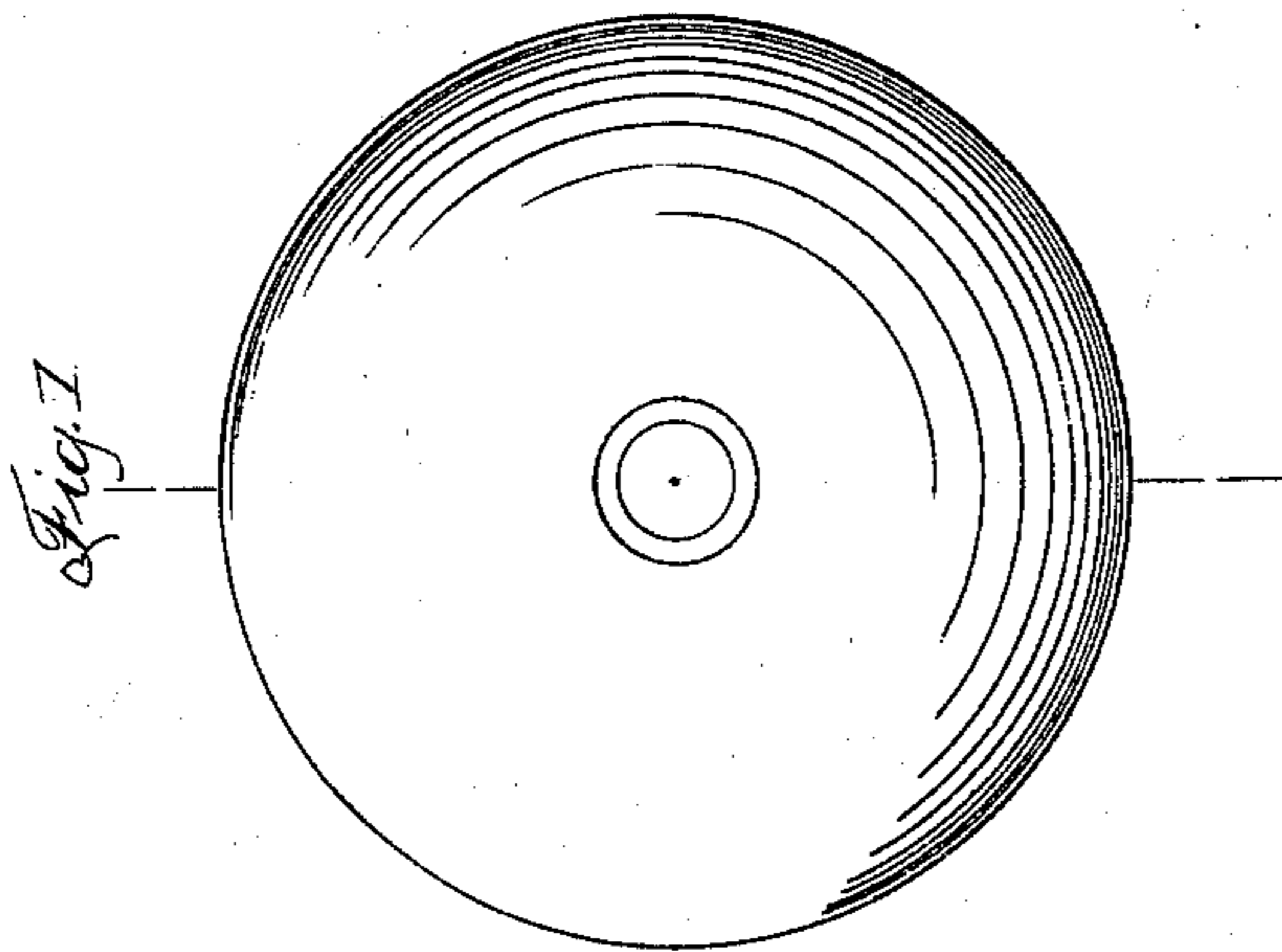
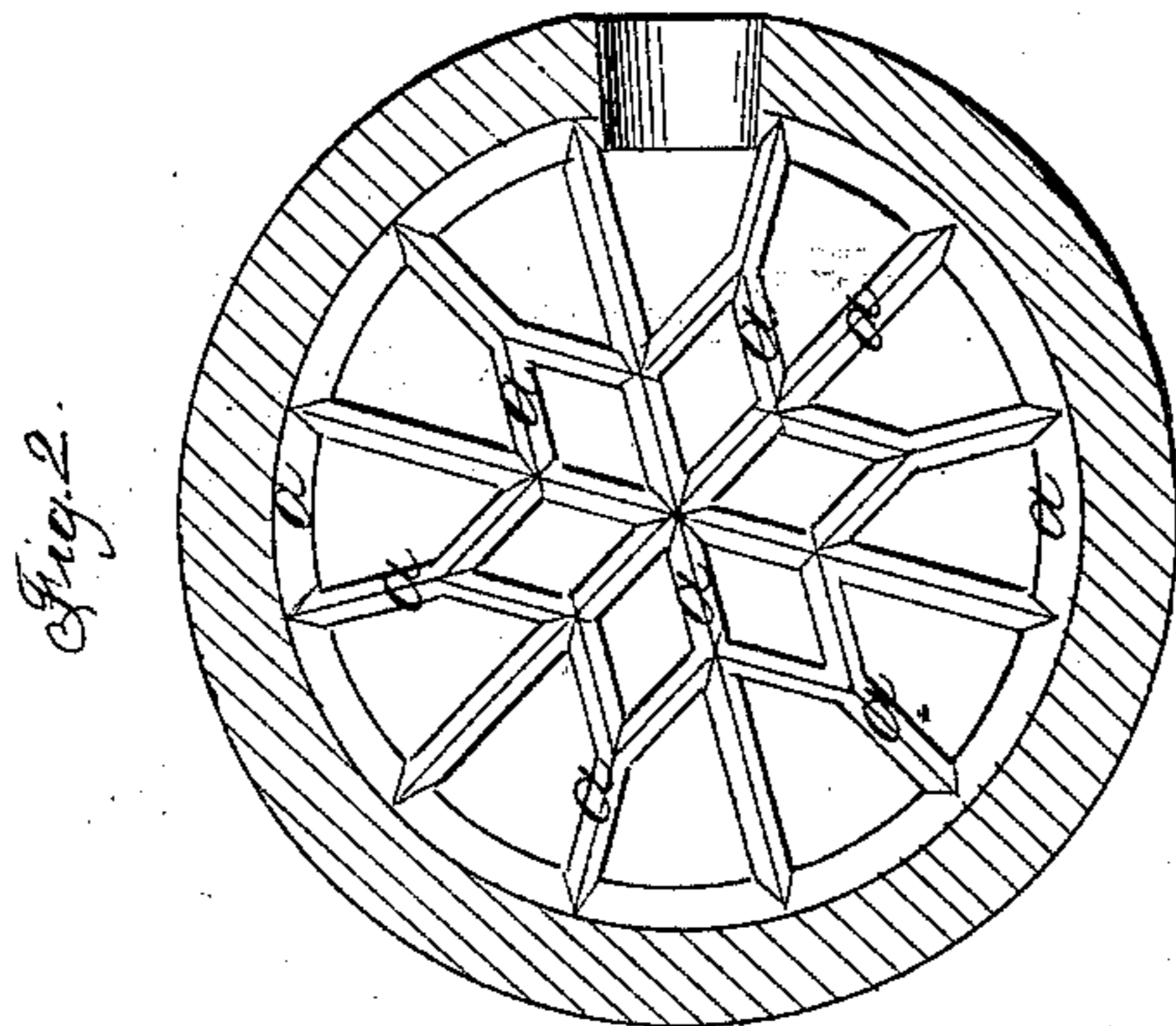


M. S. WICKERSHAM.

Shell.

No 34,798.

Patented Mar. 25, 1862.



*Witnesses*  
*J. W. Coombs*  
*J. W. Reed*

*Inventor*  
*M. S. Wickersham*  
*per Munn & Co*  
*Attorneys*

# UNITED STATES PATENT OFFICE.

M. S. WICKERSHAM, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN EXPLOSIVE SHELLS FOR ORDNANCE.

Specification forming part of Letters Patent No. 34,798, dated March 25, 1862.

*To all whom it may concern:*

Be it known that I, M. S. WICKERSHAM, of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Explosive Shells; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an outside view, and Fig. 2 a central section, of a spherical shell with my improvements.

My invention consists in the construction or manufacture of explosive shells with the interior surfaces grooved, furrowed, corrugated, or indented in various directions, for the purpose of causing their ruption at many points or in many lines, instead of at a few points or in few lines, as is the case with the shells heretofore made with the interior surface of regular form, and of thereby greatly increasing their destructiveness.

The invention is applicable to shells of all forms—spherical, spheroidal, conoidal, &c.—and I have only represented in the drawings the spherical form, because it serves as well as any other to illustrate the improvement.

The grooves, furrows, corrugations, or indentations in the interior surface may be of various forms; but the V-shaped grooves *a a* represented in Fig. 2 are perhaps the best calculated to insure fracture or ruption, which will take place in the bottoms of the grooves, where the shell is weaker than in any other parts.

I propose so to arrange the grooves, furrows,

corrugations, or indentations that they will intersect each other at many points, as in that way the shell can be made to break in the greatest number of pieces, and it is obvious that the greater the number of pieces into which it breaks the greater will be its destructiveness.

In this my invention it is in all shells essential that the thickness of the shell from the bottom of the indentations on its interior surface to the exterior surface shall be equal to that presented by the "United States Ordnance Manual," that thickness being found necessary in order to prevent the crushing of the shell by the explosion of the charge of the gun. I also wish to preserve as large an interior space as possible, so as to insure a more complete combination of the gases, and thus produce the greatest amount of explosive force.

The indentations must be exclusively on the interior surface of the shell, so as to prevent injury to the gun, and should indentations be made on the exterior surface, the end I desire would not be attained.

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

The construction or manufacture of explosive shells with their interior surfaces grooved, furrowed, corrugated, or otherwise indented, substantially as and for the purpose herein specified.

MORRIS S. WICKERSHAM.

Witnesses:

CHAS. O'NEILL,  
I. W. COOMBS.