

No. 672,827.

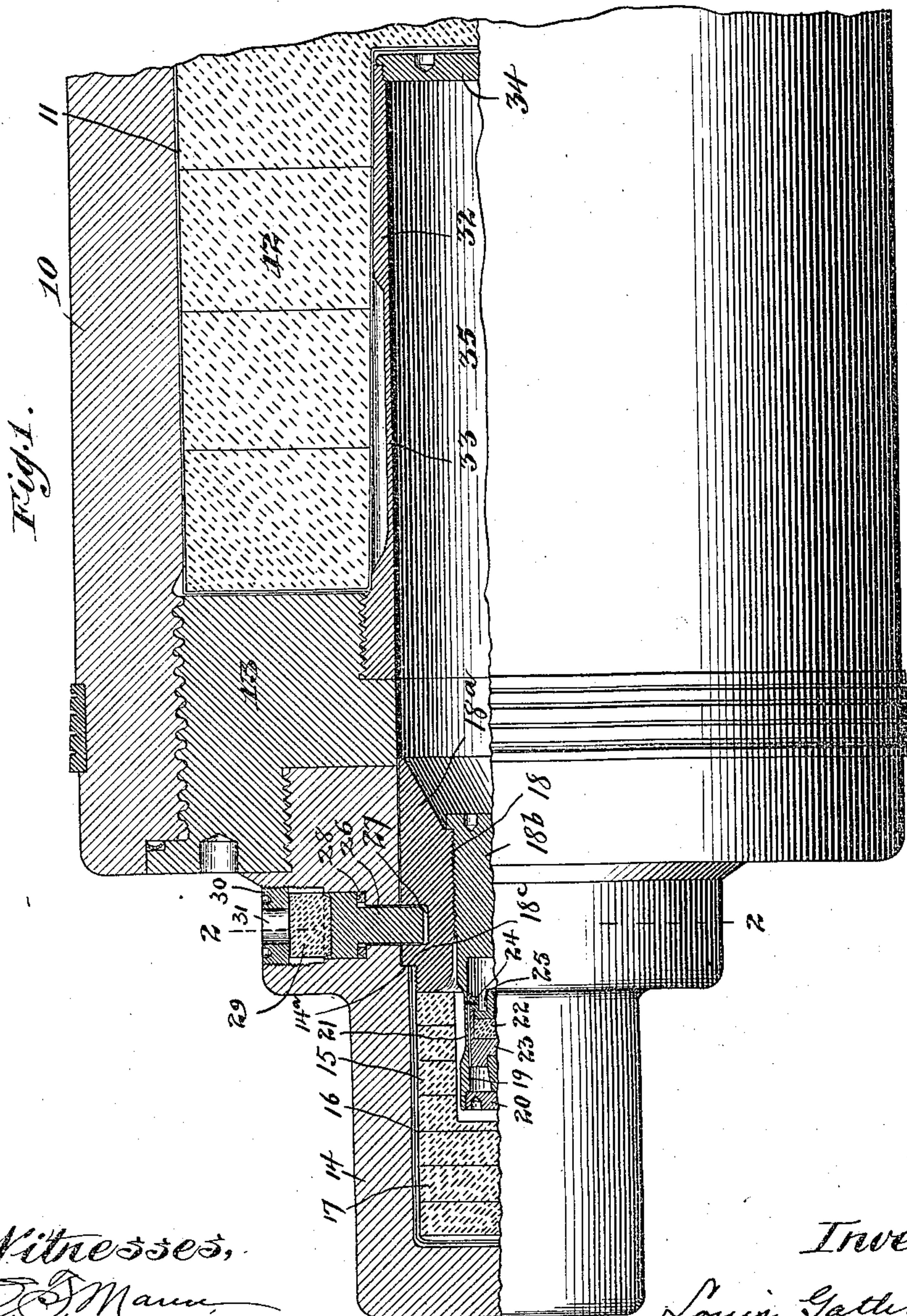
Patented Apr. 23, 1901.

L. GATHMANN.
SHELL FOR HIGH EXPLOSIVES.

(Application filed Nov. 25, 1898.)

(No Model.)

4 Sheets—Sheet 1.



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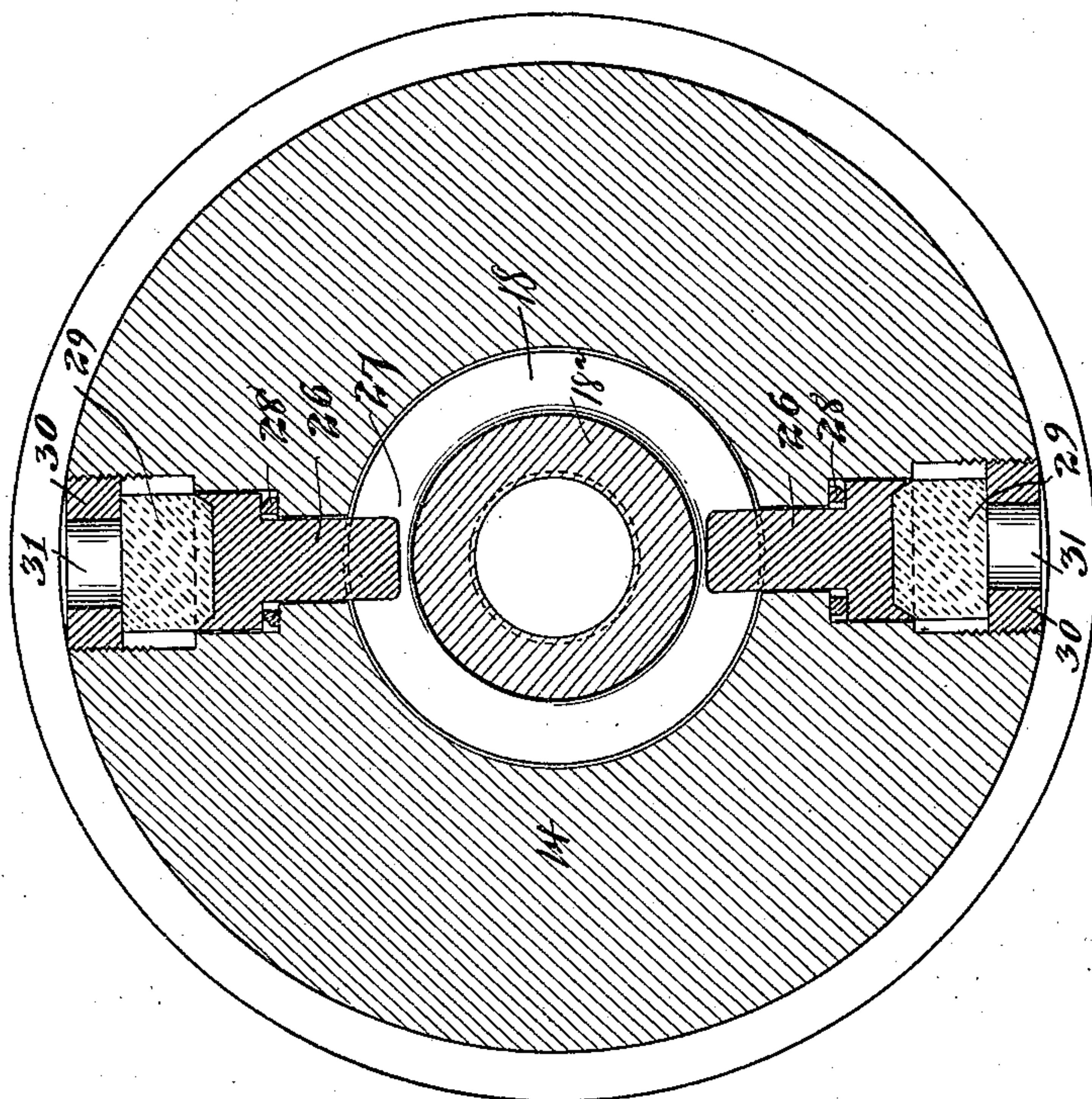
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Fig. 2.



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Fig. 3.

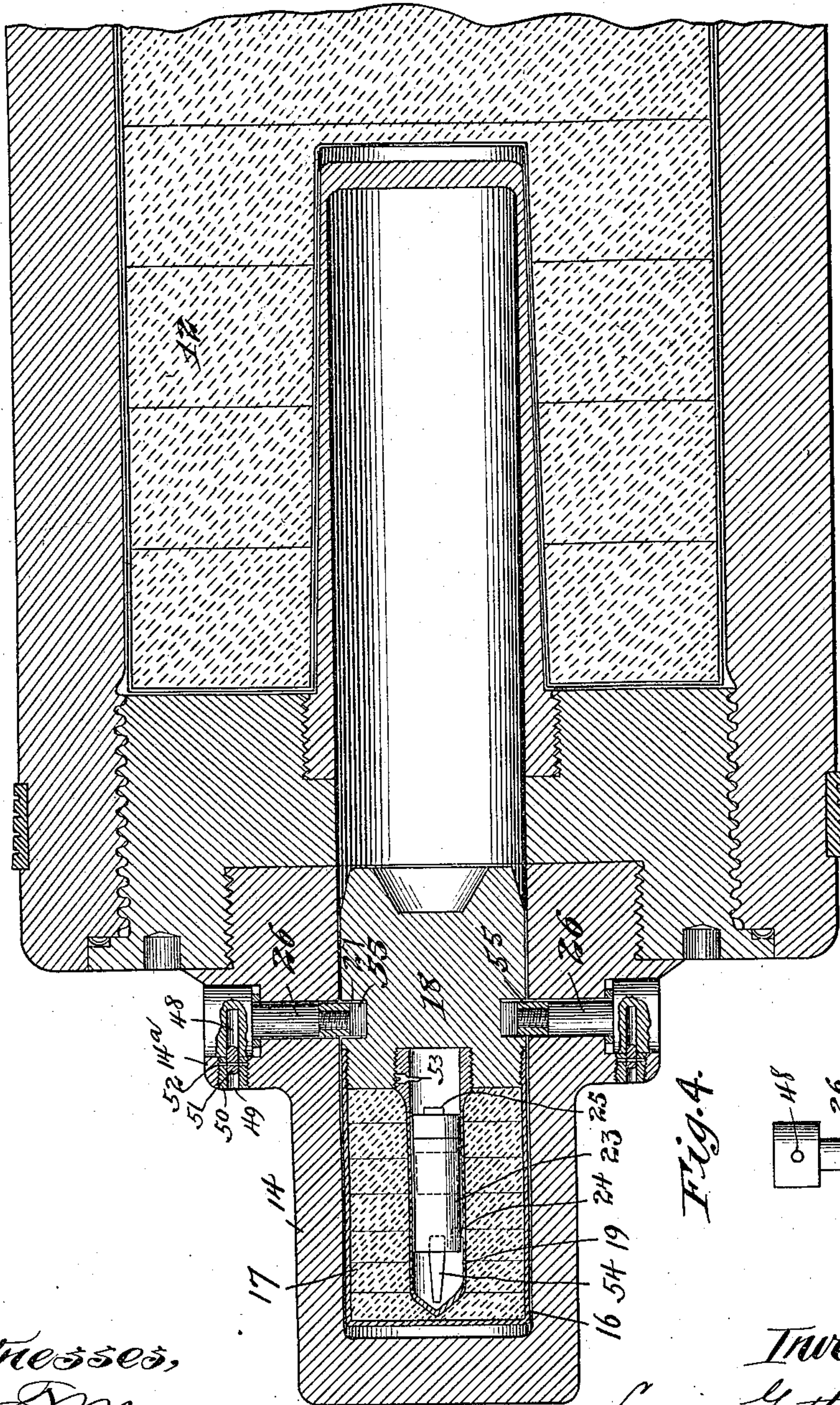
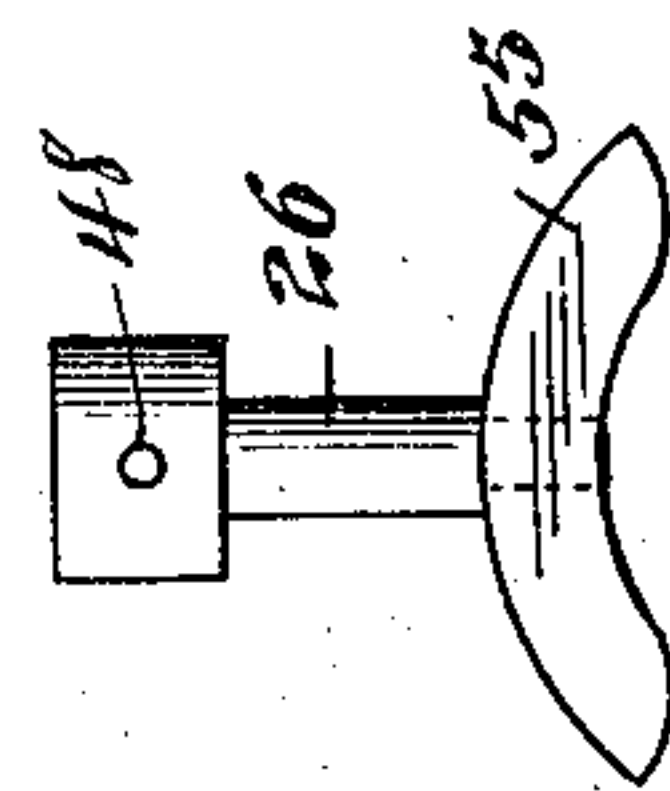


Fig. 4.



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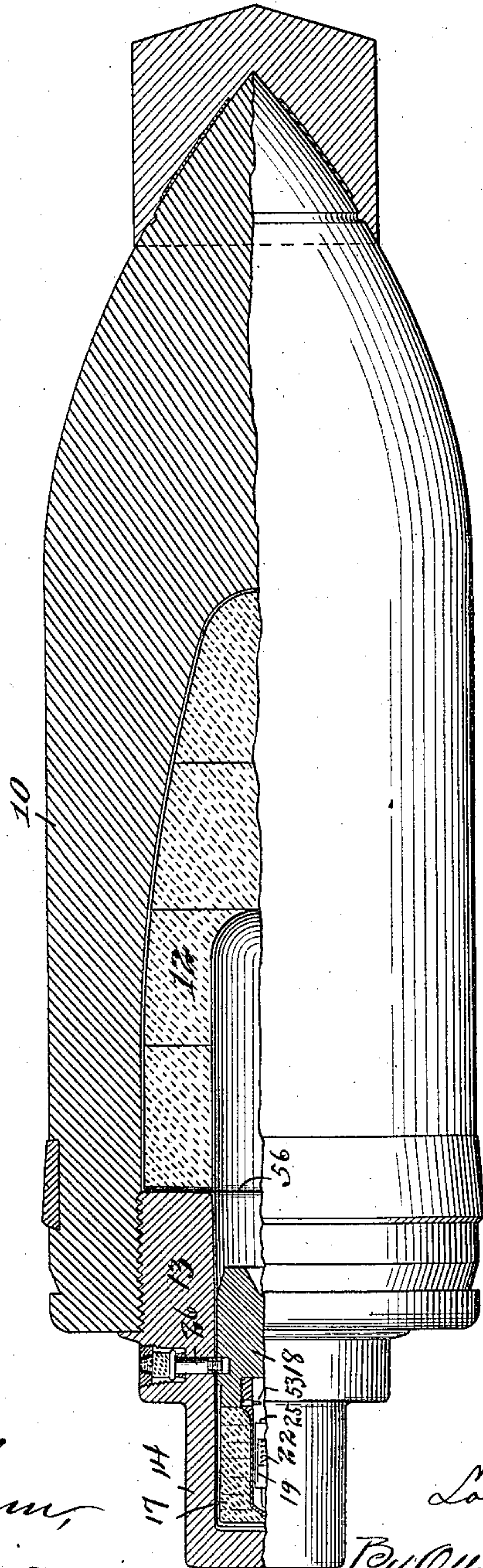
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Fig. 5.



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UNITED STATES PATENT OFFICE.

LOUIS GATHMANN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GATHMANN
TORPEDO GUN COMPANY, OF SAME PLACE.

SHELL FOR HIGH EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 672,827, dated April 23, 1901.

Application filed November 25, 1898. Serial No. 697,364. (No model.)

To all whom it may concern:

Be it known that I, LOUIS GATHMANN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Shells for High Explosives, of which the following is a specification.

This invention relates to shells for high explosives, and more particularly to safety-fuses therefor, and has for its object to provide a construction whereby the fuse, which comprises the priming charge and detonator, shall be positively held separated from the bursting charge within the shell proper before firing the gun, and shall be similarly held by the pressure of the gases caused on firing the gun until after the discharge of the shell from the gun.

To these ends my invention consists in certain novel features which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is an enlarged detail view in half-section of a shell and fuse embodying my invention in one form. Fig. 2 is a transverse sectional view of the same, taken on the line 2-2 of Fig. 1. Fig. 3 is a view illustrating a modified construction. Fig. 4 is a detail view of a portion of Fig. 3, and Fig. 5 is a longitudinal sectional view illustrating my improvements as applied to an armor-piercing shell.

Referring first to the particular construction shown in Figs. 1 and 2, 10 indicates the body of the shell the interior of which contains, inclosed within a suitable thin casing 11, a bursting charge 12, preferably of wet or paraffined guncotton. The shell is provided with a breech-plug 13, which is preferably so constructed as to fit the base of the ordinary regulation shell, being threaded to screw into place and serving to carry the fuse, which is inclosed in a separate shell or cup-like stock 14, which screws into the breech-plug 13 in the manner shown in Fig. 1 of the drawings. This separate shell or stock contains a fuse-chamber 15. The fuse comprises a thin metallic case 16, inclosing a detonating charge 17 of dry guncotton. The separating-partition (indicated as a whole by the reference-numeral 18) comprises a body portion 18^a, which is annular in shape and pro-

vided with a centrally-threaded opening, and a threaded plug portion 18^b, which screws into said opening and completes the partition. It will be noted that the partition is of considerable thickness, extending some distance longitudinally of the shell. The forward portion of the fuse-chamber is enlarged to receive the partition 18, the rear end of which is reduced, so as to extend into the smaller portion of the fuse-chamber or fuse-chamber proper, there being thus formed a shoulder 14^a in the fuse-chamber, against which abuts a similar shoulder 18^c on the partition.

19 indicates the detonator-stock, which as a matter of convenience is formed in one piece with the plug 18^b and which is closed at its free end by a screw-plug 20, said stock having a thinned or reduced wall 21, adapted to be ruptured by the explosion of the charge of the detonator. This latter consists of a charge of fulminate 22, carried by a plunger 23, mounted in the stock 19 and retained in position by a break-pin 24 and adapted to be exploded by the contact of the forward end of the plunger with the rear end of the plug 18^b, the forward end of the plunger being shod with a percussion-cap 25 for this purpose. The separating-partition 18 is held against longitudinal movement by means of pins 26, which are mounted to move radially in apertures in the shell or stock 14 and which when in their innermost positions engage apertures or a groove 27 in the partition 18. The heads of these pins are provided with packing-rings 28 to prevent ingress of the gases of the exploding charge to the dry guncotton of the priming charge, and the pins themselves are held in place in engagement with the partition by means of blocks or studs 29, of compressed powder or other combustible substance, which are pressed or held against the heads of the pins by any suitable means, such as screw-plugs 30, having a central aperture 31, which permits the flame generated by the explosion of the powder constituting the expelling charge to have access to said blocks or studs of compressed powder.

The breech-plug 13 has a central aperture of a diameter slightly greater than that of the partition 18, and there is secured on the inner side of said breech-plug a detonating-

stock 32, which screws into the breech-plug 13 and which consists of a cylindrical body having a reduced wall 33, adapted to be ruptured by the explosion of the priming charge, 5 and a screw-plug 34, closing the inner end of said stock, and thus forming a detonating-chamber 35 of a diameter equal to that of the partition 18.

Under normal conditions the partition 18, 10 which is of great thickness, intervenes between the priming charge and bursting charge, being held in position by the pins 26, so that any accidental explosion of the priming charge within the fuse will be prevented 15 from having such access to the wet guncotton in the body of the shell as will explode this latter, so that such explosion, while it may destroy the walls of the fuse-chamber, will not explode the bursting charge of the 20 shell. When the shell is being discharged from the gun, however, the flames of the expelling charge will have access through the apertures 31 to the powder-studs 29, and these latter will burn out, so that the locking-pins 25 26 will be free to move radially outward under the influence of the centrifugal force generated by the whirling of the shell after the shell has passed from the gun. It will be observed, however, that while the shell still remains in the gun during its flight the pressure of the gases produced by the firing charge employed in expelling the shell is exerted upon the outer heads of the locking-pins 26, and these latter are therefore firmly held in engage- 35 ment with the partition 18 and preclude its longitudinal movement until the shell has passed clear of the gun and the pressure has been removed from the outer or exposed heads of the locking-pins. After the shell has passed clear 40 of the gun the pins 26 are free to move radially outward under the influence of the centrifugal force generated by the whirling of the shell, and the partition 18 is thereby freed, along with the fuse, and will move forward 45 into the detonating-chamber, with the fuse in close proximity to the bursting charge of the shell. It should be noted that upon the discharge of the shell from the gun the break-pin 24 is broken by the setting back of the plunger 23, owing to the inertia of this latter. Upon 50 impact the said plunger will move forward, and by the contact of its cap 25 with the partition 18 will explode its charge of fulminate, whereupon the priming charge 17 of the fuse 55 will be exploded, and this in turn will explode the bursting charge 12 of the shell.

The longitudinally-movable partition which I have devised is advantageous not only for the reason that it renders it practicable to employ a partition of great thickness, but also 60 because there is not that liability of partial movement only which might exist where a laterally-moving partition is used, which partial movement would of course prevent the priming charge of the fuse from being brought into juxtaposition to the bursting charge of the 65 shell. Moreover, the strength of the base of

the shell is increased by reason of the absence of the lateral recesses, which are necessary when laterally-moving partitions are employed. I also deem it advantageous to so connect the partition and fuse that in practice they form a single body and move in unison, although such a construction is of course not an essential feature of my invention. 75

While I deem the combustible blocks or studs a desirable and efficient means for holding the locking-pins in position prior to the discharge of the gun, I do not wish to be understood as limiting myself to this particular 80 means, as other means may be employed, and in Fig. 3 of the drawings I have shown a modified construction. In this case each locking-pin 26 is provided with an aperture or passage 48, extending transversely of said pin, said 85 aperture or passage registering with a similar aperture or passage 49, formed in a sleeve 50, which is threaded or otherwise inserted and secured in the shoulder 14^a of the fuse chamber or stock 14. 51 indicates a pin which is 90 adapted to move longitudinally in the passages 48 and 49 and which is of less length than the passage 48. This pin is held in position in the sleeve 50 by means of a break-pin 52 in such a manner that it projects beyond the 95 sleeve 50 and into the aperture 48 in the pin 26. The action of this mechanism is as follows: Upon the discharge of the gun the pressure of the gases will force the pins 51 forward into the apertures 48, breaking the pins 52. 100 The pins 51, being shorter than the apertures 48, do not project beyond said apertures, and the pins 26 are therefore free to move outward, except for the pressure of the gases of the gun upon their heads, said pressure retaining them in position until the shell has passed from the gun, when they move outward by centrifugal force and release the separating-partition. In this construction I have 110 shown the separating-partition 18 as formed in a single piece instead of in two pieces, as shown in Figs. 1 and 2, and the shoulder 14^a of the previously-described construction is dispensed with. The case 16 is of a diameter equal to that of the partition 18, and the detonator-stock 19 screws directly into the rear end of said partition. A break-pin 53 in front and in the path of the plunger 23 serves to prevent contact of the cap 25 thereof with the partition 18 until impact of the shell, 120 while a soft-metal pin 54 at the rear end of said plunger takes up the shock of firing. I have also shown in this figure a construction wherein the locking-pins 26 are provided with segmental shoes 55, which fit within the 125 groove 27 of the partition and serve to more effectually lock the same, this feature being shown in detail in Fig. 4 of the drawings.

In Fig. 5 of the drawings I have shown my invention as applied to an armor-piercing 130 shell, in which construction the breech-plug 13 and stock 14 are made in a single piece. Between the breech-plug and the bursting charge 12 is placed a diaphragm 56 of thin

metal, by means of which, owing to its resistance to the forward movement of the fuse, the shell is made a delayed-action shell. The remaining features of construction shown in this figure will be readily understood from what precedes without particular description.

The several features hereinbefore described may be combined in various ways, and some of them, although desirable, may be omitted or modified without departing from the principle of my invention, and I therefore do not wish to be understood as limiting myself strictly to the precise details of construction hereinbefore described and shown in the drawings.

I claim—

1. A high-explosive shell comprising separate chambers for the bursting and detonating charges, a longitudinally-movable partition normally separating said chambers, and locking devices for said partition exposed to and adapted to be retained in position by the pressure of the gases of the firing charge of the gun, substantially as described.
2. A high-explosive shell provided with a main chamber containing a bursting charge, a separate or isolated chamber containing the priming or detonating charge located rearward thereof, a longitudinally-movable partition separating said chambers when in normal position and adapted when free to be moved during the flight of the shell to open communication between them, locking devices for holding said partition in its normal position, retaining devices for holding said locking devices in their normal position, said retaining devices being adapted to release the locking devices upon the discharge of the gun, and said locking devices being exposed to and retained in position by the pressure of the gases in the gun until discharged therefrom and being adapted to release the movable partition when so discharged, substantially as described.
3. A high-explosive shell comprising sepa-

rate chambers for the bursting charge and priming or detonating charge, a longitudinally-movable partition normally separating said chambers, locking-pins normally engaging said partition, and combustible blocks or studs arranged to hold said locking-pins in their normal position and exposed to the gases of the firing charge, substantially as described.

4. A high-explosive shell provided with a main chamber containing a bursting charge, a separate or isolated chamber containing a priming or detonating charge located rearward of the main chamber, a partition normally separating said chambers and adapted when released to slide freely longitudinally of the shell, and means for locking said partition in its normal or closed position until the discharge of the shell from the gun, substantially as described.

5. The combination, with a shell having a fuseway therein, of a separable fuse-stock adapted to be connected thereto, a partition and detonating devices longitudinally movable in said fuseway and stock when free, and locking-pins extending from the exterior to the interior of said fuse-stock, engaging the partition and adapted to be released by the discharge of the shell from the gun, substantially as described.

6. A fuse for high-explosive shells, comprising a stock adapted to be attached to the base of the shell, a sliding block or partition closing the front end of said stock, a priming or detonating charge within the stock, radial locking-pins extending from the exterior of the stock into engagement with the block or partition, and retaining devices for said locking-pins adapted to be released upon the discharge of the gun, substantially as described.

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