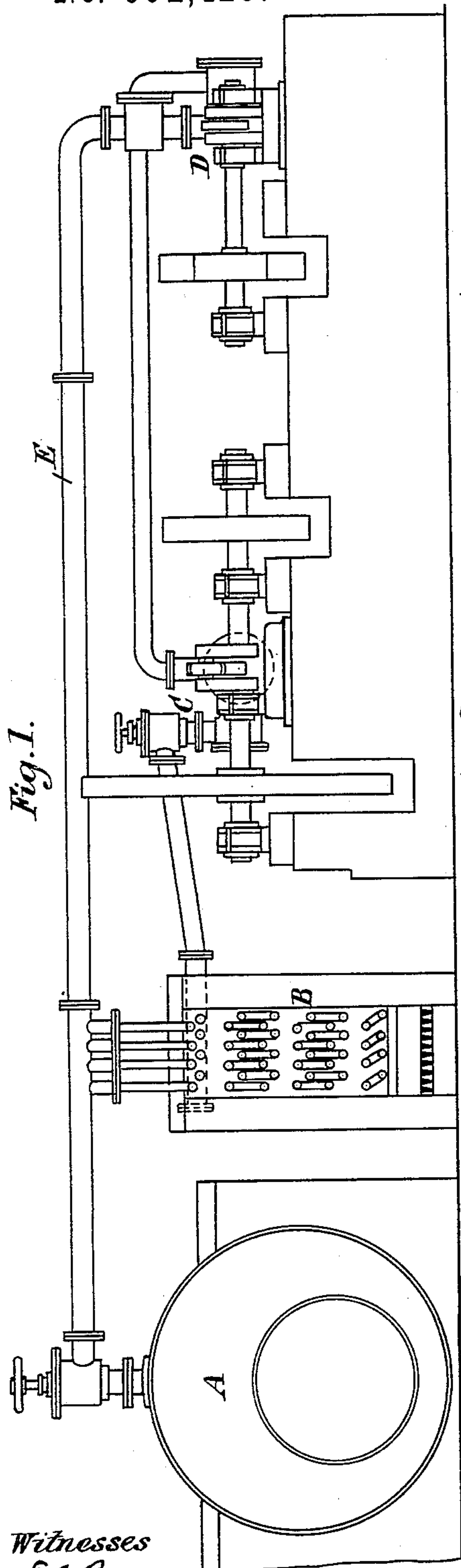


(No Model.)

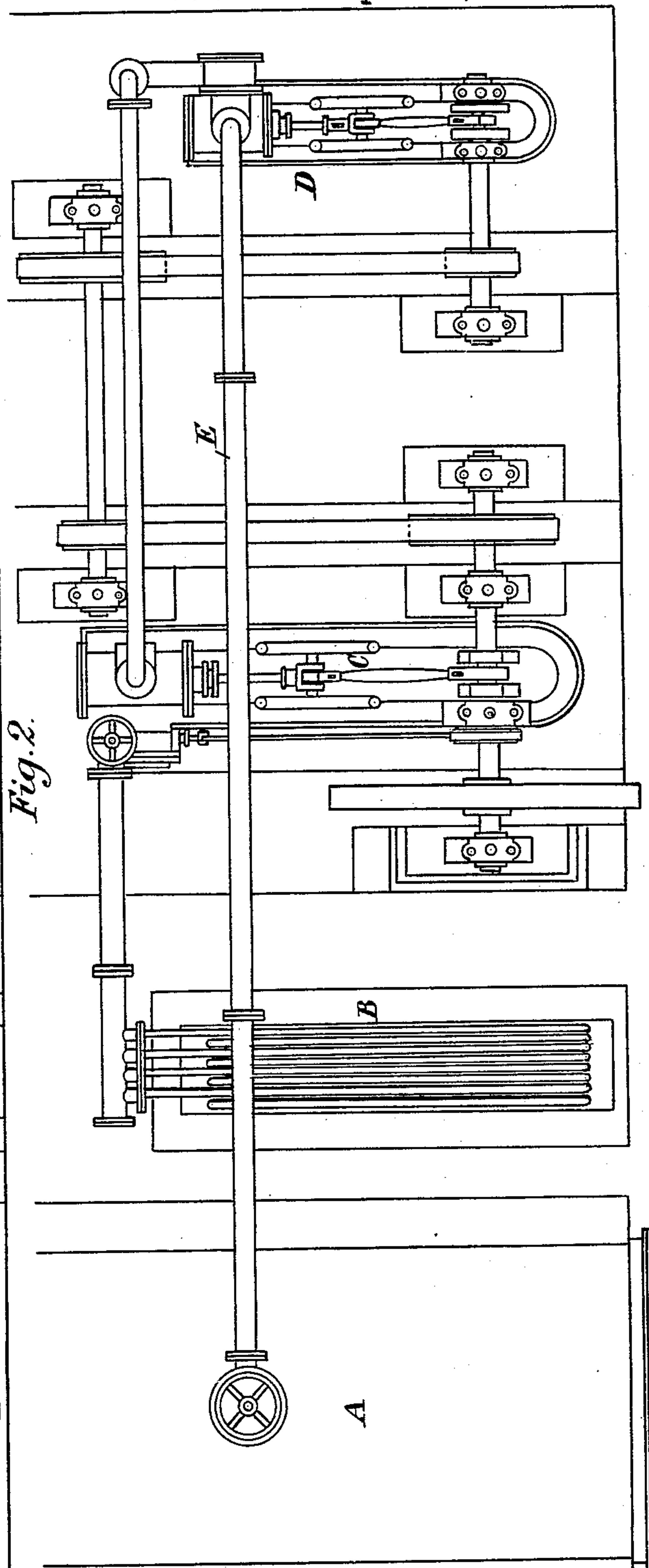
S. & S. R. CHATWOOD.
STEAM ENGINE.

No. 602,426.

Patented Apr. 19, 1898.



Witnesses
E. A. Ralloe
A. W. Perkins



Inventors
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UNITED STATES PATENT OFFICE.

SAMUEL CHATWOOD, OF LONDON, AND SAMUEL RAWSTHRONE CHATWOOD,
OF BOLTON, ENGLAND.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 602,426, dated April 19, 1898.

Application filed December 28, 1897. Serial No. 664,072. (No model.) Patented in England October 31, 1893, No. 20,583, and
in France February 9, 1895, No. 245,003.

To all whom it may concern:

Be it known that we, SAMUEL CHATWOOD, bankers' engineer, residing at 76 Newgate street, in the city of London, and SAMUEL RAWSTHRONE CHATWOOD, manager, residing at the Lancashire Safe and Lock Works, Bolton, in the county of Lancaster, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Steam-Engines, (for which we have received Letters Patent in Great Britain, No. 20,583, dated October 31, 1893, and in France, No. 245,003, dated February 9, 1895,) of which the following is a specification.

This invention has for its object improvements for obtaining motive power by means of steam. For this purpose we take superheated steam obtained in any way, as by passing saturated steam through a superheater. We pass this steam through a steam-engine, causing it to do work at the expense of the heat which it contains, the steam being expanded so largely in its passage through the engine that its temperature falls below that of the water in the generator. The exhaust-steam, which is of low pressure and temperature, but uncondensed, we cause to be compressed by a pump or by like means and driven back without being further cooled into the generator or source. Thus we retain the latent heat which the steam contains in place of allowing it to escape with the steam, as in a non-condensing engine, or with the water which in condensing-engines is passed through the condenser.

In the accompanying drawings, Figure 1 is a sectional elevation, and Fig. 2 a plan, of a combination of apparatus for obtaining motive power in accordance with our invention.

A is a steam-generator. B is a superheater or reheater. C is a steam-engine, and D is a pump or compressor. The steam from the generator passes through externally-heated pipes in the superheater or reheater, and it is then admitted to the engine. It drives the engine, and the exhaust-steam from the engine is compressed by the pump or compressor into the return-pipe E. The pipe E communicates both with the generator and the superheater or reheater, so that the steam can return to

the generator or source and afterward again pass to the engine.

The engine is represented in the drawings as driving the pump by means of an intermediate shaft and driving-belts, and, similarly, it may drive other shafting in order to perform the work required of it; but these and other details may be varied without departing from the invention, and the superheater may in some cases be so arranged that the added heat increases the pressure of the steam. A separate pump is not necessary in all cases. When the fly-wheel is sufficiently heavy and the exhaust-valve suitably arranged, the piston of the engine itself will act as a pump and discharge the exhaust-steam into the superheater or reheater. In engines with several expansions the steam may be reheated after leaving one cylinder before entering the next.

We claim as our invention—

1. The herein-described improvement in the art of obtaining motive power from high-pressure superheated steam, which improvement comprises the following steps, viz: first, working superheated steam expansively in an engine so as to reduce the temperature of the exhaust-steam below that of the water in the generator; second, compressing the resulting comparatively cool low-pressure steam as it escapes from the engine after doing its work to the initial pressure of the generator; third, returning this compressed steam without reducing its temperature to the generator; fourth, reheating this steam; fifth, passing it again through the superheater to heat it still further, and, sixth, reusing this reheated superheated steam in the engine.

2. The combination, substantially as hereinbefore set forth, of a steam boiler or generator, a superheater connected therewith, an engine connected with the superheater, a compressor directly connected with the exhaust-pipe of the engine and a return-pipe directly connecting the compressor and generator, for the purpose specified.

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