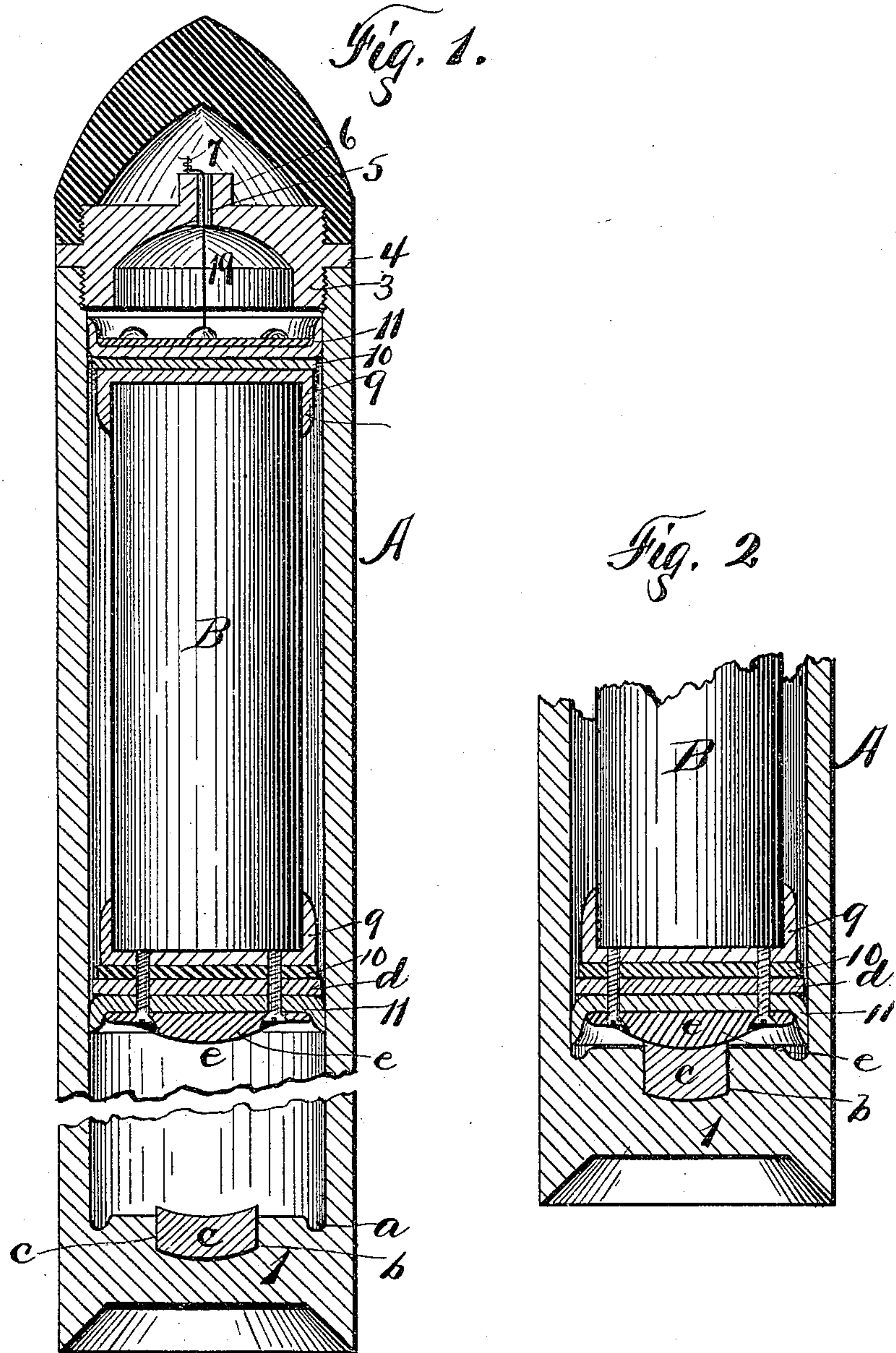


(No Model.)

J. G. JUSTIN.  
SHELL FOR HIGH EXPLOSIVES.

No. 467,334.

Patented Jan. 19, 1892.



Witnesses  
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By his Attorney  
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# 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 retard 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  
15 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  
20 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 inward 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  
25 support the carrier therein.

My invention consists in the several novel features of construction and operation hereinafter described, and which are specifically set forth in the claims hereunto annexed. It  
30 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  
35 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 over the explosive-carrier.

50 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 hereinafter described. The front end of the body  
60 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 erect a pin 7. The head or point of the shell  
65 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 and described in the patent heretofore granted to me for shell for high explosives, dated April  
70 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 elastic texture of greater diameter than the  
85 cap, and fitting the bore of the casing, as shown. Outside of this disk 11 I place the 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,  
90 substantially as shown. The central portion of 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  
95 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  
100 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 aforesaid patent, the casing will travel forward upon the carrier until the pivot of said carrier 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 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 central 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 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 being a fact that such a collapse will take place without such reinforcement to cause a premature explosion of the explosive. The front end of the carrier is not provided with any plate *d* or with any reinforcement, for the reason that I preferably leave it weak and subject 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 substantially as a detonator in producing the explosion of the explosive. Furthermore, the forward travel of the carrier being impeded by the air-cushion permits the point of the shell to penetrate deeply into the target before the explosion of the explosive, greatly increasing the effect by the delaying of such explosion. The groove in the breech of the casing receives the flange of the disk and prevents its being doubled up out of shape or torn off by rotation; also, the use of the plate *d* operates 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, these flanges are the preventives of such contact. 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.

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 combination with the explosive-carrier within said 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, provided with a base having a central pivot adapted to engage with said seat, and the flanged disks upon and supporting the carrier in the casing.

3. In a shell, the casing provided with a 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 said groove, in combination with the explosive-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 casing provided with a groove in its breech and a pivot-seat within the groove, of the explosive-carrier having a central pivot adapted to fit into said seat and a flanged disk adapted to enter said groove, and the metallic plate 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 casing inclosing it and laterally separated therefrom, 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 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.