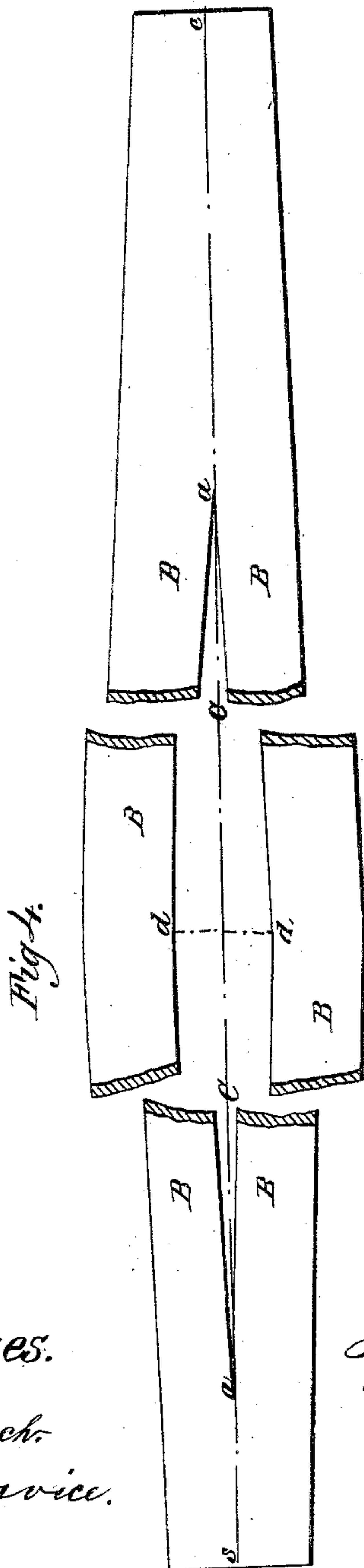


*Freeland & Ward,*

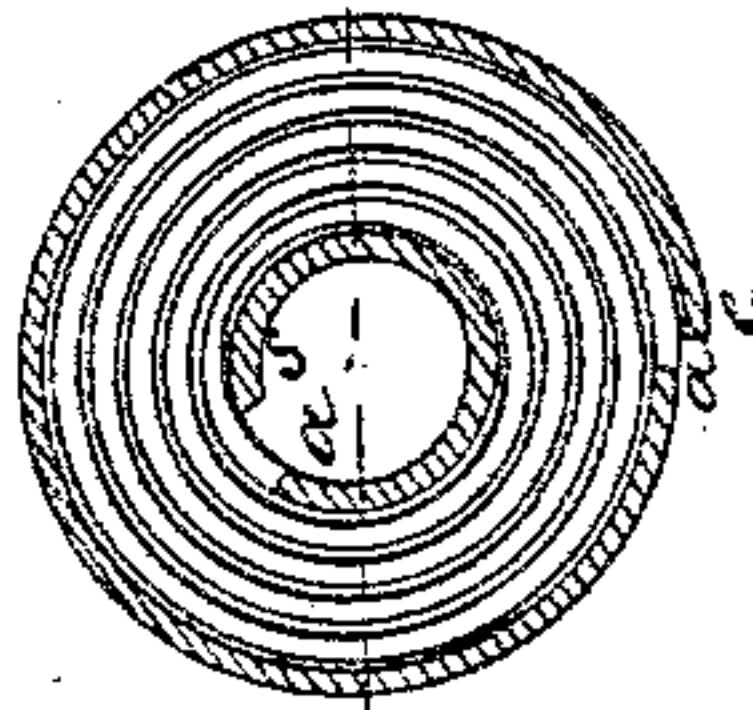
*Volute Spring,*

*N<sup>o</sup> 67,972.*

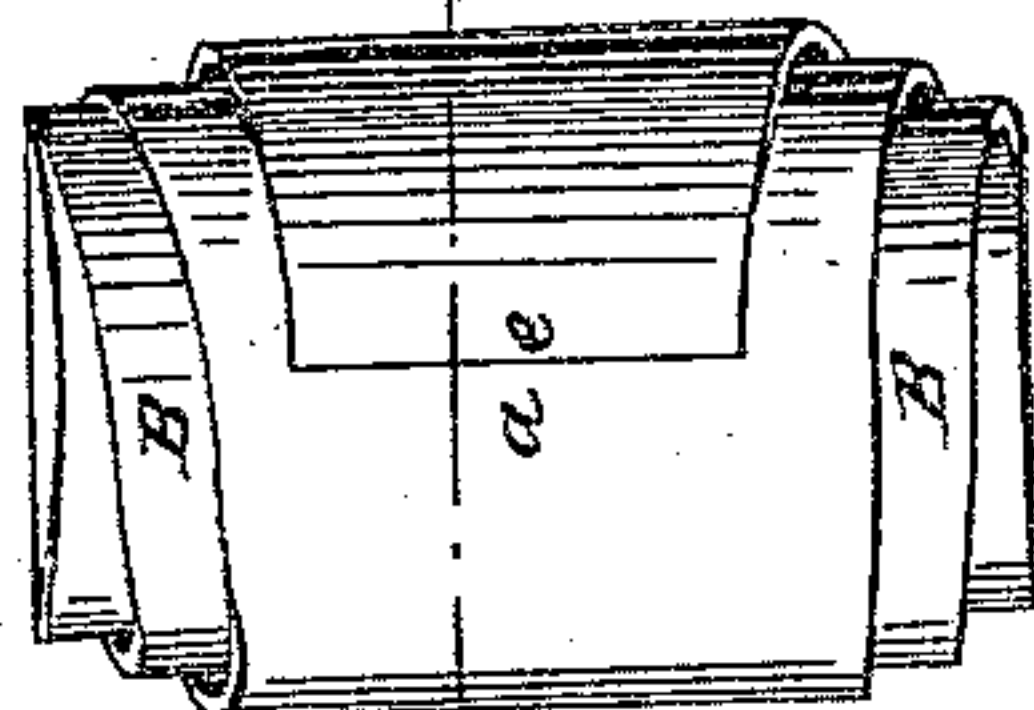
*Patented Aug. 20, 1867.*



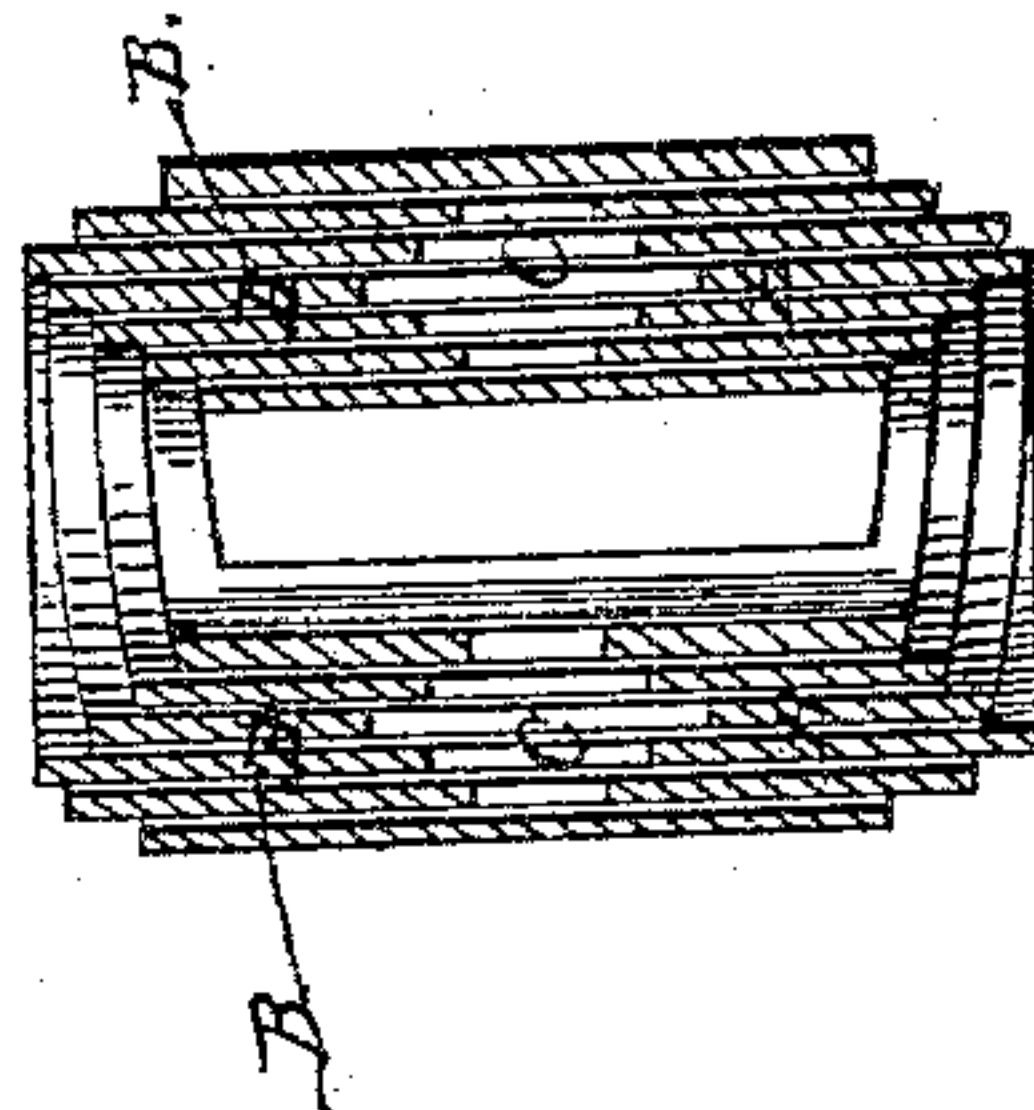
*Fig. 2*



*Fig. 1.*



*Fig. 3.*



*Witnesses.*

*Thos. Tusch.  
J. A. Service.*

*Inventors.  
John Freeland  
Daniel Ward  
Per *M. M. M.* Attorneys.*

# United States Patent Office.

JOHN FREELAND AND DANIEL WARD, OF NEW YORK, N. Y.

*Letters Patent No. 67,972, dated August 20, 1867.*

## IMPROVED VOLUTE SPRING.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that we, JOHN FREELAND and DANIEL WARD, of the city, county, and State of New York, have invented a new and useful improvement in Volute Springs; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of our compound volute spring.

Figure 2 is a central transverse section.

Figure 3 is a central longitudinal section.

Figure 4 is a top or plan view of a metal plate as cut and prepared for coiling to form our compound volute spring.

Similar letters of reference indicate like parts.

This invention relates to an improvement in the construction of volute springs for which Letters Patent were granted to us March 7, 1865.

The improvement consists in forming the spring of a metal plate or strip, which is cut or slit longitudinally nearly its whole length, but having both ends closed or uncut, instead of only one end closed, and the other open or divided by the slit and forked as the plate was cut and prepared for coiling according to the plan of our invention under the Letters Patent referred to.

Fig. 4 represents the metal plate, which is slit centrally and longitudinally between the points at *a a*, the two parts *B B* thus formed on each side of the slit being spread by suitable machinery to make the opening *C* between them widest at the central transverse line *d d*, and tapering to the points *a a*. The uncut or solid ends of the plate may be of equal length from the points *a a* at the termini of the slit or opening *C*, but we prefer to make one end, from *a* to *e*, longer than the other end from *a* to *s*, which longer end shall form the outside of the coil of the spring. By this arrangement the slit *C* may be covered with the outside solid end, and the action of the spring be equally effective with the shorter end inside. The metal plate thus cut and prepared is coiled or rolled upon a mandrel in the usual manner, and if it be made of steel it is properly heated for the purpose. After coiling the spring the ends are ground flat to give it a better seat when in position for use as a bearer.

This improved mode of forming our volute springs secures greater strength and durability, with equal elasticity and a much neater external appearance than those constructed under our patent hereinbefore referred to, having an open or forked end on the outside of the coil. Four single-plate volute springs, as ordinarily formed, are in part combined in one by this our improved plan of construction.

Having thus described our invention, we claim as new, and desire to secure by Letters Patent—

The improved volute spring formed of a single metal plate slit longitudinally nearly its whole length, with both ends uncut, and the divided parts spread apart in the middle, coiled substantially as herein shown and described.

JOHN FREELAND,  
DAN'L WARD.

Witnesses:

WM. F. McNAMARA,  
ALEX. F. ROBERTS.