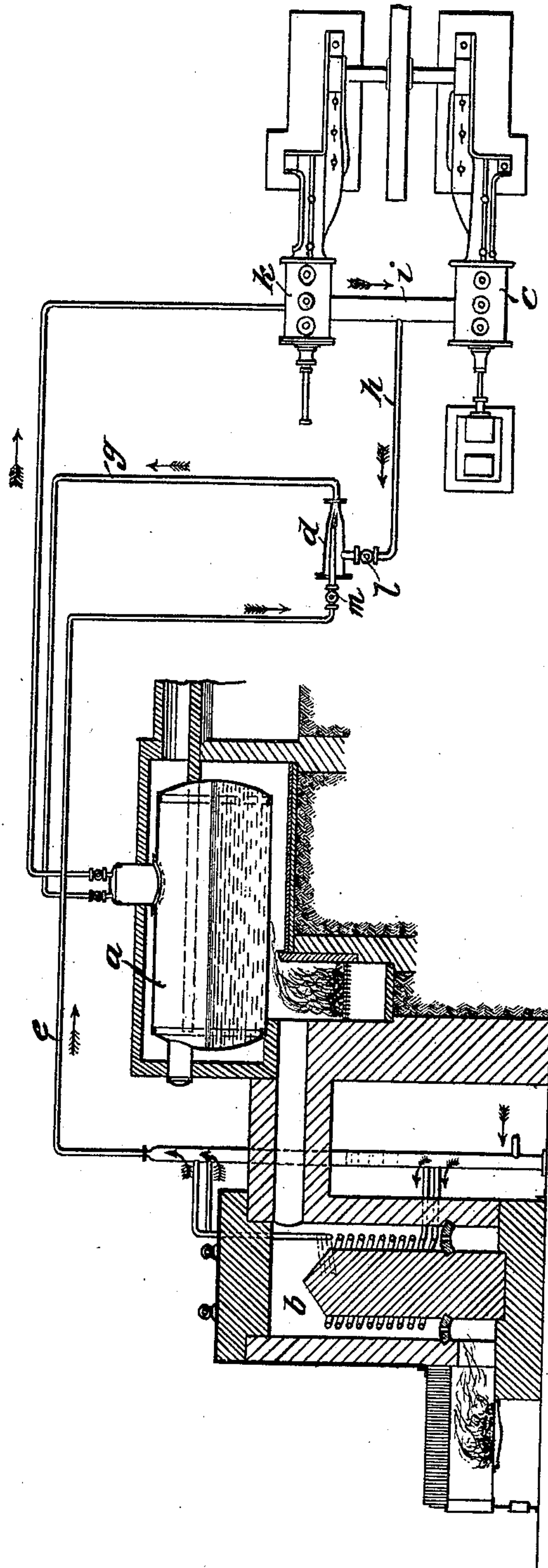
**Patented Dec. 26, 1899.**

**S. PRAGER.**

**MEANS FOR REGENERATING EXHAUST STEAM.**

(No Model.)

(Application filed May 20, 1899.)



Witnesses

Wm. K. Keeler  
Henry Swetland

Inventor

Sigismund Brager

164  
James L. Norris.  
attly



# UNITED STATES PATENT OFFICE.

SIGISMUND PRAGER, OF RAAB, AUSTRIA-HUNGARY.

## MEANS FOR REGENERATING EXHAUST-STEAM.

SPECIFICATION forming part of Letters Patent No. 640,151, dated December 26, 1899.

Application filed May 20, 1899. Serial No. 717,663. (No model.)

*To all whom it may concern:*

Be it known that I, SIGISMUND PRAGER, a subject of the Emperor of Austria-Hungary, residing at Raab, Austria-Hungary, have invented certain new and useful Improvements in Means for Regenerating Exhaust-Steam, (for which I have applied for patents in England, No. 21,917, dated October 18, 1898, and in Hungary, No. 14,083, dated October 4, 1898,) of which the following is a specification.

My invention relates to compound steam-engines, and has for its object the more perfect utilization of the heat of the steam in such engines. Such engines having two or more cylinders for the purpose of gradually expanding the working steam in them are characterized by receptacles called "receivers," the well-known function of which is to retain the steam for a certain time. The steam having done its work in one cylinder of the engine is conducted to such a receiver, in which it is collected for a certain time up to the moment when it is admitted to a secondary cylinder of the engine, where it exerts its effective force by further expanding.

The essential feature of the present invention consists in improved means whereby only a part of the steam of the receiver is introduced into the secondary cylinder and the remainder, in general the greater part of the quantity of the steam that has remained for some time in the interior of the receiver, is reverted to the boiler from which it was originally conveyed to the first cylinder. The lower pressure, and, in consequence thereof, the lower temperature, of this steam from the receiver is again raised to the original height by mixing this steam with live steam at a very high pressure in the interior of an injector. This live steam is obtained from a suitable generator of known construction.

The drawing hereto annexed shows diagrammatically my improved apparatus for carrying my invention into effect. In this instance the utilization of the heat of the steam in a compound engine with two cylinders is shown. The boiler *a* supplies the steam to the high-pressure cylinder *k*. The steam having done work in *k* is collected in the receiver *i*, and from here a part goes back to the boiler *a* and a part goes to the low-pressure cylinder *c*. If it is assumed that the greater part of the

receiver-steam is reverted to the boiler *a* and only a small part of this steam is introduced into the low-pressure cylinder, it is obvious that this cylinder for this reason could perhaps be constructed of even a smaller size than the high-pressure cylinder. The suction-pipe *h* conveys the receiver-steam from receiver *i* to the injector *d*. Into this injector steam at a high pressure, taken from the generator *b*, is blown, and not only a sucking action is exercised by the high-pressure steam blown into the injector, but also the steam passing out of the receiver *i* is raised to a higher pressure and temperature. The mixture of steam from the receiver *i* and steam from the generator *b* is forced through the tube *g* again into the boiler.

In the generator *b*, of any known construction, steam at a very high pressure—say about one hundred to two hundred atmospheres—is produced from water supplied in the ordinary way to the generator *b*. The live steam obtained from the generator *b* can also be superheated before entering the injector *d*.

In order to avoid all of the steam being sucked out of the receiver *i* by the high-pressure steam passing through the injector *d*, cocks *m* and *l* are provided, by which the amount can be regulated.

Obviously, as the pressure and temperature of the receiver-steam is not so different from the pressure and temperature of the admission-steam entering the high-pressure cylinder as is the pressure and temperature of the exhaust-steam of any engine from the pressure and temperature of the admission-steam thereof, it becomes evident that by mixing such receiver-steam with live steam at very high pressure in the injector it would in every case be possible to reach the desired result to produce a sufficient pressure and temperature, so that the mixture can be forced back into the boiler from which the admission-steam is proceeding, and it is by no means impossible that in practice this result could be obtained by mixing exhaust-steam of a very low pressure with live steam of even an exorbitant high pressure. In such a way it would be possible to increase the useful effect of a boiler and engine plant in a considerable measure.



In the special instance illustrated in the drawings hereto annexed the exhaust-steam of the low-pressure cylinder is conveyed to the condenser in the usual manner.

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

In an apparatus of the character described, the combination with the high and low pressure cylinders of a compound engine, and the  
10 intermediate receiver connecting the exhaust of the high-pressure cylinder with the low-pressure cylinder, of a primary boiler for delivering steam to the high-pressure cylinder, an auxiliary boiler for generating steam at a  
15 higher pressure than that generated in the primary boiler, an injector having its discharge end in communication with the primary boiler, a pipe leading from the receiver

to said injector, a pipe for delivering high-pressure steam from the auxiliary boiler to the injector and operating to inject a portion  
20 of the steam from the receiver into the primary boiler, a valve in the pipe leading from the receiver to the injector, and a valve in the pipe leading from the high-pressure boiler  
25 to the injector, said valves being independently controlled at will for regulating the supply of steam from the receiver and high-pressure boiler to the injector, substantially as  
described and for the purpose specified. 30

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

SIGISMUND PRAGER.

Witnesses:

JOSEPH WIEKMANN,  
MOLWIROTZ.