(No Model.)

H. P. MERRIAM.

SHELL FOR HIGH EXPLOSIVES.

No. 444,537. Patented Jan. 13, 1891.

Fig. 1.

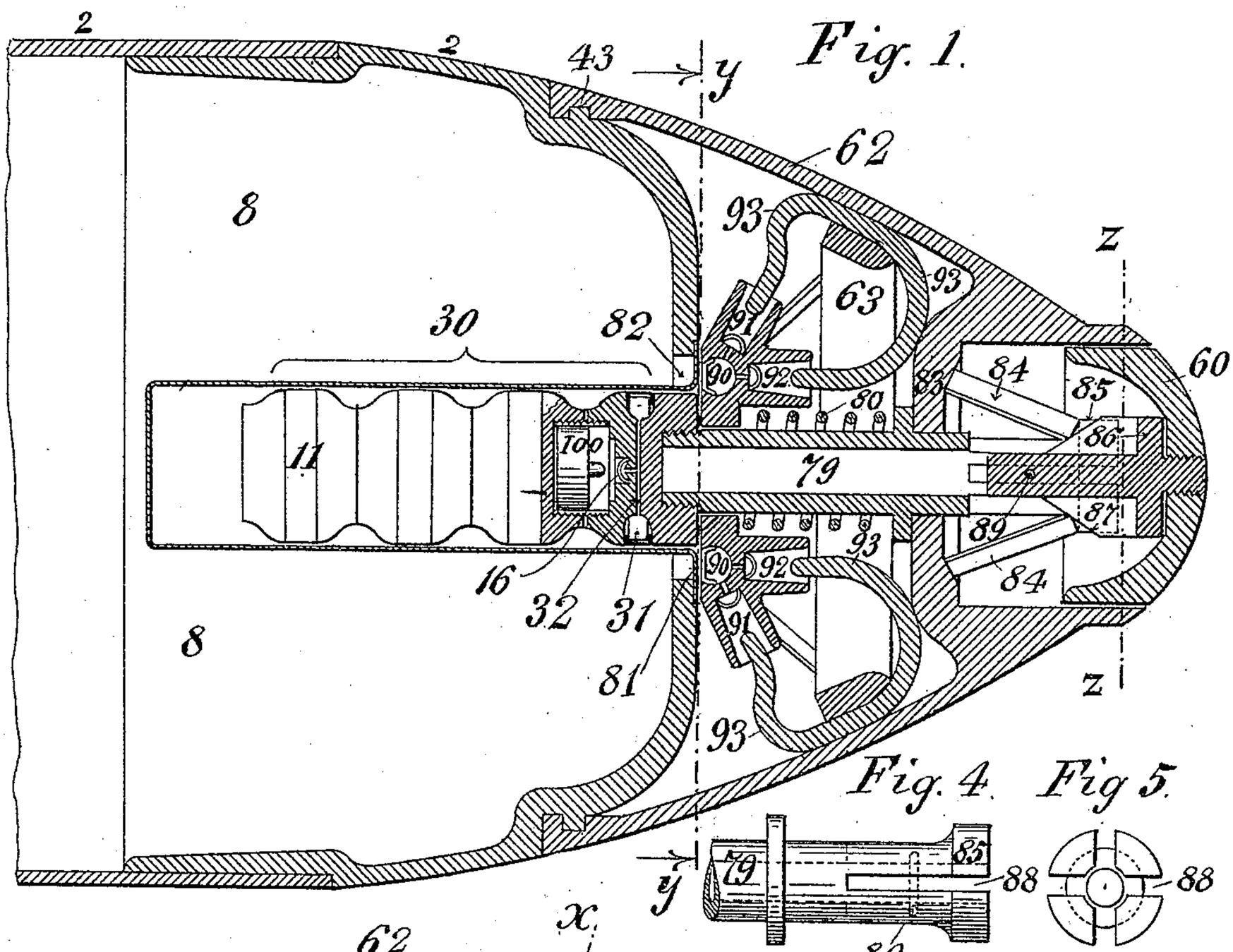


Fig. 4.

Fig 5.

Fig. 2.

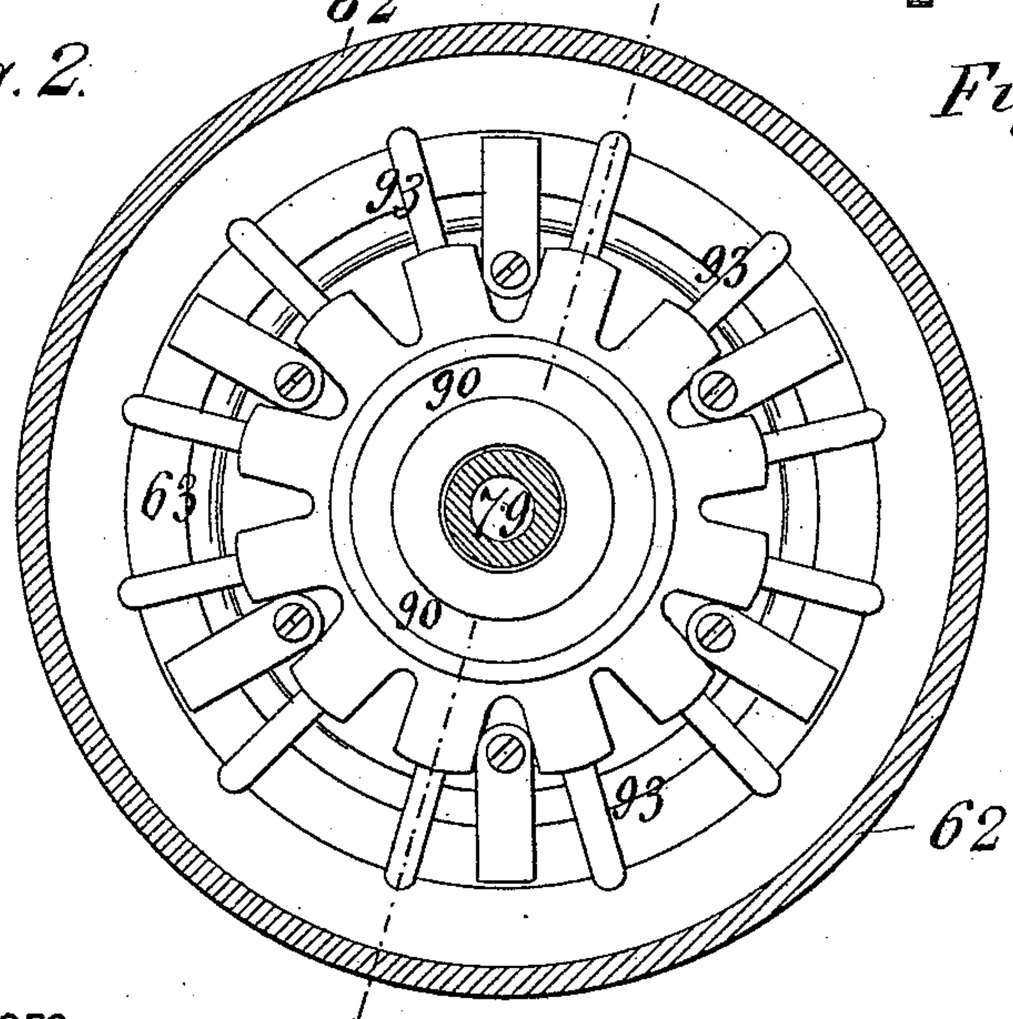


Fig. 6.

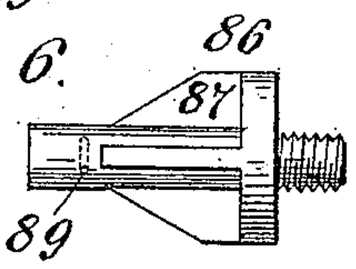
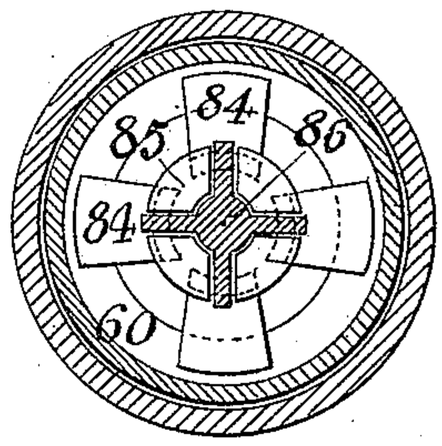


Fig. 3



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UNITED STATES PATENT OFFICE.

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SHELL FOR HIGH EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 444,537, dated January 13, 1891.

Application filed April 19, 1890. Serial No. 348,718. (No model.)

To all whom it may concern:

Be it known that I, HENRY P. MERRIAM, a citizen of the United States, residing at the city, county, and State of New York, have invented certain new and useful Improvements in Shells for High Explosives, of which the following is a specification.

The purpose of my present invention is similar to that with reference to the invention described in my separate patent application, filed September 23, 1889, No. 324,719.

My invention herein consists in a novel construction of the instant-action detonator, whereby the same may be actuated by collapse of any portion of the collapsible shell-head within which it is located, being annular in form, the percussion-caps thereof facing all sides of the interior of the head, which head is provided with exploding-arms converging toward and facing the caps.

My invention also includes certain other novel details of construction; and in order to enable others skilled in the art to understand and use the same I will proceed to describe the mechanism embodying my invention and to point out in the appended claims its novel characteristics.

Referring to the accompanying drawings, in which similar reference-numerals indicate corresponding parts throughout the several views, Figure 1 is a sectional elevation of the head of the shell, showing the annular arrangement of the percussion-caps of the detonator, the same radiating toward various portions of the collapsible head, being in section on the line *x x*, Fig. 2; Fig. 2, a cross-section of Fig. 1 on the line *y y*, looking forward; Fig. 3, a cross-section on the line *z z*, looking rearward; and Figs. 4, 5, and 6, detail views pertaining to Fig. 1.

The instantaneous-action detonator 90 is annular in form, facing the shell charge in the chamber 8. The delay-action detonators 31, capable of adjustable time-action according to the proportion of slow-burning composition in the channels 32, are placed in a series of cases 11, arranged tandem in the case 30, projecting within the shell charge adjacent the head of the shell. The delay-action detonators are exploded by hammers 100 when the cases 11 are driven back, and these cases are connected to and operated by the depressible apex 60 through the shaft 79. The head 62 is removable from the shell 2 by means of the separable joint 43, and the detonators 11 are removable with it, being separated from the shell charge by the aforesaid enveloping tube 30 closed at its inner end. The tube 30 is constructed of thin sheet metal or other substance, and is flanged at 81 to seat about the aperture 82 of the shell proper, which is of a diameter larger than the diameter of said tube. The hollow spindle 79 is shouldered to abut against the partition 83 and prevent forward movement of the same and of the structures connected therewith. The rearward or compression movement of the apex 60, spindle 79, and the fuses 11 is prevented by means of the stays 84, made in independent pieces, which are adjusted between the inclined surfaces therefor on the front of the partition 83 and the shoulder 85 on the spindle 79. To the apex 60 is attached the disengaging piece 86, having wedge-faced webs or wings 87, which slide into the radial grooves 88 of the spindle 79 and extended beyond the edge of the shoulder 85. The piece 86 is attached to the spindle 79 by the pin 89, which is sheared off by a violent compression of the apex 60, permitting the engagement of the wedge-shaped wings 87 with the stays 84, tripping the latter out from the shoulders 85, the solid portion of the piece 86 then abutting against the end of the spindle 79, detonating the fuses 30. The spring 80 is designed as a precautionary device to prevent the accidental compression of the apex should the pin 89 become broken or the stays 84 displaced. The instant-action annular fuse 90 is located opposite the thin flange of the tube 30, which incloses the aperture 82 when the head 62 is removed, said flange being easily capable of rupture, permitting the detonator to take full effect upon the shell charge. The percussion-caps 91 92 are circularly ranged about in any desired number, projecting in radiating directions, as seen in Fig. 2. The collapsible head 62 is provided with an interior collapsible ring 63, which becomes distorted by the collapse of any portion of the said head. To the ring 63 are fixed the exploders 93, consisting of forked arms, which, as viewed in end elevation, converge radially toward the caps, and the curved form given to said arms is

such as to adapt them to approach the caps by either a side compression of the head 62 or a direct longitudinal collapse thereof, hence insuring the discharge of at least one or a part of the number of caps exposed.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an explosive shell, the combination of a collapsible head, a detonator, percussion-caps thereof variously disposed in directions facing the interior of the collapsible head, and exploding-arms secured to the interior of the head converging toward and facing the caps.

2. The combination of the annular detonator adjacent the shell charge, the collapsible head, percussion-caps of the detonator radially disposed toward the head, and exploding-arms secured to the interior of the head converging toward and facing the caps.

3. The combination, with the collapsible head, the detonator, and the percussion-caps variously disposed toward the head, of the compressible ring and the converging exploding-arms secured thereby within the interior of the head and facing the caps.

4. The combination, with an explosive shell, of a collapsible head, an annular detonator therein adjacent the shell charge, radially-disposed caps of the detonator and converging exploding-arms attached to the head, a second detonator adjacent the shell charge explosive by a rearward thrust, a shaft thereof extending through the annular detonator, and a depressible shell apex attached to the shaft.

5. The combination, with the longitudinally-movable detonator-shaft 79, the depressible apex 60, and socket thereof, of the movable supporting-stays 84, bearing between the bottom of said socket and the shoulders 85 of the shaft, and the wedge 87 on the back of the apex, normally sustained in front of the said shoulders for tripping the stays when driven back.

HENRY P. MERRIAM.

Witnesses:
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CHAS. W. FORBES.