(No Model.) 2 Sheets—Sheet 1.

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SAFETY APPARATUS FOR CARBONIC ACID GAS FLASKS.

No. 412,702. Patented Oct. 8, 1889.

Fig: 1.

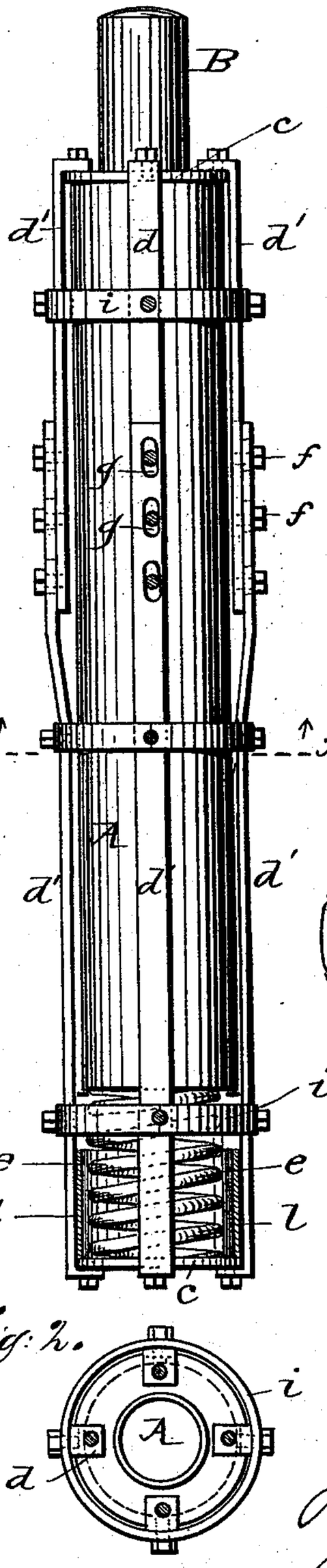

Fig: 3.

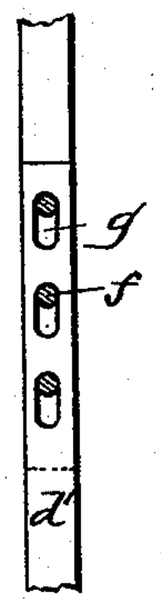

Fig: 4.

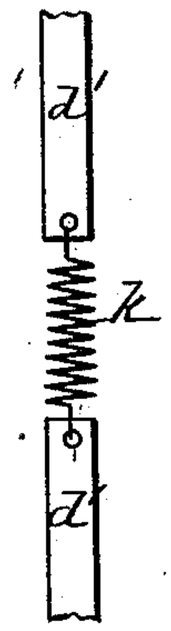

Fig: 5.

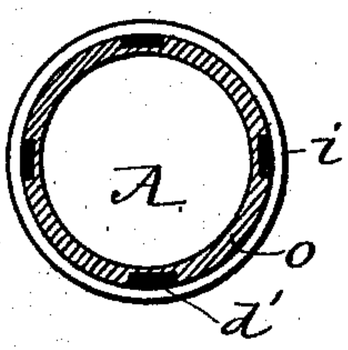

Fig: 6.

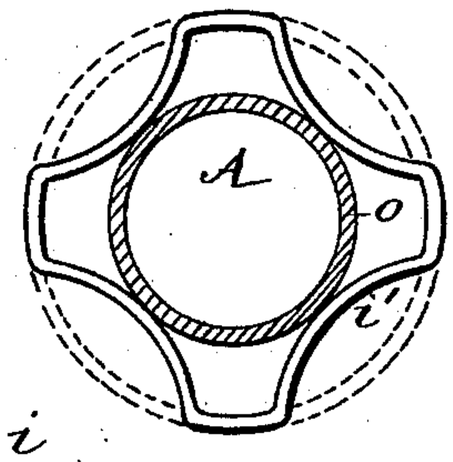

Fig: 7.

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(No Model.) 2 Sheets—Sheet 2.

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SAFETY APPARATUS FOR CARBONIC ACID GAS FLASKS.

No. 412,702. Patented Oct. 8, 1889.

Fig. 7.

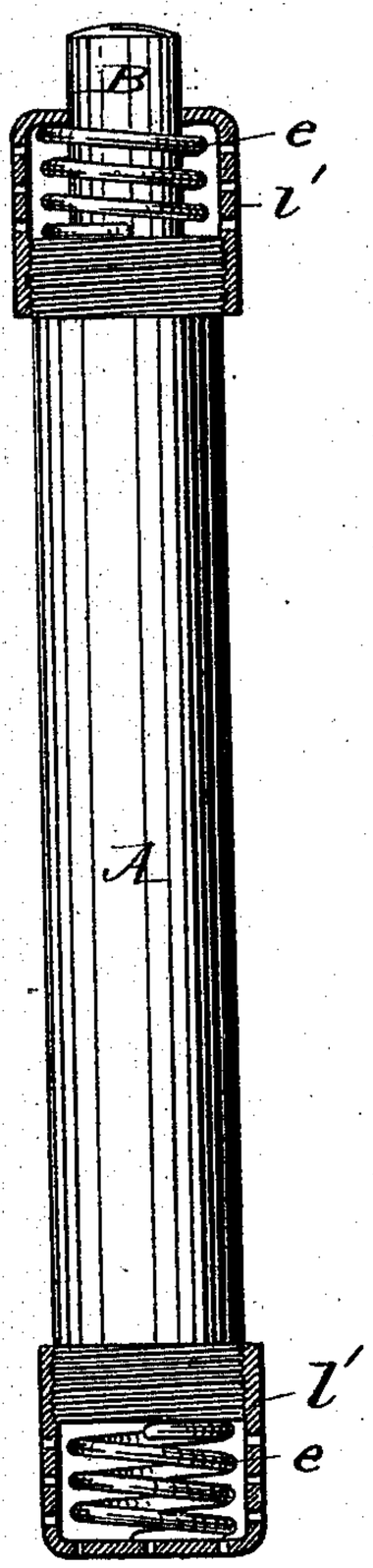


Fig. 8.

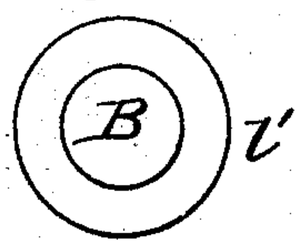


Fig. 9.

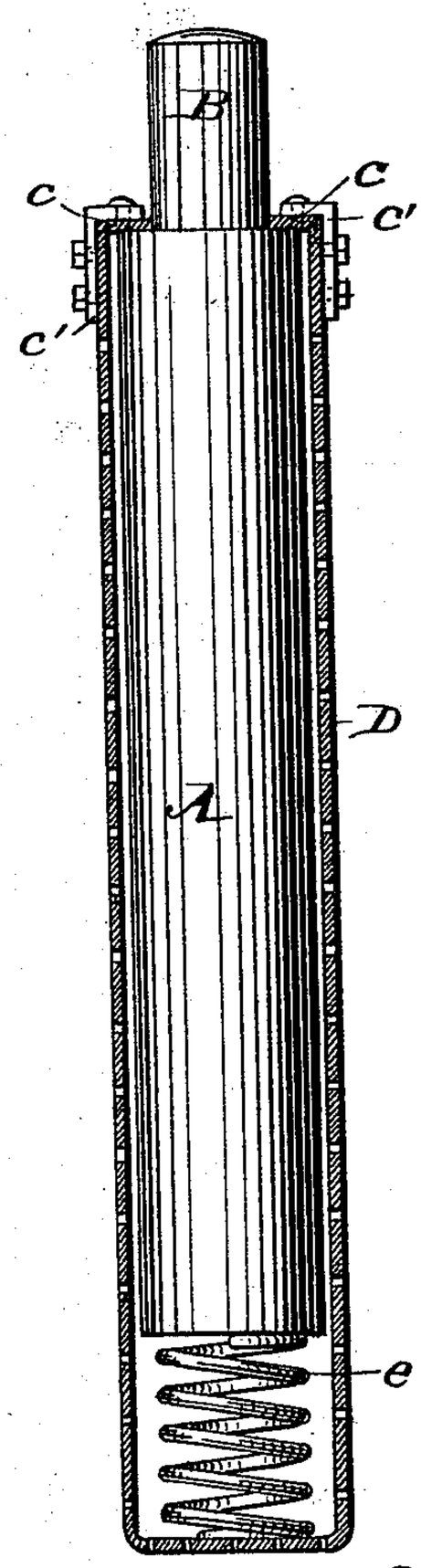
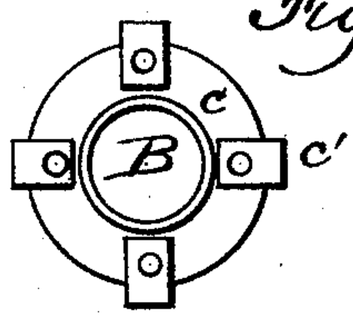


Fig. 10.



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UNITED STATES PATENT OFFICE.

JOHANNES FLEISCHER, OF FRANKFORT-ON-THE-MAIN, ASSIGNOR OF ONE-HALF TO WILHELM THOMAS, OF OFFENBACH-ON-THE-MAIN, GERMANY.

SAFETY APPARATUS FOR CARBONIC-ACID-GAS FLASKS.

SPECIFICATION forming part of Letters Patent No. 412,702, dated October 8, 1889.

Application filed June 15, 1889. Serial No. 314,518. (No model.) Patented in Germany June 17, 1888, No. 46,583.

To all whom it may concern:

Be it known that I, JOHANNES FLEISCHER, a subject of the Emperor of Germany, and a resident of Frankfort-on-the-Main, Germany, have invented a certain new and useful Improvement in Safety Appliances for High-Pressure Receptacles, (partly patented by German Letters Patent No. 46,583, June 17, 1888,) of which the following is a specification.

This invention relates to safety-cages for enveloping or confining receptacles containing fluids under high pressure, and particularly the iron, steel, or other bottles or tubular flasks in which carbonic-acid or other gases liquefied under pressure are manufactured or contained, so as to guard against accidents in case the ends of the receptacle should blow out or it should burst laterally.

These safety-cages have generally heretofore been made to rigidly confine the bottle or receptacle, and thus take the shock of explosion simultaneously with the bottle or receptacle.

My invention consists, mainly, in making the safety-cage elastic, so as to absorb the shock of explosion gradually, and thus greatly reduce the strain before the limit of elasticity of the cage is reached, whereby danger of the cage fracturing, and thus permitting the fragments of the receptacle to be scattered, is entirely obviated.

In order that my invention may be fully understood, I shall first describe in detail the mode in which the same may be carried into effect, and then point out its distinctive feature in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of a high-pressure flask provided with a safety-cage embodying my invention. Fig. 2 is a view of the upper end of the same. Fig. 3 is a detail view of a part of one of the longitudinal members of said cage. Fig. 4 is a view illustrating a modified construction of the said members of the cage. Fig. 5 is a sectional end view on the line X X, Fig. 1. Fig. 6 illustrates a modified form of circumferential cage member. Figs. 7 and 8 are sectional side and top views, respectively, illustrating a modified form of safety-cage. Figs. 9 and 10 are similar views of another modification.

Like letters of reference denote corresponding parts in the various figures.

In the form of my invention illustrated in Figs. 1, 2, 3, and 5 the safety-cage is constructed of a number of longitudinal strips d', of iron or other appropriate material, equally spaced around the body of the high-pressure flask or receptacle A, and connected by intermediate bands i, surrounding the receptacle A. The upper and lower ends of the longitudinal strips d' are bent inward and secured to end plates c to confine the ends of the receptacle A, the upper plate c being annular to surround the neck B of the receptacle. The cage is made somewhat longer than the body of the receptacle A, and a strong rubber or spiral spring e is interposed between the bottom of the receptacle and the lower end plate c, a thimble l being introduced into the cage to receive the end of the spring e and prevent its injury or displacement. The upper end plate c bears directly upon the top of the receptacle; but, if desired, a spring-cushion may be interposed between them also. The longitudinal cage members d' are made in sections which overlap, and are connected by bolts f, passing through slots g in one section, so as to render the cage to a certain extent extensible and permit it to yield lengthwise in case the limit of elasticity of the spring or springs e is exceeded. With this arrangement, if either end of the receptacle should blow out, the explosive energy will be absorbed by the spring or springs e and the cage remain intact, thus preventing damage by scattering of the fragments of the receptacle. To prevent damage from lateral bursting of the receptacle, the circumferential bands i are lined with rubber or other elastic rings o, as shown in Fig. 5, which in like manner afford a yielding support for the circumference of the receptacle, and allow any fracture that may occur to enlarge gradually and absorb most of the strain before the strength of the bands i is tried. Instead of connecting the sections of the longitudinal members d' by bolts f and slots g, the sections may be connected, as shown in Fig. 4, by strong springs k, in which case the spring or springs e may be dispensed

with. Further, in lieu of lining the circumferential members *i* with elastic rings *o*, the said members may be of elastic metal and of a shape, as that shown in Fig. 6, to bear yieldingly upon the sides of the receptacle.

In the modification shown in Figs. 7 and 8 perforated sheet-metal safety-cages *l'* are employed instead of the skeleton form previously described, and separate cages screwed upon the respective end parts of the receptacle A, the elastic bearings for the ends of the receptacle being afforded by interposed spring-cushions *e*, as in the form shown in Figs. 1, 2, 3, and 5.

In the modification shown in Figs. 8 and 9 a single perforated sheet-metal cage D is employed, completely enveloping the receptacle, the cage D being closed at the bottom and containing thereat a spring-cushion *e* and having an annular plate *c* attached to its upper end by brackets *c'* and screw-bolts, and bearing on the upper end or shoulder of the receptacle. The perforations permit the escape of the gas in case of fracture of the confined receptacle.

I claim as new and desire to secure by Letters Patent of the United States of America—

1. The combination, with a receptacle of the character described, of a reticulate cage completely enveloping the receptacle or the weaker wall thereof, and provided with an elastic internal bearing, against which the wall of the receptacle rests, substantially as described.

2. The herein-described safety apparatus for high-pressure receptacles, consisting of a reticulate cage adapted to completely envelop the receptacle or the weaker wall thereof, and provided with an elastic internal bearing for the wall of the receptacle, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHANNES FLEISCHER.

Witnesses:
FRANZ HASSLACHER,
JOSEPH PATRICK.