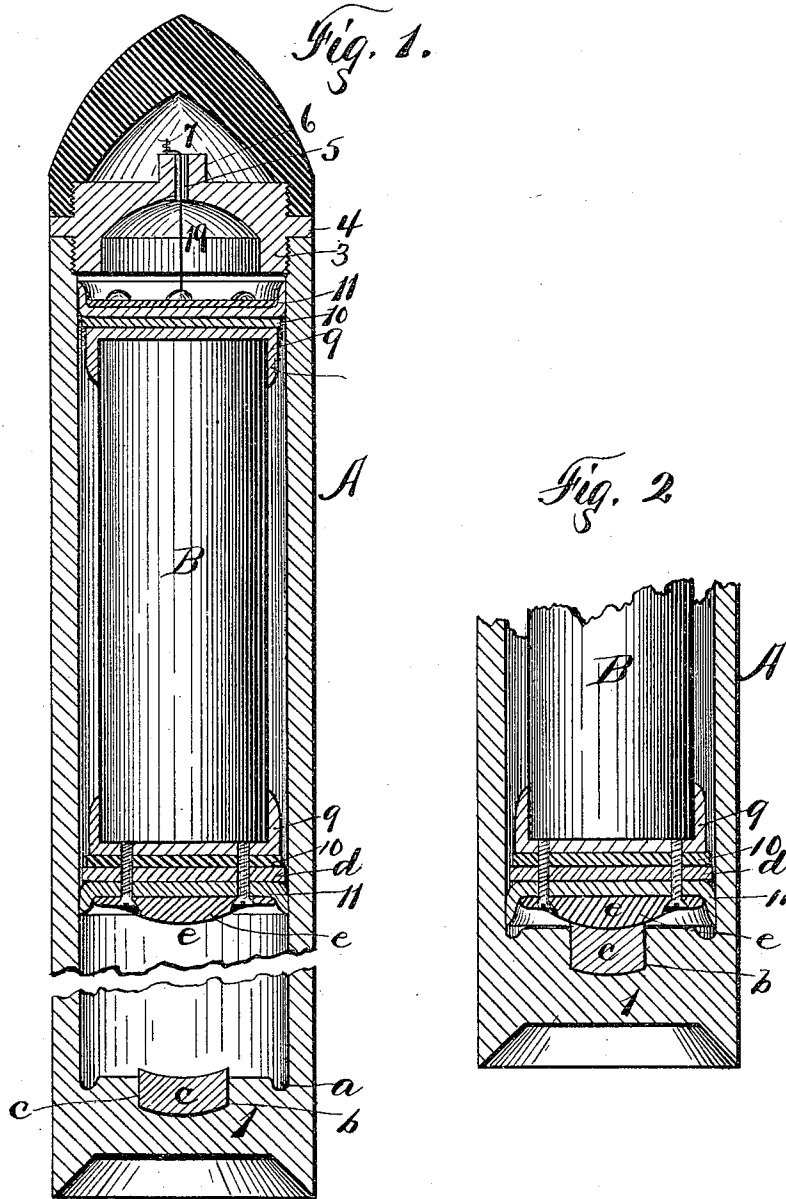


(No Model.)

J. G. JUSTIN.
SHELL FOR HIGH EXPLOSIVES.

No. 467,334.

Patented Jan. 19, 1892.



Witnesses
E. V. MacC.
H. A. Carhart.

Joel G. Justin

Inventor

By his Attorneys
Smith & Denison

UNITED STATES PATENT OFFICE.

JOEL G. JUSTIN, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE JUSTIN PROJECTILE COMPANY, OF JERSEY CITY, NEW JERSEY.

SHELL FOR HIGH EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 467,334, dated January 19, 1892.

Application filed January 7, 1891. Serial No. 376,959. (No model.)

To all whom it may concern:

Be it known that I, JOEL G. JUSTIN, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful
5 Improvements in Shells for High Explosives, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to the construction of
10 shells carrying high explosives which are to be fired from cannon or fire-arms.

My object is to more perfectly protect the explosives to avoid premature explosion, and especially to provide means by which to re-
15 tard and possibly entirely avoid the transmission of the angular rotation of the outer casing to the cylindrical explosive-carrier within said casing, so that the casing will rotate freely around the carrier upon a pivotal
20 bearing between the rear end of the carrier and the casing, the parts forming the pivot being either normally out of contact (or in full engagement) but engaging with each other when the shell is fired and then forming the
25 pivot, or when in full contact the pivot is formed before the firing.

It is also another object of this invention to reinforce the base or rear end of the explosive-carrier, so as to protect it from in-
30 ward compression and collapsing by the sudden impact of the air-cushion behind it or the direct push of the breech-block, and, further, to protect the flanged disks, which prevent the metallic contact of the casing and carrier, and
35 support the carrier therein.

My invention consists in the several novel features of construction and operation here-
40 inafter described, and which are specifically set forth in the claims hereunto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal and transversely-diametrical sectional elevation of the shell, showing the explosive-carrier in its normal
45 position in the front of the casing. Fig. 2 is a like view showing the carrier in pivotal connection with the casing, as when the shell is fired and the casing travels forward upon and
50 over the explosive-carrier.

A is the casing or body of the shell of tubular form and having a rear end or breech-

piece 1, provided with a circular groove *a*, adjacent to the inner wall of the casing, and a central gravity or recess *b*, adapted to receive and hold a bearing-block *c*. (Shown in the
55 drawings as having a concave outer face.) This block is preferably of different material than the casing or breech-piece, either of anti-friction metal or of wood, inasmuch as it forms a part of the pivotal bearing, as here-
60 inafter described. The front end of the body is closed by the screw-plug 3, having a peripheral flange 4, with a central opening 5 opening out through a stud 6, upon which I
65 erect a pin 7. The head or point of the shell screws or is otherwise secured upon this plug, as shown. This construction at the front end of the shell is not shown, as the same is shown
70 and described in the patent heretofore granted to me for shell for high explosives, dated April 1, 1890, No. 424,482, as illustrating a manner of construction; but I do not limit myself thereto.

Within the casing I place a cylinder B, closed at the ends by caps 9, upon each of
75 which I place an elastic washer 10, which may be dispensed with in case I do not consider a cushion necessary at that point. Upon this washer, at the breech, I place a circular metallic plate *d*, of such size as to nearly fit the
80 bore of the casing or at least to project substantially as far as the washer 10, and upon this plate I place the flanged disk 11, of leather or other material, of rather stiff but slightly
85 elastic texture of greater diameter than the cap, and fitting the bore of the casing, as shown. Outside of this disk 11 I place the
90 pivot-plate *e*, of substantially the same size as the head of the cap, and secure it and the washer, the plate *d*, and the washer to the cap, substantially as shown. The central portion of
95 this pivot-plate is made convex on substantially the same radius as the concavity in the block *c*, so that it will properly fit such concavity, so that this convexity forms the pivot, while
100 the concavity is the bearing therefor. I do not limit myself to this precise form, as shown, as this is only one of the many forms which can be used to produce a central pivotal bearing for the explosive-carrier upon the center
of the breech of the casing.

It is a fact, demonstrated by my experi-

ments and by actual tests, that when the wire 19 is broken, as fully described in my afore-
 said patent, the casing will travel forward
 upon the carrier until the pivot of said car-
 5 rier will seat itself in its seat in the breech of
 the casing, as shown in Fig. 2, and will be
 guided to its seat by the flanged disks either
 alone or in conjunction with the washer and
 metallic plate *d*.
 10 The rifling of the cannon imparts a very
 rapid twist or spirally-angular rotation to
 shell. My invention consists in confining
 this rotation to the casing as long as possible
 and preventing its frictional transmission to
 15 the carrier. If such rotation was at once
 transmitted to the carrier, it would create a
 dangerous friction of the stick or particles of
 the explosive against each other and against
 the inclosing walls. By the use of this cen-
 20 tral pivotal bearing the casing will spin upon
 the pivot for a long time, and will fairly polish
 said pivot before such rotation frictionally
 overcomes the inertia of the explosive carrier;
 also, the central thickening of the pivot-plate
 25 operates to reinforce the base of the carrier
 against the sudden impact of the air-cushion
 behind it, and either alone or in conjunction
 with the plate *d* will prevent the collapsing
 and inward compression of said base, it be-
 30 ing a fact that such a collapse will take place
 without such reinforcement to cause a pre-
 mature explosion of the explosive. The front
 end of the carrier is not provided with any
 plate *d* or with any reinforcement, for the rea-
 35 son that I preferably leave it weak and sub-
 ject to collapse. When the shell strikes the
 object or target, the momentum of the carrier
 carries it to the front of the casing, and the
 then collapsing of the front end operates substan-
 40 tially as a detonator in producing the explo-
 sion of the explosive. Furthermore, the for-
 ward travel of the carrier being impeded by
 the air-cushion permits the point of the shell
 to penetrate deeply into the target before the
 45 explosion of the explosive, greatly increasing
 the effect by the delaying of such explosion.
 The groove in the breech of the casing re-
 ceives the flange of the disk and prevents its
 being doubled up out of shape or torn off by
 50 rotation; also, the use of the plate *d* oper-
 ates to protect the disk and prevent the
 flanges from being torn off by the rotation of
 the casing, which is important because it is
 essential to prevent all metallic contact of

the casing with the carrier, and, primarily, 55
 these flanges are the preventives of such con-
 tact. The flanged disks also afford lateral
 support to the carrier during the rotation of
 the casing, as well as at all other times, and
 steady it upon the pivot. 60

What I claim as my invention, and desire
 to secure by Letters Patent, is--

1. A shell consisting of the casing provided
 with a concave seat in its breech, in combi-
 nation with the explosive-carrier within said 65
 casing, provided with a base having a central
 pivot to rest upon said seat.

2. In a shell, the casing provided with a
 concave seat in its breech, in combination
 with the explosive-carrier within said casing, 70
 provided with a base having a central pivot
 adapted to engage with said seat, and the
 flanged disks upon and supporting the car-
 rier in the casing.

3. In a shell, the casing provided with a 75
 groove in its breech, in combination with the
 explosive-carrier and the flanged disk upon
 the rear end of said carrier.

4. In a shell, the casing provided with a
 groove in its breech and a concave seat within 80
 said groove, in combination with the explo-
 sive-carrier provided with a base having a
 central pivot and the flanged disks upon and
 supporting the carrier in the casing.

5. In a shell, the combination, with the cas- 85
 ing provided with a groove in its breech and
 a pivot-seat within the groove, of the explo-
 sive-carrier having a central pivot adapted to
 fit into said seat and a flanged disk adapted
 to enter said groove, and the metallic plate 90
 under the disk of larger diameter than the
 carrier, and means to secure the pivot, disk,
 and plate to the carrier.

6. An explosive-carrier and an outer cas- 95
 ing inclosing it and laterally separated there-
 from, both being constructed, combined, and
 adapted when the shell is fired to change
 their relative positions and to retain their new
 relations, said parts having then a pivotal
 bearing between them until the flight of the 100
 shell is arrested, substantially as specified.

In witness whereof I have hereunto set my
 hand on this 23d day of September, 1890.

JOEL G. JUSTIN.

In presence of—
 C. W. SMITH,
 H. P. DENISON.