

(No Model.)

J. H. POLLARD.
STOPPER FOR BOILER TUBES.

No. 509,678.

Patented Nov. 28, 1893.

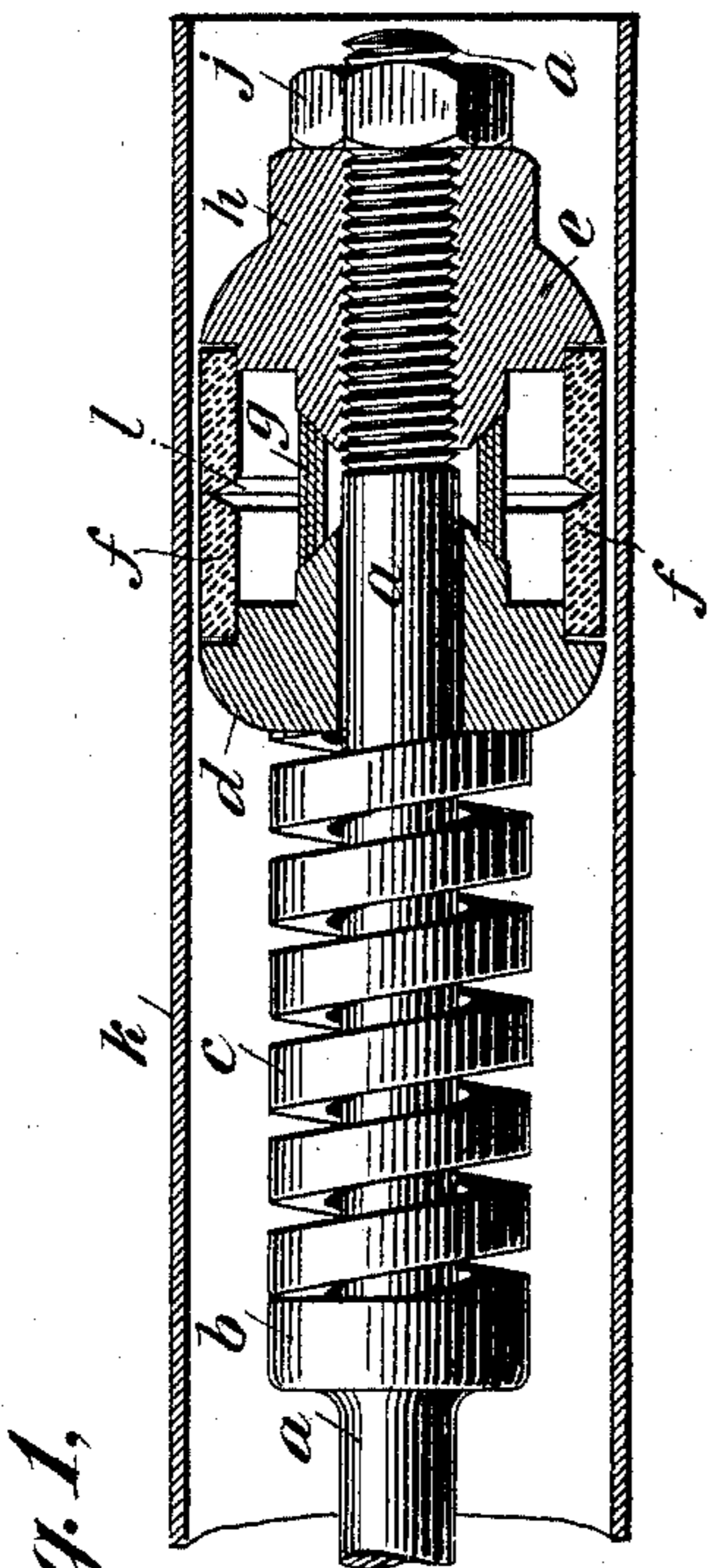


Fig. 1,

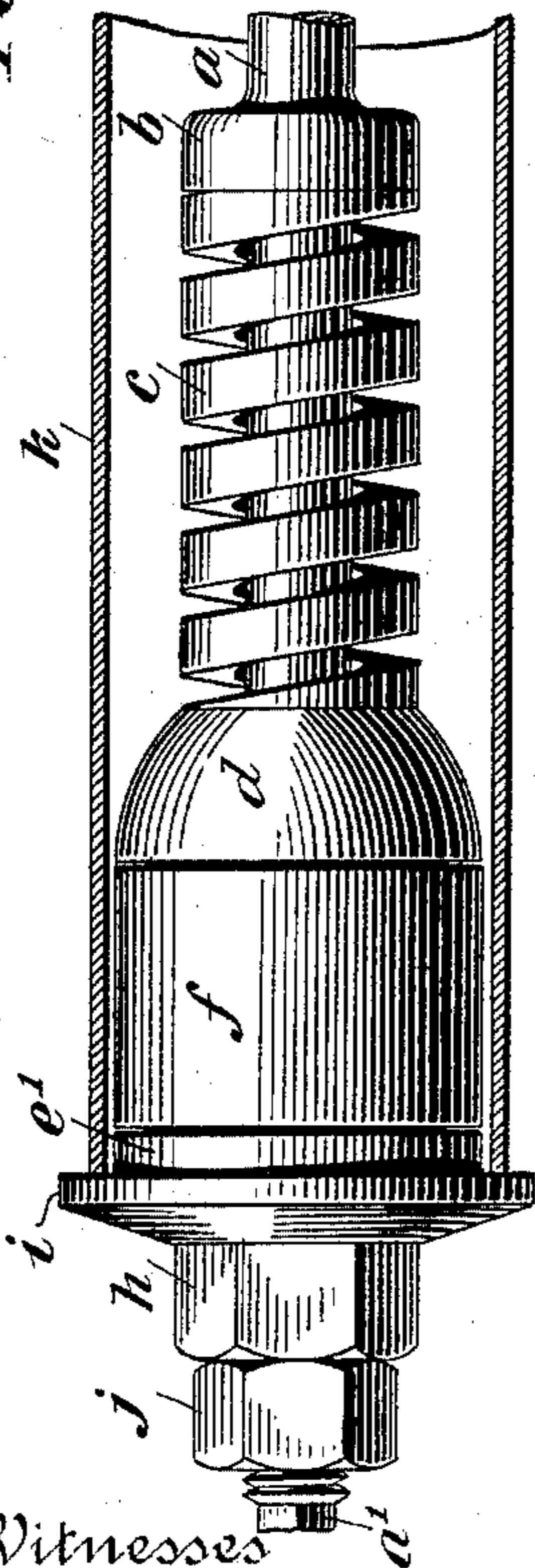


Fig. 2,

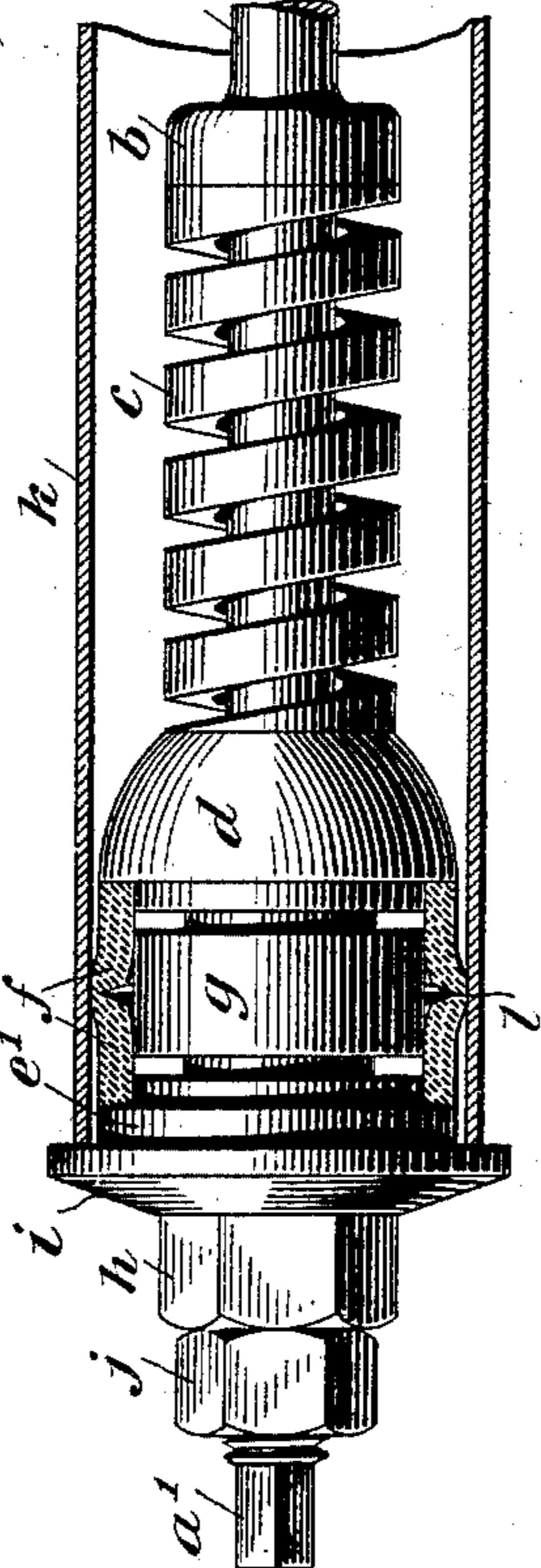
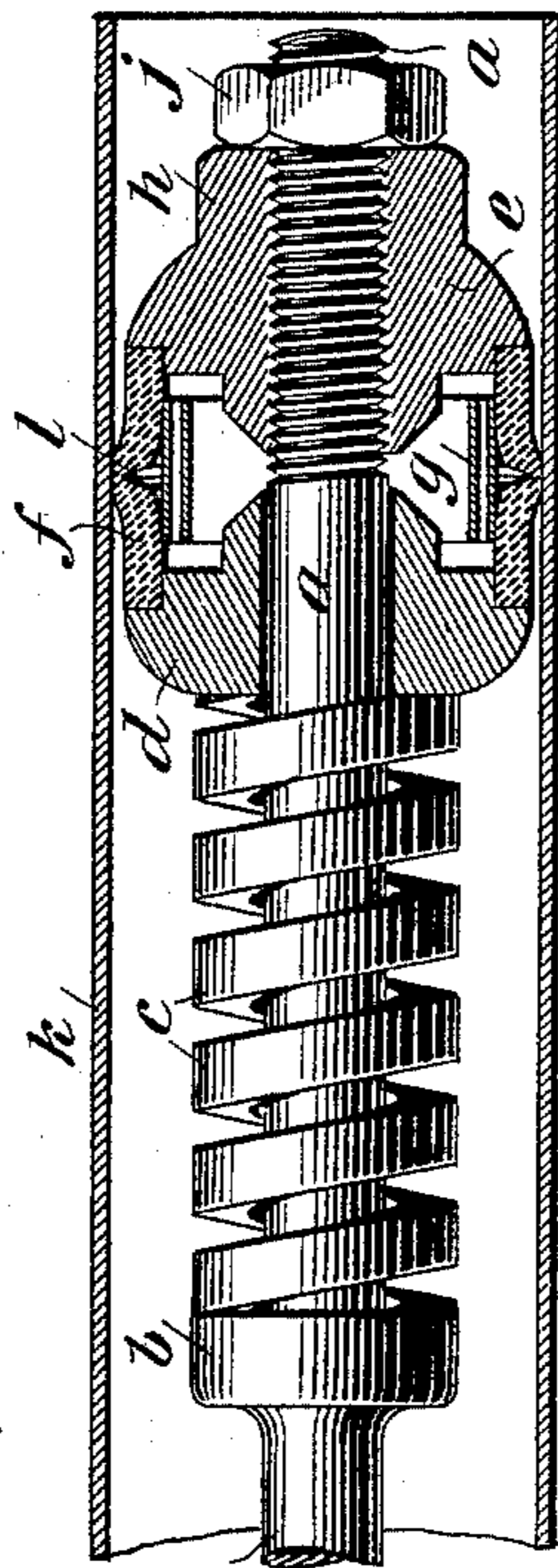
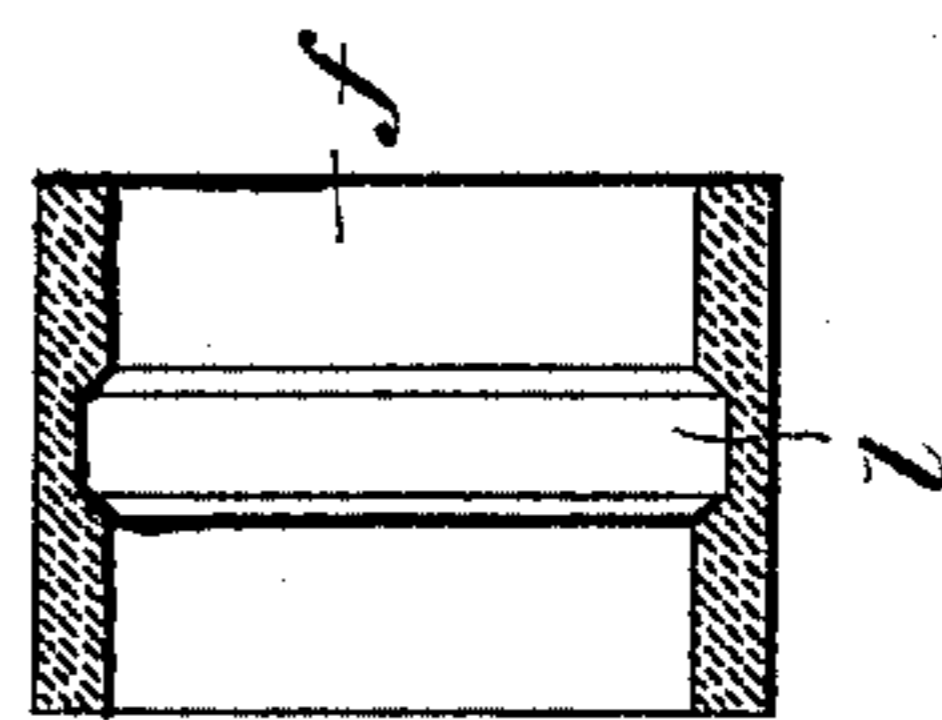
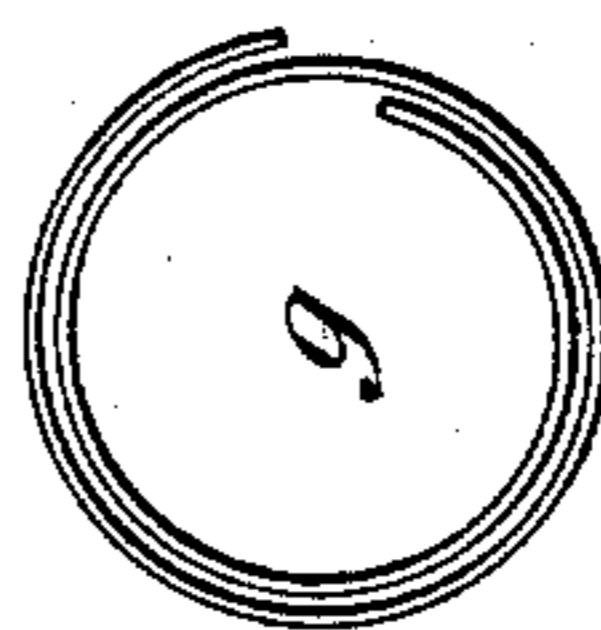
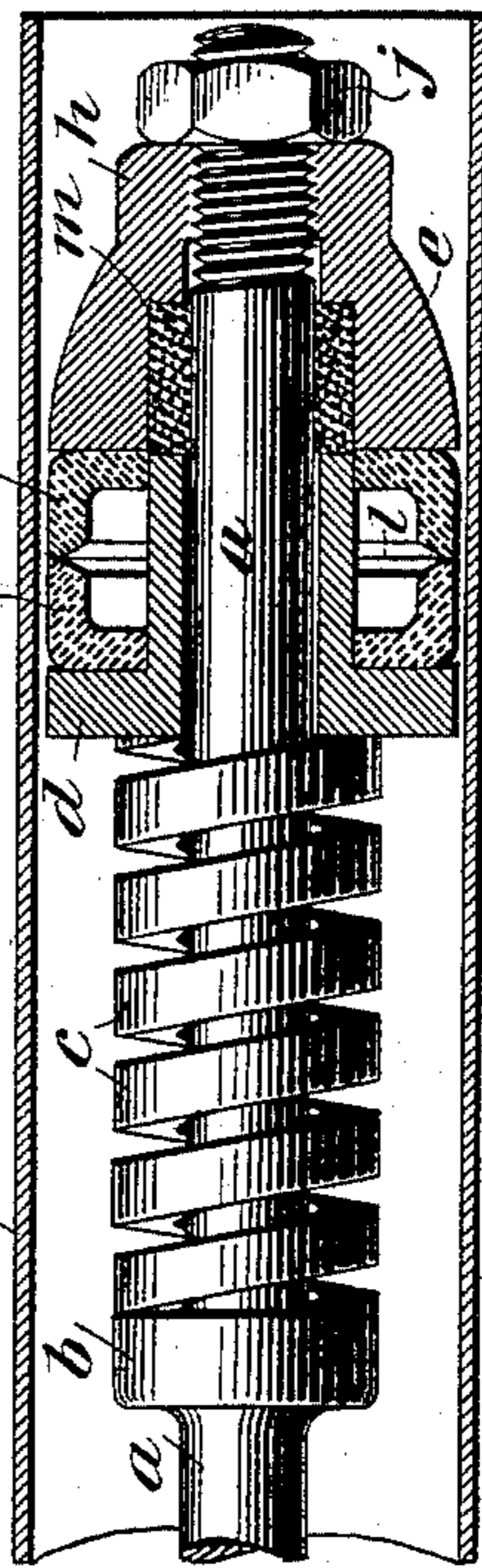


Fig. 3,

Fig. 4,

Fig. 5,

Fig. 6,



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UNITED STATES PATENT OFFICE.

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STOPPER FOR BOILER-TUBES.

SPECIFICATION forming part of Letters Patent No. 509,678, dated November 28, 1893.

Application filed April 3, 1893. Serial No. 468,897. (No model.)

To all whom it may concern:

Be it known that I, JOHN HOWIE POLLARD, a subject of the Queen of Great Britain, residing in the city of New York, county and State of New York, have invented a new and useful Stopper for Boiler-Tubes; and I do hereby declare that the following is a full, clear, and exact description of my invention, reference being had to the accompanying drawings.

10 The object of my invention is to stop up leaking or bursted boiler tubes by utilizing the heat of the boiler to set in operation a novel plugging device, without drawing the fires or interrupting the use of the boiler.

15 To more particularly describe my novel plugging device, I will refer to the accompanying drawings.

Figure 1, shows a vertical longitudinal section of a boiler tube *k*, with the plugging device inserted therein ready for operation, one end of the plugging device being shown in similar section, the other end in side elevation. The boiler tube and stopper are shown broken, the parts omitted being the continuation of the boiler tube and rod *a*, of the stopper. Fig. 2 shows the same section of the tube and plugging device as Fig. 1, and also a similar section of the other end of the plugging device, and the whole plugging device in operation stopping up the tube. Fig. 3 is a detailed view in cross section of a part of the plugging device shown at *g*, Figs. 1 and 2. Fig. 4 is another detailed view in similar section of the same part. Fig. 5 is a detailed view in section showing a modification in construction of the like parts *f, f*, in Figs. 1 and 2. Fig. 6 is a vertical longitudinal section showing a modification in the parts of the plugging device shown in Fig. 1.

40 Letter *a*, represents a forged metal rod corresponding in length to the boiler tube. The similar collars, *b, b*, forged upon the rod *a*, support the strong spiral springs *c, c*, which bear outwardly on the loose circular washers *d, d*, facing which are the circular washers *e, e'*, bored with screw thread to fit respectively the screw thread turned on the ends of the forged rod *a*. The opposing washers, *d* and *e*, embrace and support an annular metal band *f, f*, and toward their centers are made with beveled projections upon which rests the metal

coil *g*. The washers, *d* and *e'*, at the other end of the rod, *a*, are similarly designed to support a like metal band *f*, and like coil *g*. The washer *e'*, is flanged at *i*, to prevent the stopper from entering too far within the tube *k*.

The metal coil *g*, Figs. 1 and 2, may be formed by coiling a strip of brass or other suitable metal of the desired width and length, binding the coil temporarily with wire *w*, Fig. 3, and dipping the coil first into muriatic acid and then into molten fusible metal. After cooling and removing the tying wire, the coil will remain fastened by the quantity of fusible metal taken up in the process of sweating just described. The coil is then ready to be placed between the washers at each end of the stopper.

The annular metal bands *f, f*, Fig. 1, are grooved on the inner side in V shape as at *l*, Figs. 1 and 2, to facilitate an outward expansion of the metal band under pressure as shown in Fig. 2; another form of groove, shown at *l*, Fig. 5, may also be used to advantage. I prefer to make the expanding band of lead, but do not limit myself to the use of metal and any other suitable expansible material may be used for this purpose. The washers, *d, d, e, e'*, and the metal bands, *f, f*, are made of such size as to allow the stopper to freely enter the tube until arrested by the flange *i*, on the washer *e'*. The pairs of washers and inclosed metal bands are arranged apart from each other on the rod, in order to include as much as possible of the boiler tube. The springs, *c, c*, are compressed by screwing the washers *e, e'* on the rod *a*, against the metal coil *g*, by the nut ends *h, h*, and locked by the jam nuts *g, g*.

The operation of my invention is as follows: The stopper constructed as described is inserted within the boiler tube. The heat of the boiler tube immediately liquefies the fusible metal fastening of the coil *g*, which, being loosened, expands as shown in Figs. 2 and 4. The expansion of the coils *g*, frees the washers *d, d*, and the springs *c, c*, which compress the bands, *f, f*, expanding them at *l*, Fig. 2, outwardly against the side of the boiler tube, thus completely closing the tube at both ends. The bands *f, f*, are preferably made of a width slightly less than the space between the op-

posing faces of the washers when held in check by the fusible coil *g*, to enable the springs, *c*, *c*, to gain momentum on being released. To remove the stopper, it is only necessary to unscrew the washer *e'*, after loosening the lock nut *g*, and while holding the squared end of the rod at *a*. Instead of the band *f*, and the fusible coil *g*, shown in Figs. 1 and 2, two U shaped lead pieces *f*, *f'*, Fig. 6, with their opposing faces beveled as at *l*, may be used, the loose washer *d*, being formed with a projecting bearing to fit into a corresponding space, provided in the washer *e*, or *e'*. This space being filled with fusible metal *m*, after the spring has been compressed, the loose washer is held back against the spring. Within the boiler tube the heat as before liquefies the fusible metal, which escapes between the rod *a*, and the loose washer *d*, and the lead pieces *f*, *f'*, thereupon compressed and expanded, close up the tube, as before described. To permit the escape of the fusible metal in the form of construction shown in Fig. 6, and to avail of the steam in the boiler tube to aid in expanding the lead band or pieces, the borings of the loose washers *d*, *d*, are made larger than the circumference of the rod *a*.

Besides securing immediate action in plugging the tube, I am enabled by my improvement to dispense with the use of pressure or force against the boiler sheet, and do not re-

quire a large escape of steam in the boiler tube to furnish the necessary pressure to expand the plugging band.

I claim—

1. In a boiler tube stopper the combination of an expansible band with compressing washers, a fusible check, and a pressure spring, substantially as described.

2. In a boiler tube stopper the combination of an expansible band with expanding mechanism, and a fusible check, substantially as described.

3. A boiler tube stopper, consisting of a rod carrying at each end a pressure spring, compressing washers, a fusible check, and an expansible band, constructed and arranged substantially as described.

4. In a boiler tube stopper the combination of the pressure spring, the compressing washers, the fusible metal coil, and the expansible band, constructed and arranged substantially as described.

5. In a boiler tube stopper the combination of the pressure spring, the compressing washers, the fusible metal, and the expansible band, constructed and arranged substantially as described.

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