

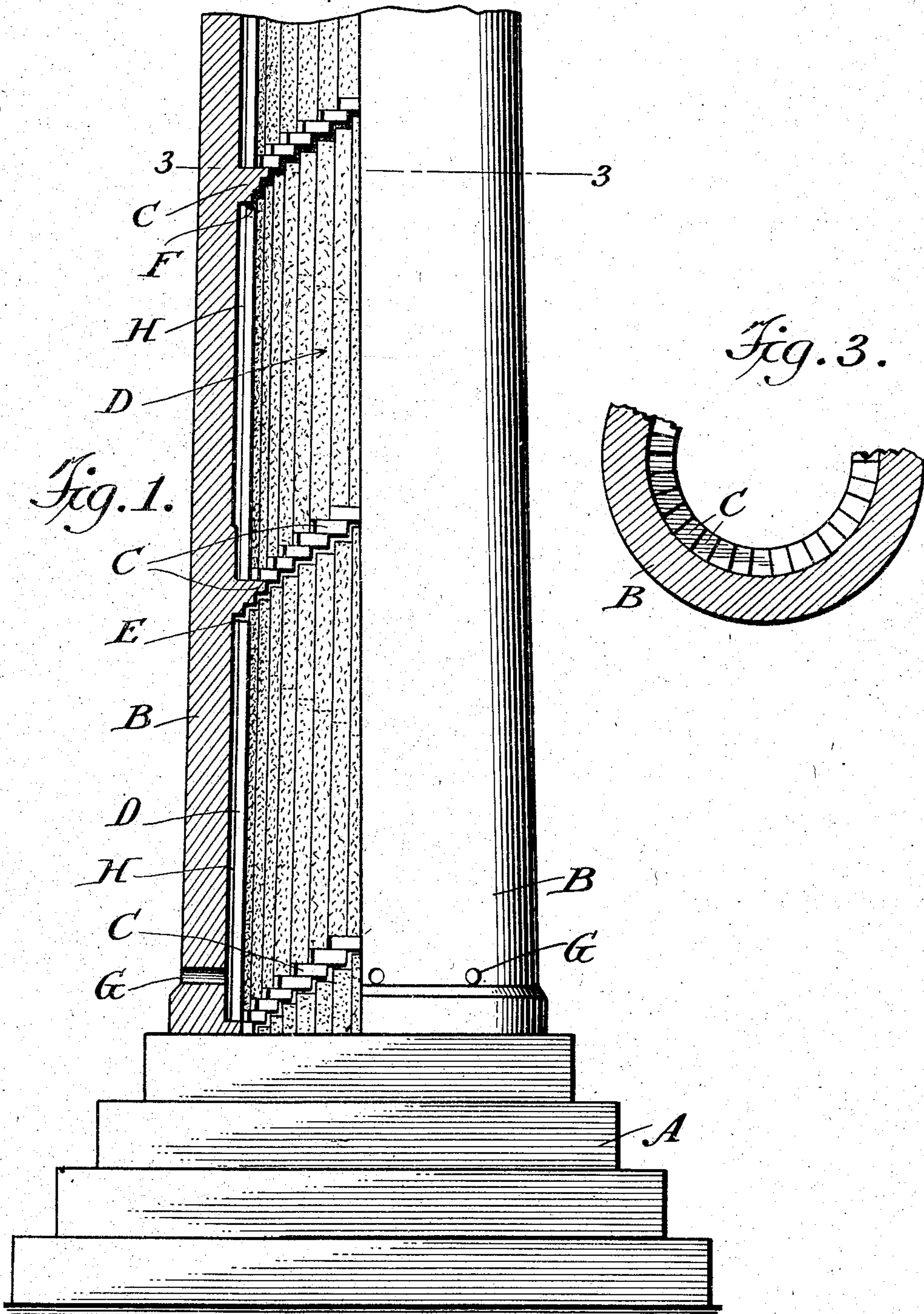
No. 791,545.

PATENTED JUNE 6, 1905.

D. D. ELDER, JR.
CHIMNEY.

APPLICATION FILED DEC. 29, 1904.

2 SHEETS—SHEET 1.



Witnesses
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F. M. Doustach

David D. Elder, Jr. Inventor
By his Attorney *Phillips Abbott*

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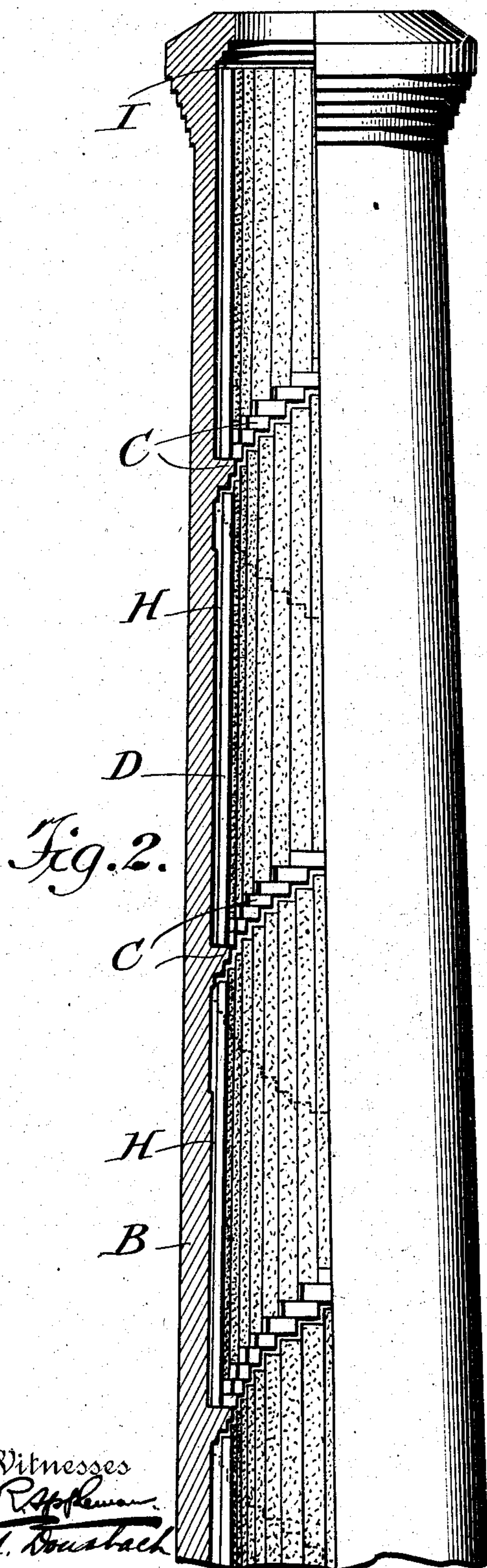


Fig. 2.

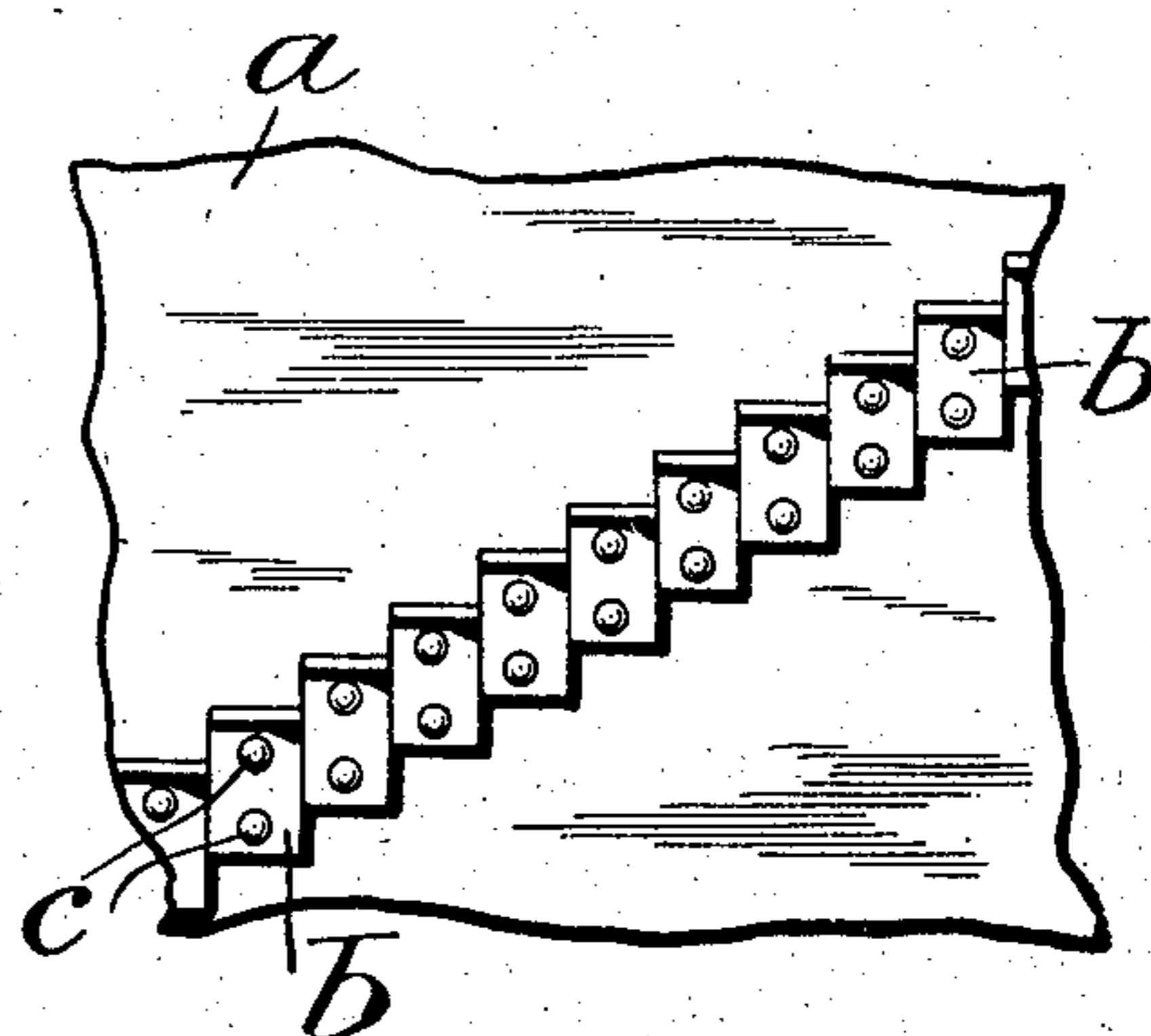


Fig. 4.

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UNITED STATES PATENT OFFICE.

DAVID D. ELDER, JR., OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO MORRIS W. KELLOGG, OF ELIZABETH, NEW JERSEY, AND W. B. OSGOOD FIELD, OF NEW YORK, N. Y., COMPOSING THE FIRM OF M. W. KELLOGG & COMPANY, OF NEW YORK, N. Y.

CHIMNEY.

SPECIFICATION forming part of Letters Patent No. 791,545, dated June 6, 1905.

Application filed December 29, 1904. Serial No. 238,703.

To all whom it may concern:

Be it known that I, DAVID D. ELDER, Jr., a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Chimneys, of which the following is a description, reference being had to the accompanying drawings, in which—

Figure 1 illustrates a vertical elevation, partly in section, of the base and lower part of a chimney embodying my invention. Fig. 2 illustrates a view the same as Fig. 1, but showing the top or upper part of the chimney only. Fig. 3 illustrates a horizontal sectional view on the line 3 3 of Fig. 1. Fig. 4 illustrates a detail showing the invention as applied to a chimney or stack in which the exterior shell or wall is of steel or other metal.

In the construction of large chimneys or stacks during recent years it has been customary to erect within the chimney a so-called "lining" of brick specially adapted to withstand the action of heat, so that the life of the chimney may be prolonged and also that the destructive effects of the heat, which is sometimes intense, may be confined to the lining, and thus remedied with comparative ease and low cost. In order that buckling or distortion of the lining by reason of expansion and contraction may be reduced to a minimum and also so that repairs may be limited to the injured or defective part of the lining, and that only, it has likewise been customary to make the linings in sections of greater or less altitude, usually from ten to twenty or twenty-five feet, each section being horizontally disposed and supported at its lower edge upon a horizontal ledge or bracket supported by the outer wall of the chimney. In brick chimneys or stacks this horizontal ledge has been made by suitably "corbeling out," as it is called, fire-brick set in the outer wall to form the ledge, and in the case of steel or metal stacks metallic ledges or brackets have been likewise arranged circumferentially on the inside of the stack, being riveted or bolted to, and thus supported by, the

exterior wall or shell, and upon this ledge or bracket thus formed the lining has been erected substantially the same as in brick chimneys. In both cases the lining has extended from the circumferential and horizontal brackets or ledge up to within a short distance of the one next above, where a space has been left between the upper edge of the lining and the superposed ledge or bracket to permit of vertical expansion, thus avoiding buckling or distortion of the lining.

A series of objectionable features attend the constructions above described, among them the following: In brick chimneys the corbeling out of the brick to produce the circumferential and horizontal ledges of requisite thickness and strength to support the lining occasions very great thickening of the exterior wall of the chimney where the ledges occur because of the addition of the several courses of brick requisite for the ledges, and since these added courses are subjected to the expanding influence of the heat, which is of course transmitted through all the courses to the exterior of the chimney, it is inevitable that the expansion at the ledges is greater than at the intermediate parts of the outer wall of the chimney, and the structure is liable to crack adjacent to the ledges. To guard against this, it has sometimes been necessary at great cost and labor to band the chimney with heavy metal bands opposite the ledges or otherwise reinforce or protect it, so as to control, as much as possible at least, the excessive expansion and protect against the action of heat at those points. Another objection is that the air-currents, which are preferably admitted between the lining and the outer wall in an air-space intentionally left there for its circulation, must necessarily be discharged into the interior of the stack at each section of the lining through the opening left between the upper edge thereof and the superposed ledge or bracket, because there is no way that the air-currents can be carried around the ledges, and this occasions two troubles. First, the discharge of the outside air, which has very large volume when the chimney is hot, through

the open spaces referred to, has the effect of deadening the draft of the chimney, partly because the exterior air is admitted otherwise than through the combustion-chamber and partly because it is projected into the stack through the opening between the lining and the ledge with considerable force, tending to knock down or choke back the column of air and gases passing upward through the chimney. There is also a further objection that in order to supply air circulation to the several sections of the lining it is necessary to make holes through the outer wall just above each ledge, and these holes are unsightly and also weaken the chimney and permit rain and snow to enter the structure, whereby injury sometimes arises consequent upon frost action.

Under my invention I obviate the above-stated objections and secure a lined chimney which I believe to be stronger, better, and more permanent than any heretofore constructed, embodying also all of the advantages of any form heretofore known.

I will first describe my invention as applied to a brick chimney or stack, and in the form which I have illustrated I assume that the lining extends entirely to the bottom of the chimney, the thick shield or lining of fire-brick or abestos material which is sometimes used at the base of such stacks to withstand the excessive heat of the products of combustion as they come immediately from the furnace being omitted. It will of course be understood that such shield may be provided in the lowermost section of my chimney, if desired, in which event my new lining will commence from the upper edge of such heavy base shield.

Referring to the drawings, A represents the base, which may be made in any preferred manner; B, the exterior wall, which may be made of such brick as preferred.

C represents what I will call "step ledges or brackets." They are or may be of the width of one or more of the lining-brick used in such constructions, as preferred, but usually not wider than two or three of the superposed lining-brick at the most, and these step ledges or brackets instead of extending in a horizontal line ring-like circumferentially of the interior of the chimney are arranged, as illustrated, in a succession of spirally-ascending steps from the bottom of the chimney or from the space where they commence in the chimney, wherever that may be, up to the top thereof or so far up as it is desired to extend the lining.

D is the lining, which may be formed of the ordinary fire-brick or other suitable material, as is now the practice. It is supported upon the spirally-ascending step-like ledges or brackets C. The lining extends upwardly nearly to the corresponding step or ledge vertically above that upon which it rests,

leaving a space E for expansion. This space may be left open; but in order that the air-currents circulating between the lining and the outer wall may not be permitted to discharge into the interior of the stack I prefer to close this opening E in some suitable way, which, however, should not interfere with the expansion of the lining. This closure may be effected in various ways. I have found that a body of elastic asbestos material F, such as fire-felt, which may be compressed by the expansion of the lining, yet will return substantially to its original bulk upon the cooling and consequent contraction of the chimney, is useful for the purpose. An effective method of applying this asbestos material is to prepare a strip of indefinite length, preferably of pure asbestos fire-felt, of the requisite thickness and width to rest upon the upper edge of the lining, which may be placed in position thereon during the building of the chimney, the superposed step-like ledges being laid up with the lining, in such manner as to slightly compress the fire-felt cushion or sealing-strip at the time the steps are laid up. I do not limit myself, however, to the employment of asbestos, for other suitable material may be employed.

It will be noted that in my construction I secure in a very effective manner the following important advantages: My lining is not a sectional lining. On the contrary, it is continuous from the bottom to the top, but is arranged after the manner of a spirally-wound ribbon or sheet and yet it is so disposed that I secure all the advantages of a sectional lining, because each vertical run or tier, so to speak, of the lining of whatever it may be made has its own provision for vertical expansion. Also in the event of injury occurring at any part only the area affected need be taken down for repair, the same as the horizontal or cylindrical sections now in use. Also I entirely obviate the very serious structural defects above referred to, because owing to my brackets being arranged step-like in spirally-ascending lines there is not sufficient thickening of the brickwork at any one place to cause a rupturing or damaging effect upon the outer wall, because the mortar used in building such chimneys has sufficient elasticity to permit the requisite expansion of the relatively small individual steps composing my ledges, and there is consequently no concentration of expansion at any one place. Thus no possibility of injurious expansion exists, because my individual step-like ledges are so small in area and embody so little material. Also the cooling air-currents, which I may admit to the bottom of the chimney through the air-spaces H, ascend through the continuous spiral air-spaces between the lining and the chimney proper with a whirling movement from its bottom to the top and are there discharged at the opening I at the top of the lining near the

top of the chimney, which I do not seal—on the contrary, intentionally leave open for the escape of the air-currents. In this way the lining, as well as the exterior wall, are both
 5 reduced in temperature, very much to the advantage of the structure, as is well understood. Also under my invention I secure the further advantage of sectional linings—that is to say, it may be built of the minimum
 10 thickness throughout—because each vertical run or tier of lining-brick is supported upon its own bracket or ledge, and there is no necessity for additional thickness or strength at the bottom of the stack to support the super-
 15 posed lining, as is the case where the sectional system is not employed.

In Fig. 4 I show one form of construction in which my invention may be applied to steel chimneys. *a* represents the metallic outer
 20 shell or wall; *b*, a series of step-like ledges, shown as ascending spirally up through the interior of the stack, as before. The steps are shown as bolted or riveted to the exterior shell *a* by bolts *c*. I do not show the lining
 25 in this drawing. Its construction and location upon the steps is obvious from what has heretofore been stated, and in this Fig. 4 the section or piece of the exterior shell *a* is shown flat instead of concave, as would be the case in
 30 the actual construction, for the sake of simplicity and clearness in the drawings.

It will be obvious to those who are familiar with this art that modifications may be made in the details of construction of my invention
 35 without departing from the essentials thereof. I therefore do not limit myself to such details. For example, instead of having the step-like ledges arranged in a continuously-ascending spiral line they may ascend for a
 40 considerable series of steps and then descend, the ascending and descending being repeated as many times as desired. This form has the disadvantage of not permitting continuous air
 45 circulation, but nevertheless by it will be realized one important feature of my invention—

the distribution of strain because of the non-concentration of excessive material at any one point or on any one line, thus dividing the expansion of the ledges into as many small and consequently non-injurious portions as there
 50 are individual step-ledges.

I claim—

1. A chimney embodying an outer wall and an interior lining resting upon a series of spirally-ascending ledges supported by the outer
 55 wall.

2. A chimney embodying an outer wall, an interior lining resting upon a series of ledges supported by the outer wall, and cushioning material interposed between the upper edge
 60 of the lining and the superposed ledges.

3. A chimney embodying an outer wall, an interior lining resting upon a series of spirally-ascending ledges supported by the outer wall and a spiral air-space between the lining
 65 and the outer wall.

4. A chimney embodying an outer wall, an interior lining resting upon a series of ledges supported by the outer wall, an air-space between the lining and the outer wall, and means
 70 to prevent or retard the air in the air-space from entering the interior of the chimney.

5. A chimney embodying an outer wall and a continuous spirally-arranged interior lining suitably supported by the outer wall.
 75

6. A chimney embodying an outer wall, a continuous spirally-arranged interior lining suitably supported by the outer wall, and a continuous spiral air-space between the lining
 80 and the wall.

7. In a chimney a series of spirally-ascending ledges or steps upon the inside of the chimney adapted to support a lining.

In testimony whereof I have signed my name to this specification in the presence of two sub-
 85 scribing witnesses.

D. D. ELDER, JR.

Witnesses:

PHILLIPS ABBOTT,
 F. M. DOUSBACH.