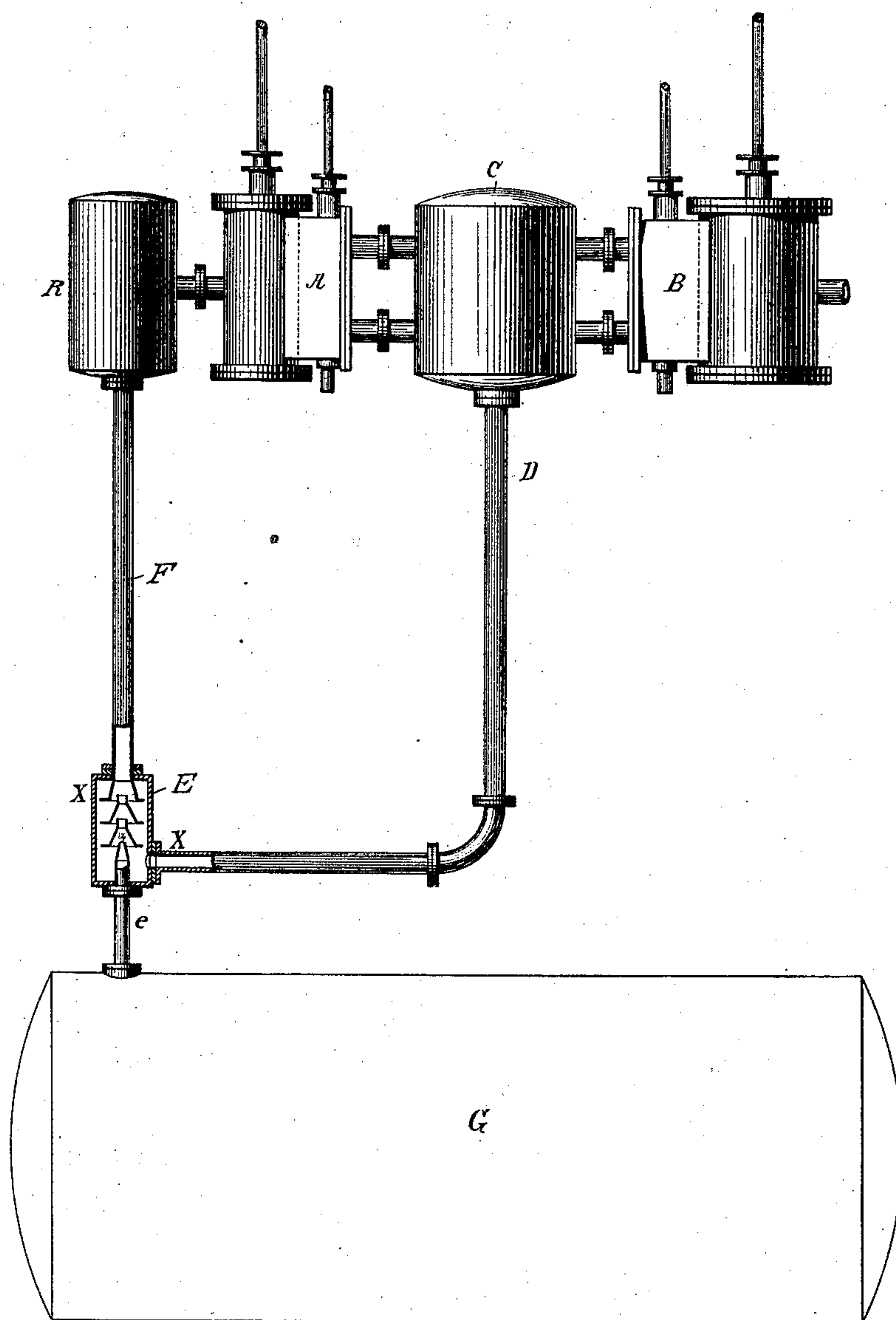


(No Model.)

W. SCHMIDT.  
UTILIZING EXHAUST.

No. 381,957.

Patented May 1, 1888.



Witnesses:

*O. Schuler.*

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Inventor:

*Wilhelm Schmidt,*

*by*  
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# UNITED STATES PATENT OFFICE.

WILHELM SCHMIDT, OF HALBERSTADT, PRUSSIA, GERMANY.

## UTILIZING EXHAUST.

SPECIFICATION forming part of Letters Patent No. 381,957, dated May 1, 1888.

Application filed October 6, 1887. Serial No. 251,656. (No model.) Patented in Germany May 8, 1885, No. 34,358; in France May 16, 1885, No. 167,618; in Belgium May 19, 1885, No. 68,930; in Italy May 21, 1885, No. 18,372; in England May 28, 1885, No. 6,157, and in Austria-Hungary May 28, 1885, No. 19,737 and No. 41,041.

*To all whom it may concern:*

Be it known that I, WILHELM SCHMIDT, a subject of the King of Prussia, German Emperor, and a resident of Halberstadt, No. 8 Plautagen Street, in the State of Prussia, German Empire, civil engineer, have invented new and useful Improvements in Utilizing Exhaust, (for which I have obtained Letters Patent in Germany May 8, 1885, No. 34,358; in France May 16, 1885, No. 167,618; in Belgium May 19, 1885, No. 68,930; in Italy May 21, 1885, No. 18,372; in England May 28, 1885, No. 6,157, and in Austria-Hungary May 28, 1885, No. 19,737 and No. 41,041,) of which the following is a full and clear specification.

This invention relates to a method for returning a portion of the steam of a compound or other engine working with cylinders of different steam-pressures back to the high-pressure cylinder by means of a steam-injector which is driven by the steam of a boiler or steam-generator.

The apparatus for carrying out my method is shown in the accompanying drawing by a sectional elevation of a compound engine.

In the said drawing, A is the high-pressure cylinder, and B the low-pressure cylinder, of a compound engine, and C is the steam chamber or receiver between the two cylinders, into which the high-pressure cylinder A exhausts its steam in the well-known way, and from which receiving-vessel the low-pressure cylinder B receives its steam. A pipe, D, leads from the receiver C to an injector, E, (shown in section at  $x x$ ), and thence a pipe, F, guides to the steam-reservoir R. From this steam-reservoir R the high-pressure cylinder A receives its steam.  $e$  is a pipe which conducts the steam of the generator or steam boiler G to the nozzle of the injector.

My method for using the exhaust-steam is as follows: The steam of the generator G discharges into the injector E—for instance, with a pressure of one hundred atmospheres—and sucks up the steam being in pipe D and receiver C, having, for instance, a pressure of eight atmospheres. This latter steam is compressed by the generator-steam, and both will have at least a pressure of sixteen atmospheres,

as the generator-steam is at such a high pressure that it is able to compress a great quantity of the steam coming from the receiver to sixteen atmospheres pressure. The mixture of the generator and receiver steam enters through pipe F into the reservoir R, which only serves as a collecting-vessel, but which is of no great importance in my new method for using the exhaust-steam of the high-pressure cylinder. As already said, the steam has a pressure of sixteen atmospheres in this reservoir R, and the high-pressure cylinder receives from it its working-steam in the common way. The steam is reduced in pressure in the cylinder A, when entering the same, to about eight atmospheres, and escapes into the receiver C while having such pressure. Part of this steam of eight atmospheres pressure of the reservoir C is used for feeding the low-pressure cylinder B, where it is further reduced to about two atmospheres. The remaining part of the steam in the receiver C is sucked up by injector E through pipe D and compressed and driven into the reservoir R once more, where it is again used for working the high-pressure cylinder.

I am aware that it is not new to return the exhaust-steam to the same or to other cylinders by means of an injector; and I am also aware that it is not new to return this exhaust-steam back again (partly or completely) into the boiler by the same means; but it has never been attempted to guide this steam (the exhaust-steam) into a reservoir and to return a part of it back into the cylinder again by means of an injector and to use the other part not so returned to drive a low-pressure cylinder or cylinders. In this new method this low-pressure cylinder can again be used as the high-pressure cylinder of another compound set, and the exhaust steam from this second cylinder led into a reservoir and part of it back again into the said cylinder again by means of an injector, and the other part not so used made to drive a third cylinder, which has still a lower pressure than the second.

Having thus fully described and ascertained the nature of my invention, what I claim, and desire to secure by Letters Patent, is—



The method for repeated utilizing of the partly-expended exhaust-steam of a compound or receiver steam-engine, consisting in first leading the exhaust-steam of the high-pressure cylinder or cylinders into a receiver-vessel, from whence it is partly guided off into the low-pressure cylinder of the compound or receiver steam-engine, and partly it is driven by the steam of a generator, by means of an injector,

back into the high-pressure cylinder for working in the same, substantially for the purpose as described.

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

WILHELM SCHMIDT.

Witnesses:

B. ROY,

R. DERPLER.