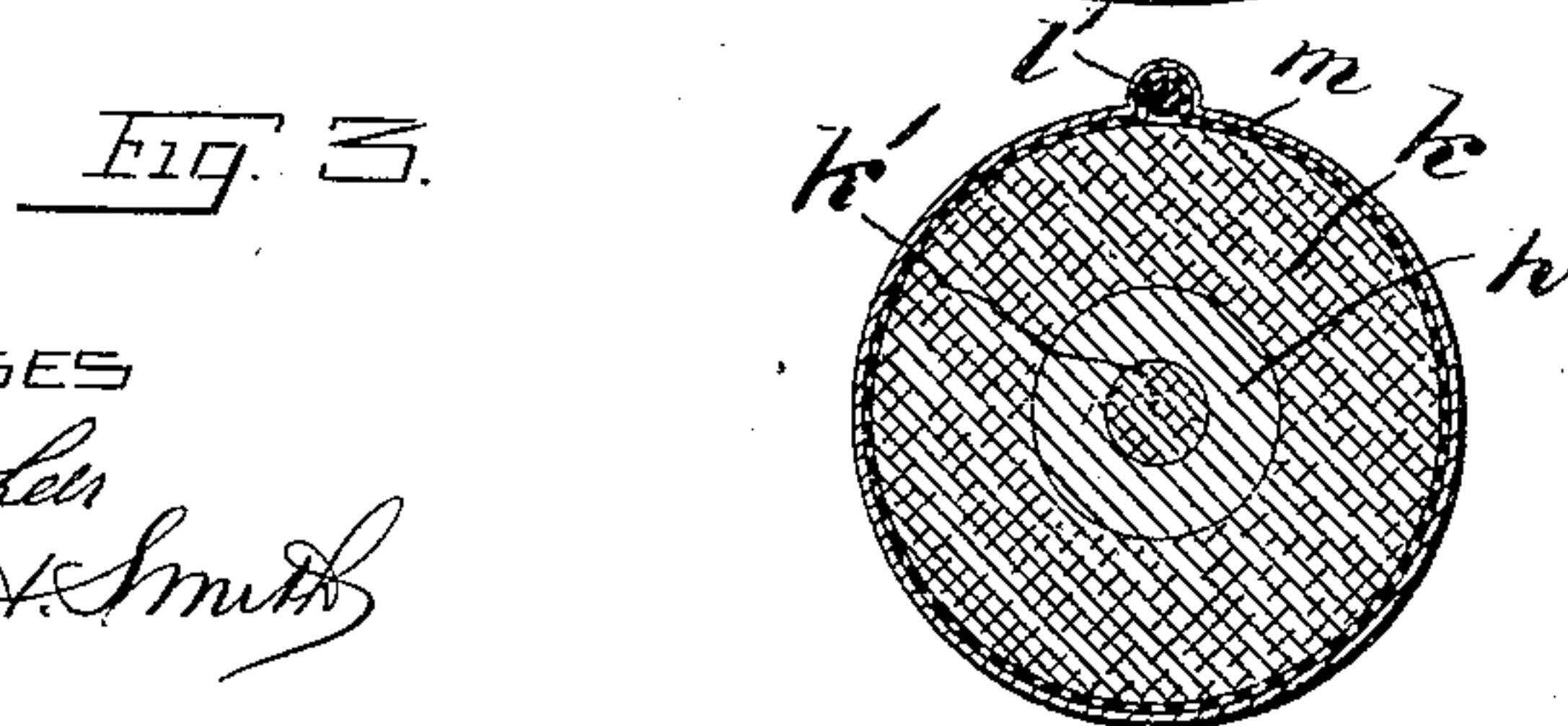
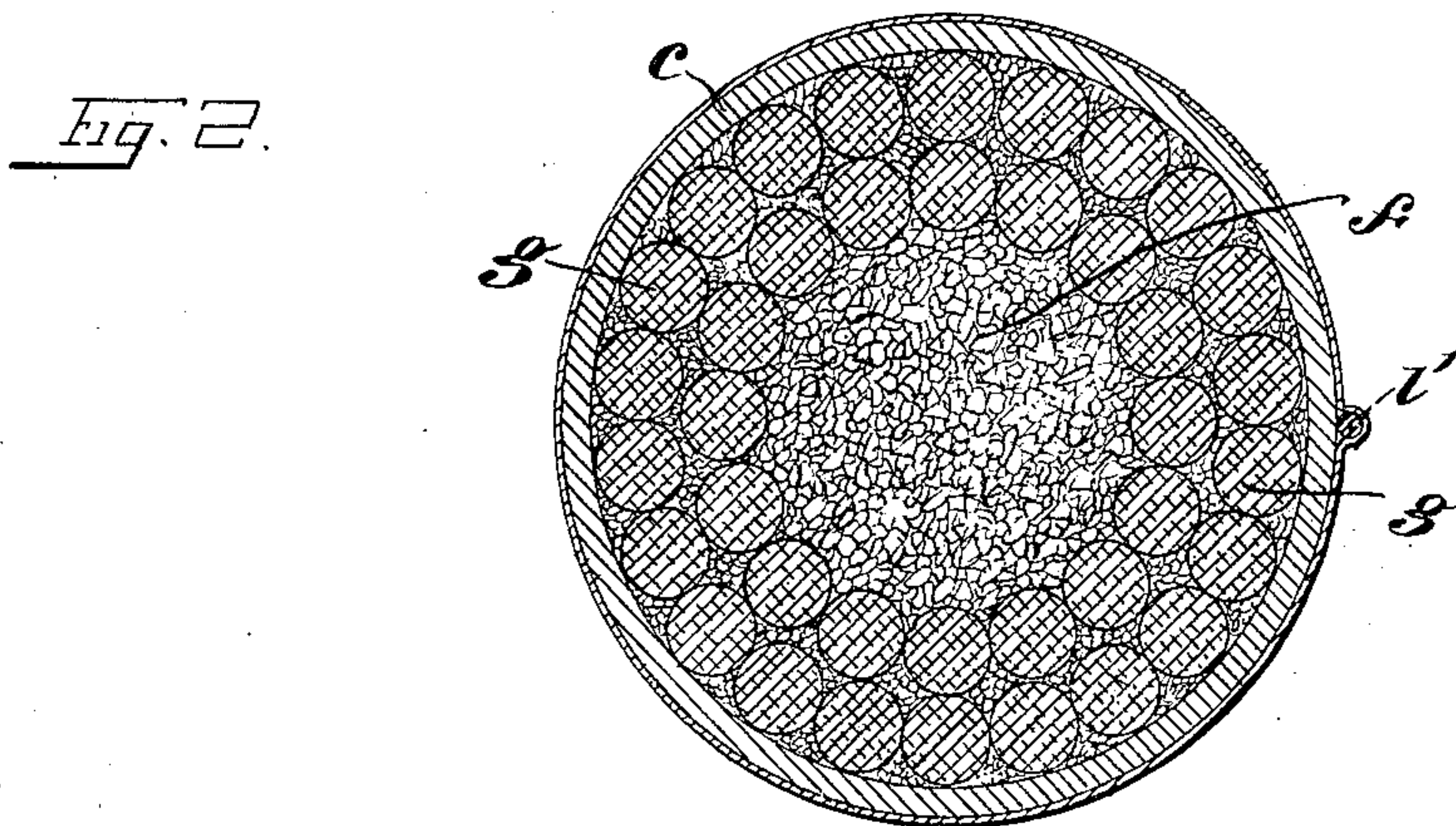
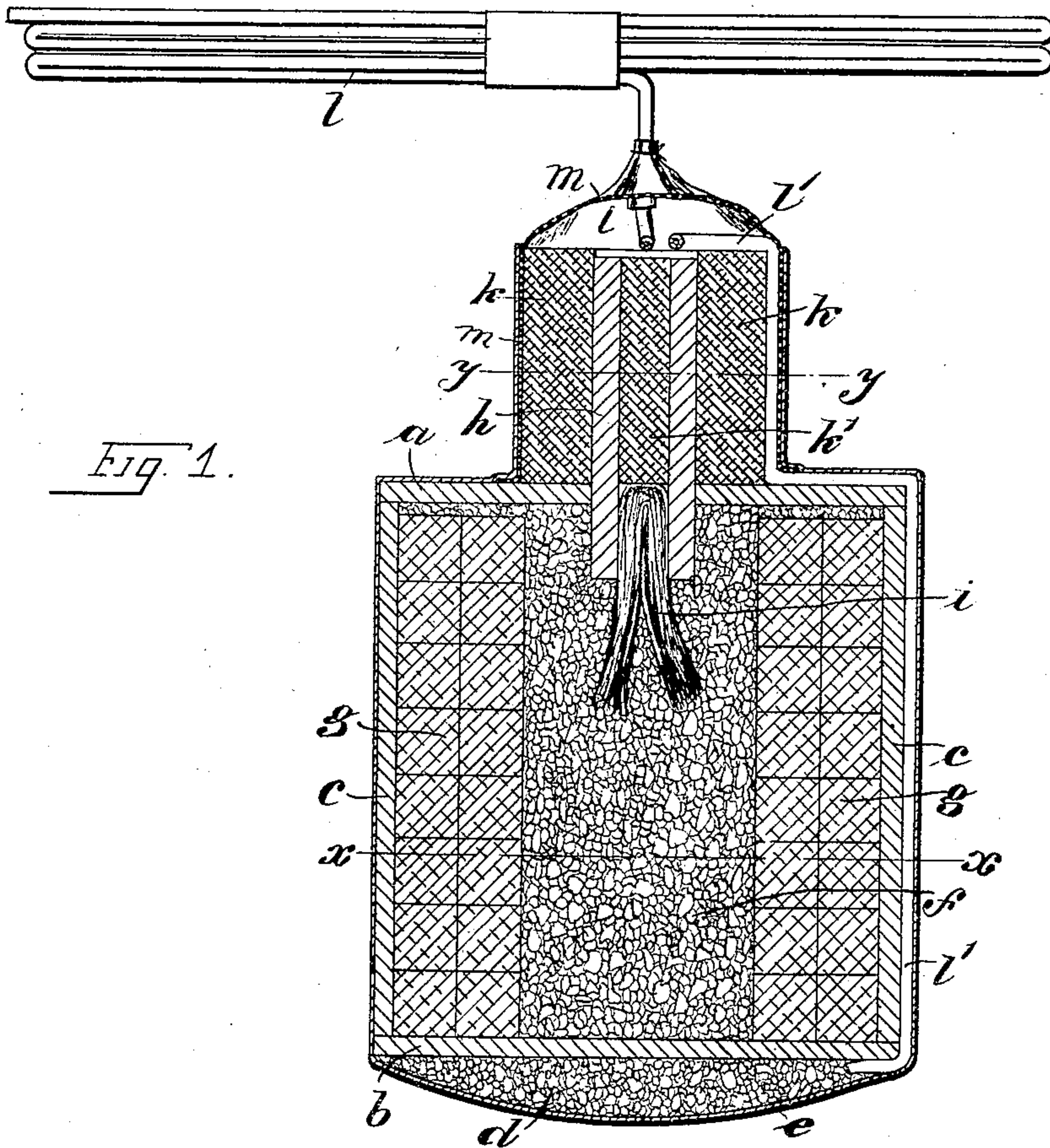


No. 827,939.

PATENTED AUG. 7, 1906.

H. J. PAIN.
PYROTECHNIC DEVICE.
APPLICATION FILED JUNE 24, 1905.



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PYROTECHNIC DEVICE.

No. 827,939.

Specification of Letters Patent.

Patented Aug. 7, 1906.

Application filed June 24, 1905. Serial No. 266,758.

To all whom it may concern:

Be it known that I, HENRY J. PAIN, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented an Improvement in Pyrotechnic Devices, of which the following is a specification.

My invention relates to pyrotechnic devices in the nature of rockets and bombs.

Heretofore the spectacular stream of fire or incandescent particles, as a tail, left by the rocket in its ascent and the roar or noise thereof have given pleasure and satisfaction to spectators, but the falling sticks of rockets possess an element of danger to be avoided. With bombs fired from a mortar the explosion of the fire charge is manifest, but nothing is again heard until the explosion in mid-air, or visible until the colored stars are as the result of the explosion fired, released, and scattered, there being no element of danger from the bomb as the paper particles of the same are blown to atoms.

The object of my invention is the construction of a bomb having a rocket effect—that is, with a tail of fire like the tail of the rocket—so that there will be a spectacular effect during the ascent of the bomb similar to the effect of the rocket.

In carrying out my invention the bomb is provided with a tubular portion and heads, between which is placed the igniting and bursting charge of powder and series of disks of pyrotechnic material forming the stars when ignited. Adjacent to and outside of one head is placed the firing-powder charge, and through the opposite head is a tubular body, preferably of paper, for the igniting time-fuse, which communicates with the igniting and bursting charge of powder within the bomb. Around this tubular body is an annulus of pyrotechnic material preferably in a solid form, and within the tubular body adjacent to the outer end and in proximity with the time-fuse is also preferably placed a quantity of the same material for producing the tail of fire when lighted during the ascent of the bomb, so as to give to the bomb a rocket effect. This pyrotechnic material and the firing-powder charge at one end of the bomb are simultaneously ignited by means of a quick-fuse or quick-match, as hereinafter described. As the bomb leaves the mortar and ascends in mid-air the lighted pyrotechnic material burns with all

the visible scintillating effect of an ascending rocket, a tail of fire being left behind.

My invention is applicable to any form of bomb.

In the drawings, Figure 1 is a vertical longitudinal section of a bomb made according to my invention and an elevation of the quick match or fuse. Fig. 2 is a sectional plan of the same at xx of Fig. 1; and Fig. 3 a sectional plan at yy , Fig. 1.

The bomb is preferably circular and comprises the disk-heads a b and cylindrical intervening shell c , which parts are preferably formed of paper in the nature of strawboard, the cylindrical shell c being preferably wound as a tube-section and the disk-heads a b of a diameter agreeing therewith and fitting over the ends thereof. These parts are held together by a surface of paper, preferably pasted thereto. At one end d represents the charge of firing-powder ignited after the bomb is put in the mortar and employed for propelling the bomb, the height of which the same is forced being controlled by the size of the charge of powder in relation to the size of the bomb.

A paper end e is employed so that between the same and the disk-head b the charge of firing-powder is confined. The cylindrical body formed by the disk-heads a b and cylindrical shell c contains a powder-igniting and bursting charge f in the central portion and circularly arranged superimposed series of disks of pyrotechnic material closely arranged within the cylindrical shell c and leaving a space in the center for an ample igniting and bursting charge of powder f .

In the disk-head a and through the center of the same I place a paper tube h and surrounding the same an annulus k of pyrotechnic material. This rests upon the outer surface of the disk-head a , closely surrounds the paper tube h , and extends outward to an extent substantially agreeing with that of the end of the paper tube. In the inner end of the paper tube h I place the time-fuse i , the projecting ends thereof being in the charge of powder f , while in the outer end of said paper tube h I prefer to place a short stick of material k' similar to the pyrotechnic material k .

l represents a quick match or fuse, which may be of any desired length, the parts being preferably held together with a paper strap as wound back and forth, one end of this quick-match entering the paper or cloth ma-

terial *m*, surrounding and extending over the pyrotechnic materials *k k'* and the end of the paper tube *h*. This inclosing material *m* not only connects the quick fuse or match *l* to this end of the bomb, but supports the same in its relation thereto, with the free end of the said match within said parts and terminating adjacent to the surfaces of these parts.

l' represents a quick match or fuse, with one end projecting in the paper or cloth inclosing material *m*, coming adjacent to the free end of the quick match or fuse *l*, and this extends out and down the outer surface of the material *k*, over the surface of the disk-head *a*, down the outside of the cylindrical shell *c*, and passes into the paper cover *e*, with its other free end in the charge of firing-powder *d*.

In the operation of this pyrotechnic device the same is placed in a mortar for firing in the position Fig. 1, and the end of the quick match or fuse *l* is ignited. This burns through within the paper or cloth closure *m*, simultaneously igniting the end of the quick-match *l'* and setting fire to the pyrotechnic materials *k k'*. The quick-fuse now burns outside the bomb and around and communicates with the firing charge of powder *d*, exploding the same and causing the bomb to be ejected from the mortar and thrown upward into mid-air. During the upward movement of the bomb the pyrotechnic materials *k k'* are burning with a scintillating effect, leaving a tail of fire and producing a visible rocket effect—that is, in leaving a tail of fire behind as the bomb ascends.

The parts are so proportioned and arranged that the pyrotechnic materials *k k'* are used up during the ascent of the bomb. As soon as the portion *k'* is consumed the fire communicates with the time-fuse *i*, the action of which is not quite instantaneous, but would possibly prevent the further ascent of the bomb. The fire from the fuse *i* ignites the powder *f* and simultaneously ignites all of the series of disks *g* of pyrotechnic material, the ignition of the powder charge *f* bursting the bomb and blowing the paper parts to atoms and at the same time scattering the lighted disks *g*, which produce the effect of stars, they quickly burning and leaving nothing but possibly light floating ash in the air.

The essential part of this invention is the pyrotechnic materials *k k'* for producing the rocket effect, and this may be employed in connection with a bomb of any character or construction. Therefore I do not limit myself to the precise construction of the bomb, as the same may be of the construction shown or of other well-known constructions, it being a fact that in the construction of some bombs and in addition to the parts herein shown and described there have been employed parachute and asteroid effects—that is, lighted

colored stars depending from floating parachutes—and the device of my invention is equally applicable to this form of bomb.

I claim as my invention—

1. In a pyrotechnic bomb device of the character described, a firing charge, an external independent structure of pyrotechnic material also independent of but connected to the bursting charge and adapted when burning and during the ascent of the bomb to give off a tail of fire simulating an ascending rocket.

2. In a pyrotechnic device of the character described, a structure of pyrotechnic material adapted when burning to give off a tail of fire simulating an ascending rocket, a quick fuse or match for lighting the same and simultaneously lighting a second quick fuse or match extending to the charge of firing-powder for propelling the bomb.

3. In a pyrotechnic bomb device of the character described, an external structure of pyrotechnic material independent of but connected to the bomb at one end and adapted when burning and during the ascent of the bomb to give off a tail of fire simulating an ascending rocket, a quick fuse or match device for igniting the said material and simultaneously igniting a second quick fuse or match device for igniting the firing or propelling charge of powder for discharging the bomb from the mortar.

4. In a pyrotechnic bomb device of the character described, a tube passing through one head of the bomb, an annulus of pyrotechnic material surrounding the same, a covering material therefor connecting the same to the bomb, a piece of similar pyrotechnic material within the outer end of the tube and a time-fuse within the inner end of said tube, and means for igniting the said pyrotechnic materials so as to give off a tail of fire during the ascent of the bomb simulating an ascending rocket.

5. In a pyrotechnic bomb device of the character described, a tube passing through one head of the bomb, an annulus of pyrotechnic material surrounding the same, a covering material therefor connecting the same to the bomb, a piece of similar pyrotechnic material within the outer end of the tube, a time-fuse within the inner end of said tube, a quick fuse or match, and means for supporting the same with a free end thereof adjacent to said annulus of pyrotechnic material, and a second quick fuse or match extending therefrom to the firing charge of powder for propelling the bomb from the mortar, the first said quick-fuse simultaneously igniting the pyrotechnic materials and the second quick match or fuse.

6. A pyrotechnic bomb, comprising disk-heads and an intervening cylindrical shell preferably of paper, a paper cover over one end, a charge of firing propelling-powder be-

tween the same and the disk-head, a series of disks of pyrotechnic material forming stars circularly arranged and superimposed within the cylindrical shell, and a central igniting and bursting charge of powder within said disks, the powder-tube passing through the head of the bomb opposite to the head adjacent to the firing charge, a time-fuse within the inner end of said paper tube in contact with the bursting charge of powder, an annulus of pyrotechnic materials around said paper tube, and a filling of the same within the outer end of said paper tube, a covering material of paper or cloth to said annulus and extending over the end thereof, and means for igniting and firing the bomb.

7. A pyrotechnic bomb, comprising disk-heads and an intervening cylindrical shell preferably of paper, a paper cover over one end, a charge of firing propelling-powder between the same and the disk-head, a series of disks of pyrotechnic material forming stars circularly arranged and superimposed within the cylindrical shell, and a central igniting

and bursting charge of powder within said disks, the paper tube passing through the head of the bomb opposite to the head adjacent to the firing charge, a time-fuse within the inner end of said paper tube in contact with the bursting charge of powder, an annulus of pyrotechnic materials around said paper tube and a filling of the same within the outer end of said paper tube, a covering material of paper or cloth to said annulus and extending over the end thereof, a quick match or fuse entering the material covering said end of the bomb, and a second quick match or fuse extending out therefrom and to the firing charge of powder at the opposite end, the first of said quick-matches igniting the second and simultaneously igniting the pyrotechnic materials adapted to produce the rocket effect with the ascent of the bomb.

Signed by me this 21st day of June, 1905.

HENRY J. PAIN.

Witnesses:

GEO. T. PINCKNEY
S. T. HAVILAND.