

(No Model.)

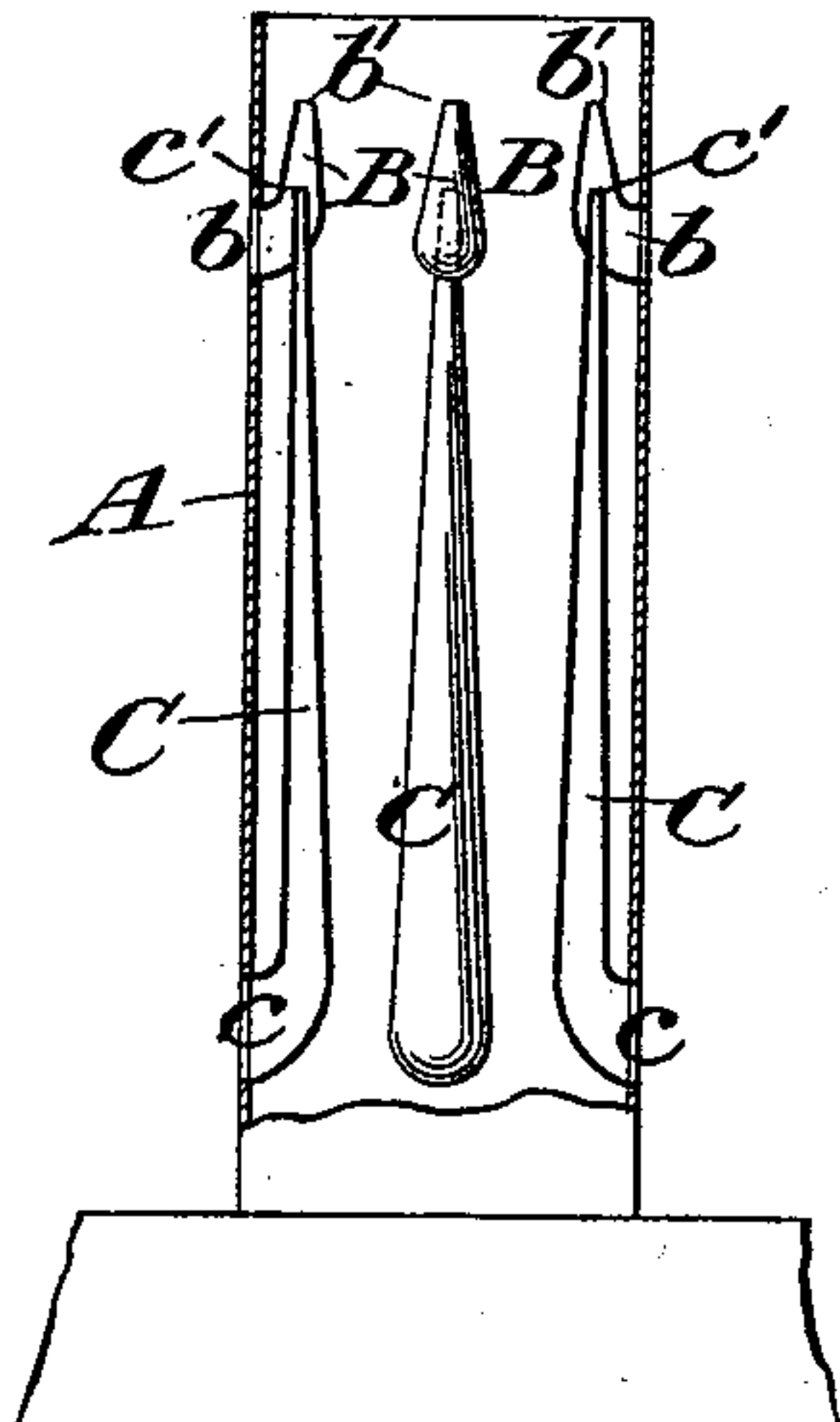
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DEVICE FOR INCREASING DRAFT IN SMOKE STACKS.

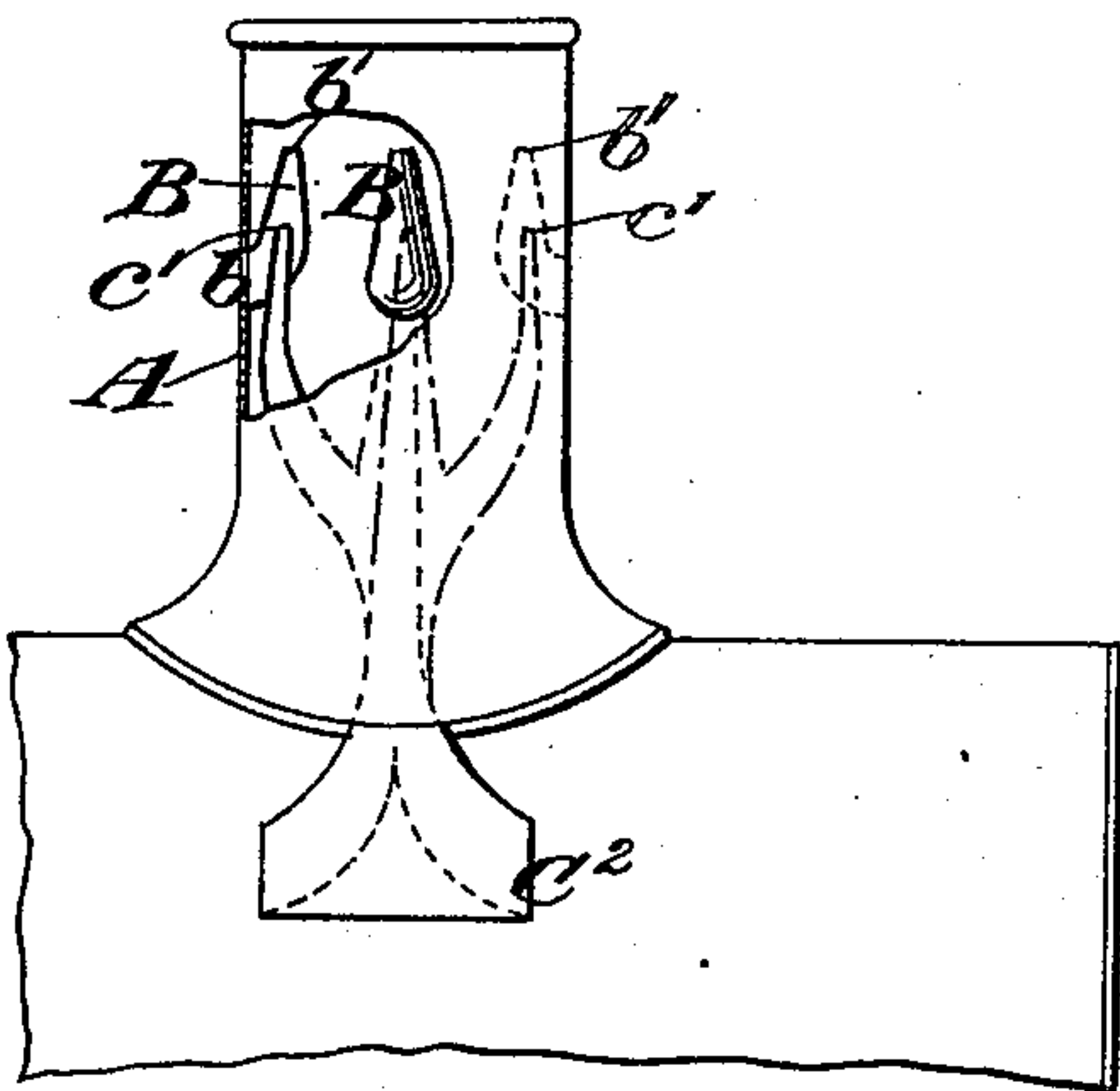
No. 522,009.

Patented June 26, 1894.

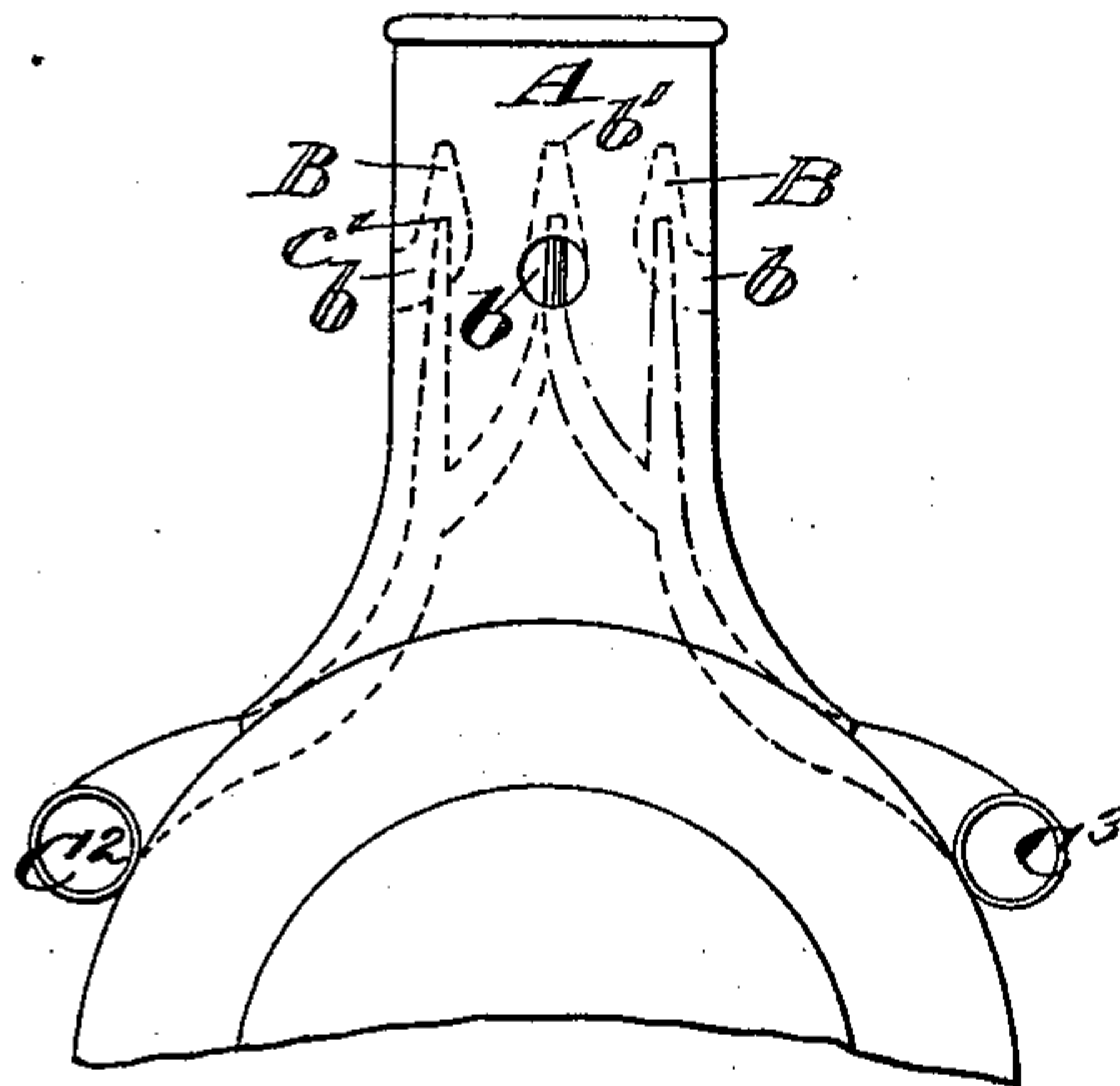
*Fig. 1.*



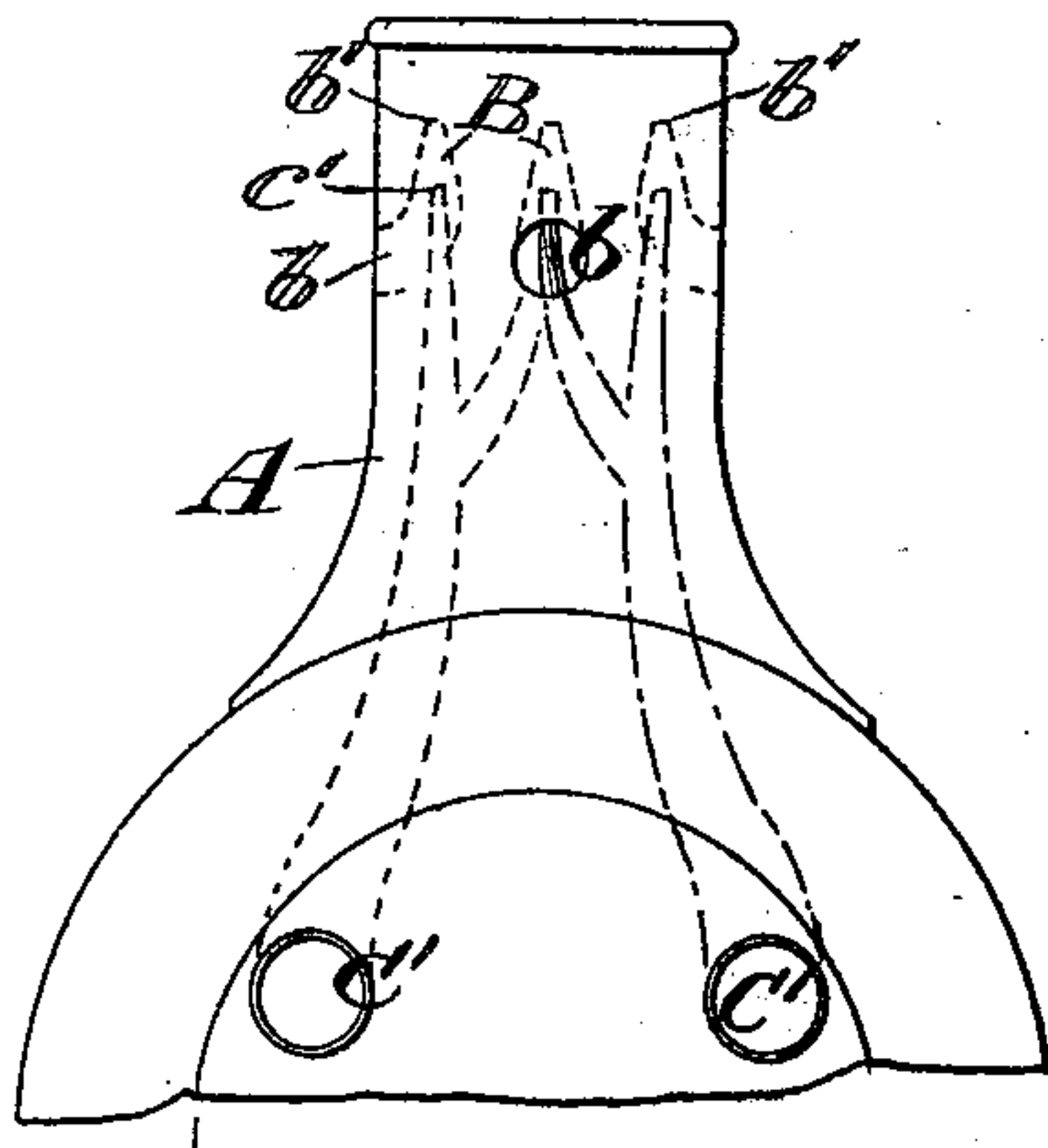
*Fig. 4.*



*Fig. 3.*



*Fig. 2.*



Witnesses:-  
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A. B. Howard.

Inventor.  
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# UNITED STATES PATENT OFFICE

RAY GAUL, OF BROOKLYN, NEW YORK.

## DEVICE FOR INCREASING DRAFT IN SMOKE-STACKS.

SPECIFICATION forming part of Letters Patent No. 522,009, dated June 26, 1894.

Application filed February 26, 1894. Serial No. 501,487. (No model.)

*To all whom it may concern:*

Be it known that I, RAY GAUL, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Devices for Increasing the Draft in Smoke-Stacks, of which the following is a specification.

My invention relates to an improvement in devices for increasing the draft in and protecting the tops of smoke stacks; and more particularly to devices for utilizing drafts of air produced either by the air in motion with relation to a stationary stack or by the air disturbed by the motion of a stack through the air.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents the device applied to a stationary smoke stack. Fig. 2 represents one form of applying the device to the smoke stack of a locomotive engine, and Figs. 3 and 4 represent respectively an end and side view of another means for applying the device to a locomotive smoke stack.

Referring particularly to Fig. 1, A represents the smoke stack and B represents one of a series of curved taper tubes, in the present instance four, arranged around the wall of the smoke stack near its top. The larger lower end of the tube B, represented by *b*, extends through the wall of the smoke stack to receive the air from the outside of the stack and the said tube extends thence within the stack, curving upwardly along the interior wall of the stack, spaced a short distance therefrom, and gradually contracting toward its upper end *b'* out of which the air received in its larger end is discharged upwardly within the top of the stack.

In addition to the series of upper taper tubes B, I provide the stack; at a point below the tubes B, preferably as near its base as is feasible in connection with a free exposure to the surrounding air; with a second series of tubes C, the larger lower ends *c* of which open through the wall of the stack to the exterior air. The tubes C extend thence within the stack along up, spaced a short distance from the interior wall of the stack and

gradually diminishing in size, finally entering the lower portions of the tubes B and extending upwardly within them in a direction toward their discharge nozzles, but terminating at a point below their discharge nozzles, as indicated at *c'*. There may be one lower tube C for each upper tube B or a single lower tube may be arranged to discharge into more than one upper tube, as will hereinafter appear, or two or more lower tubes might be arranged to connect and discharge into a single upper tube, as will also hereinafter appear.

In whatever direction the wind be blowing with relation to the stack, it will force itself into one or more of the upper tubes B and will be discharged from their narrowed upper ends in upward jets, tending to carry the point of ignition of the gases at the top of the stack above the top of the stack or to form a blanket of cooler air around the interior of the top of the stack sufficient to prevent it from becoming overheated by the combustion of the gases which commonly takes place at the top of the stack. The jets of air discharged through the tubes B are materially increased in velocity and effectiveness, particularly when there is little or no wind stirring, by means of the supplementary jet tubes C extending from a point farther down the stack. These tubes C, like the tubes B, will receive and discharge jets of air and, because of the high heat to which they are raised by their extended discharge along the interior wall of the smoke stack, they will materially increase the velocity of the current within themselves by the heating of the column of air therein and all of this additional force, wholly independent of any artificial draft producer, such for example as a force fan or steam jet, will materially increase the force of the jet of air issuing from the upper end of the tube B, thereby more effectually throwing the bank of flame above the top of the stack and at the same time producing what is commonly called a suction draft of high power in the furnace. In applying this structure and arrangement of supplementary tubes to the smoke stack of a locomotive engine, I either arrange the supplementary tubes to open through the end of the boiler casing in



front, as noted in Fig. 2, or attach them to the exterior of the boiler casing, as shown in Figs. 3 and 4.

Referring to Fig. 2, the auxiliary tubes are denoted by C', two of them being shown opening through the front of the boiler casing and each divided intermediate of its ends into two branches, one branch leading to each one of two of the upper tubes B.

Referring to the structure shown in Figs. 3 and 4; a structure which is particularly adapted to dummy-engines or to engines which, for any reason, are commonly run either end foremost at pleasure; I provide the supplementary tubes C<sup>2</sup> C<sup>3</sup>, a pair of them on each side of the locomotive boiler case, exterior thereto, the tube C<sup>2</sup> opening in one direction and the tube C<sup>3</sup> opening in the opposite direction and each leading to two of the tubes B, the two tubes C<sup>2</sup> and C<sup>3</sup> uniting in one a short distance from their larger open ends and afterward branching off to the tubes B.

It is obvious that when the speed with which the locomotive rushes through the air is taken into consideration, it will produce a very powerful jet out of the upper end of the tube B and will thereby produce a very powerful suction in the furnace, making it feasible to burn coal of grades which would not be practically possible under a less powerful draft.

It is obvious that slight changes might be resorted to in the form and arrangement of parts, other than those which I have particularly referred to, without departing from the spirit and scope of my invention, hence I do

not wish to limit myself strictly to the construction and arrangement herein set forth, but

What I claim is—

1. The combination with a smokestack, provided with taper tubes opening to the exterior of its wall near its upper end and extending upwardly within it, of supplementary tubes opening to the exterior air at a point lower down than the tubes before referred to and extending upwardly within the stack with their upper ends inserted within the first named tubes, substantially as set forth.

2. The combination with a locomotive smoke stack, provided with taper tubes opening to its exterior and extending upwardly within the stack near its top, of supplementary tubes opening to the front of the locomotive lower down than the tubes aforementioned and extending upwardly and having their upper ends inserted within the tubes near the top, of the stack, substantially as set forth.

3. The combination with a locomotive smoke stack, provided with taper air-jet tubes extending through its wall near its upper end, of supplementary air-jet tubes opening to the exterior air, both to the front and the rear at a point lower down than the first mentioned tubes and extended upwardly and having their discharge ends inserted within the tubes at the top of the stack, substantially as set forth.

RAY GAUL.

Witnesses:

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