

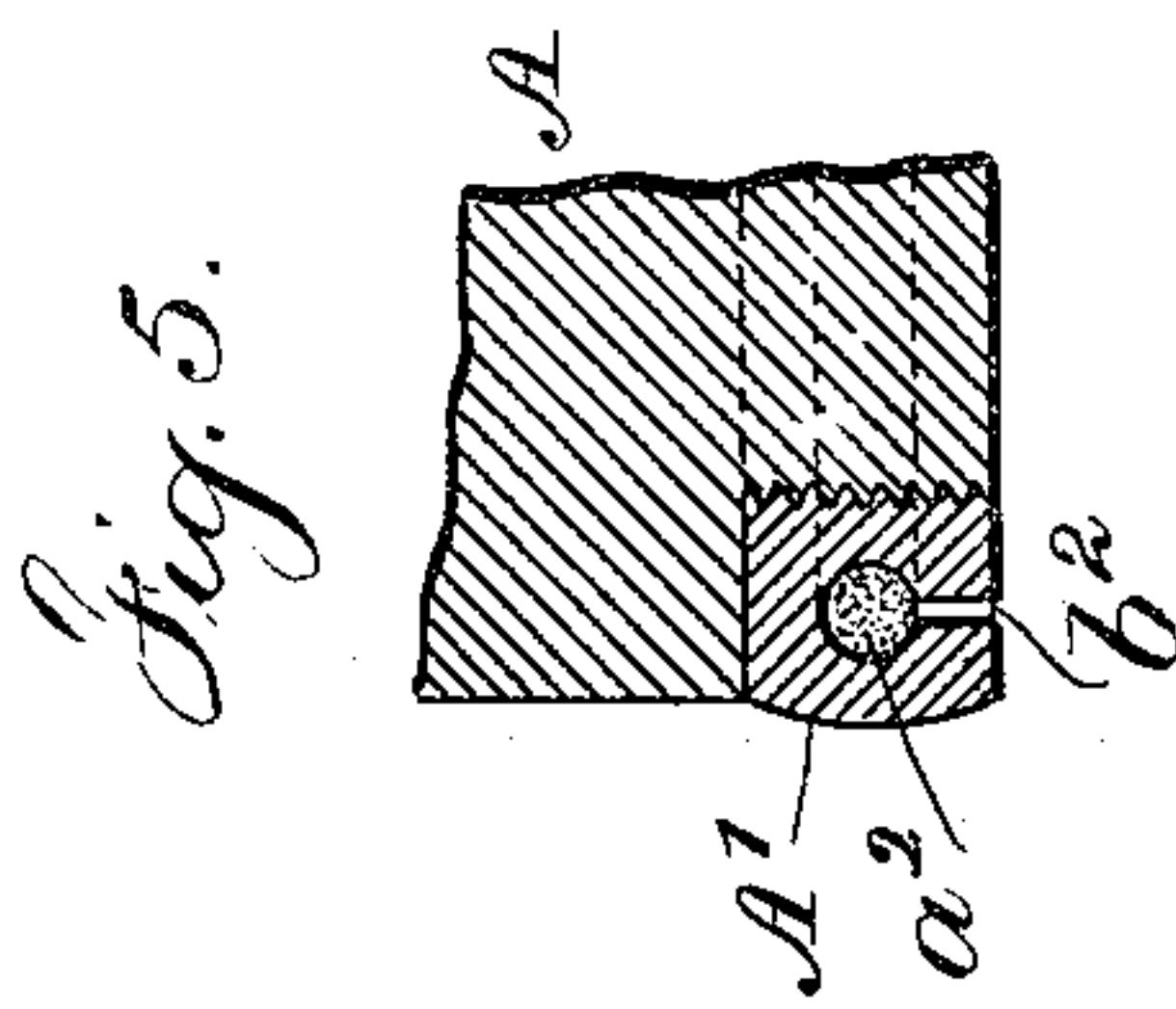
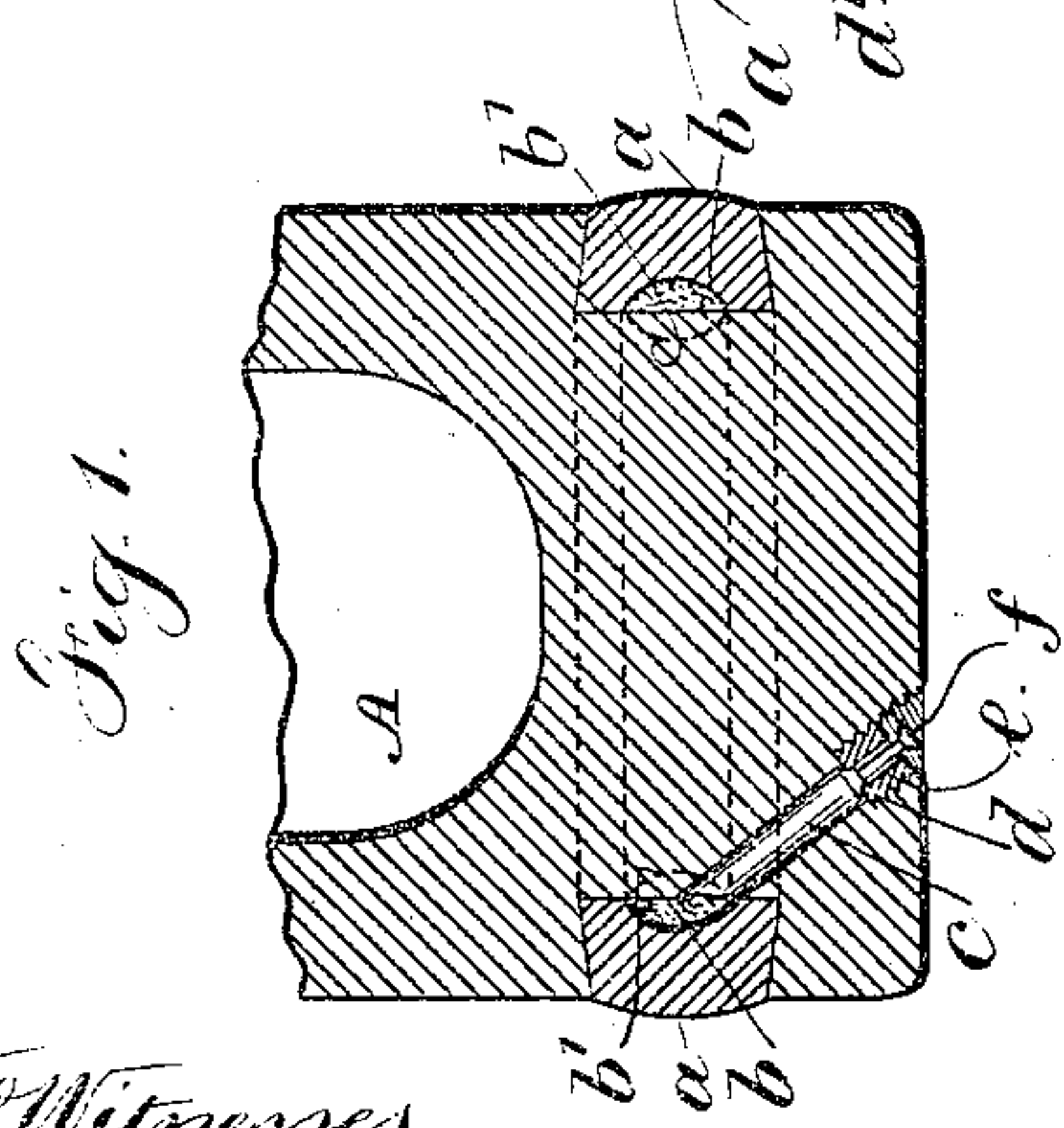
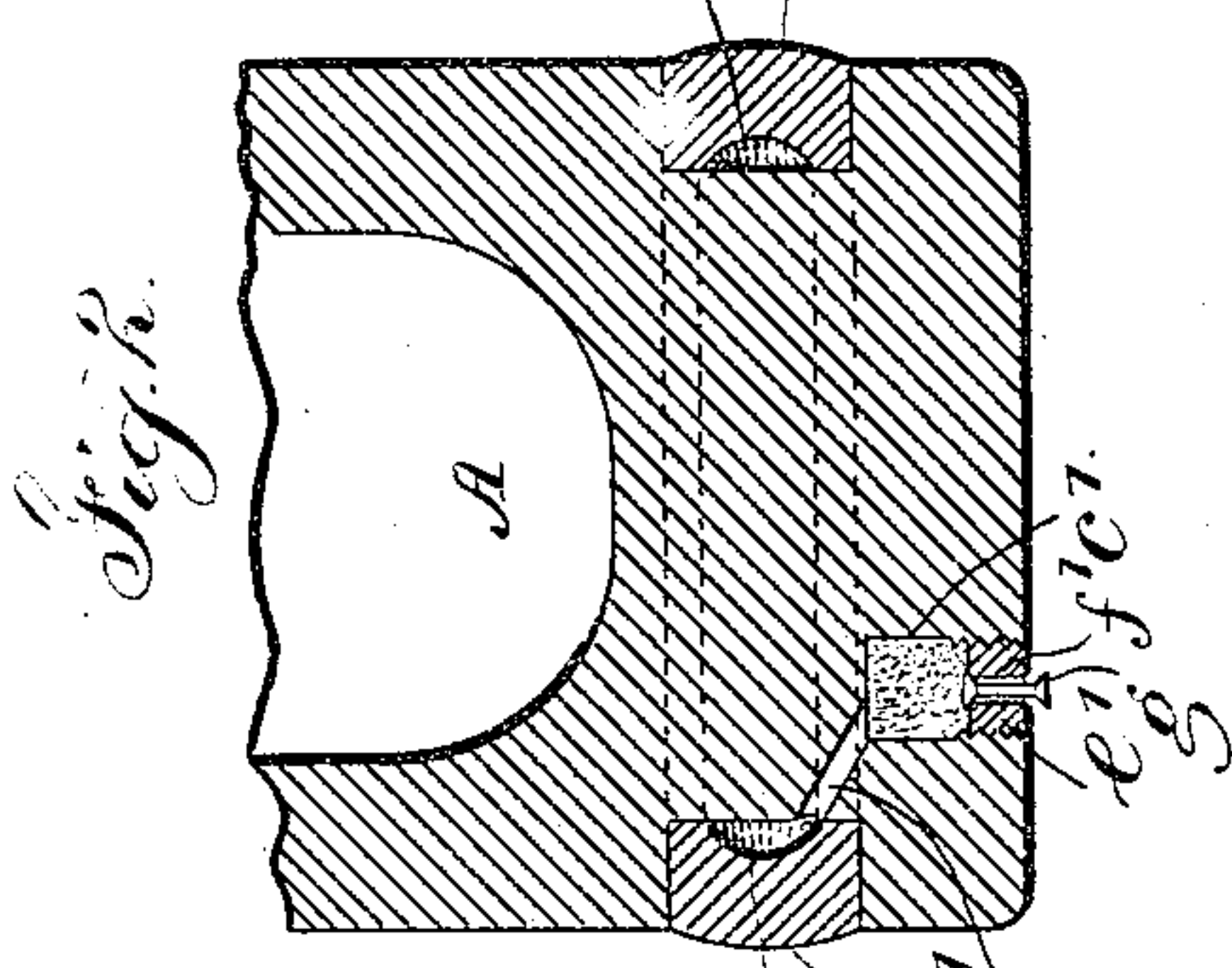
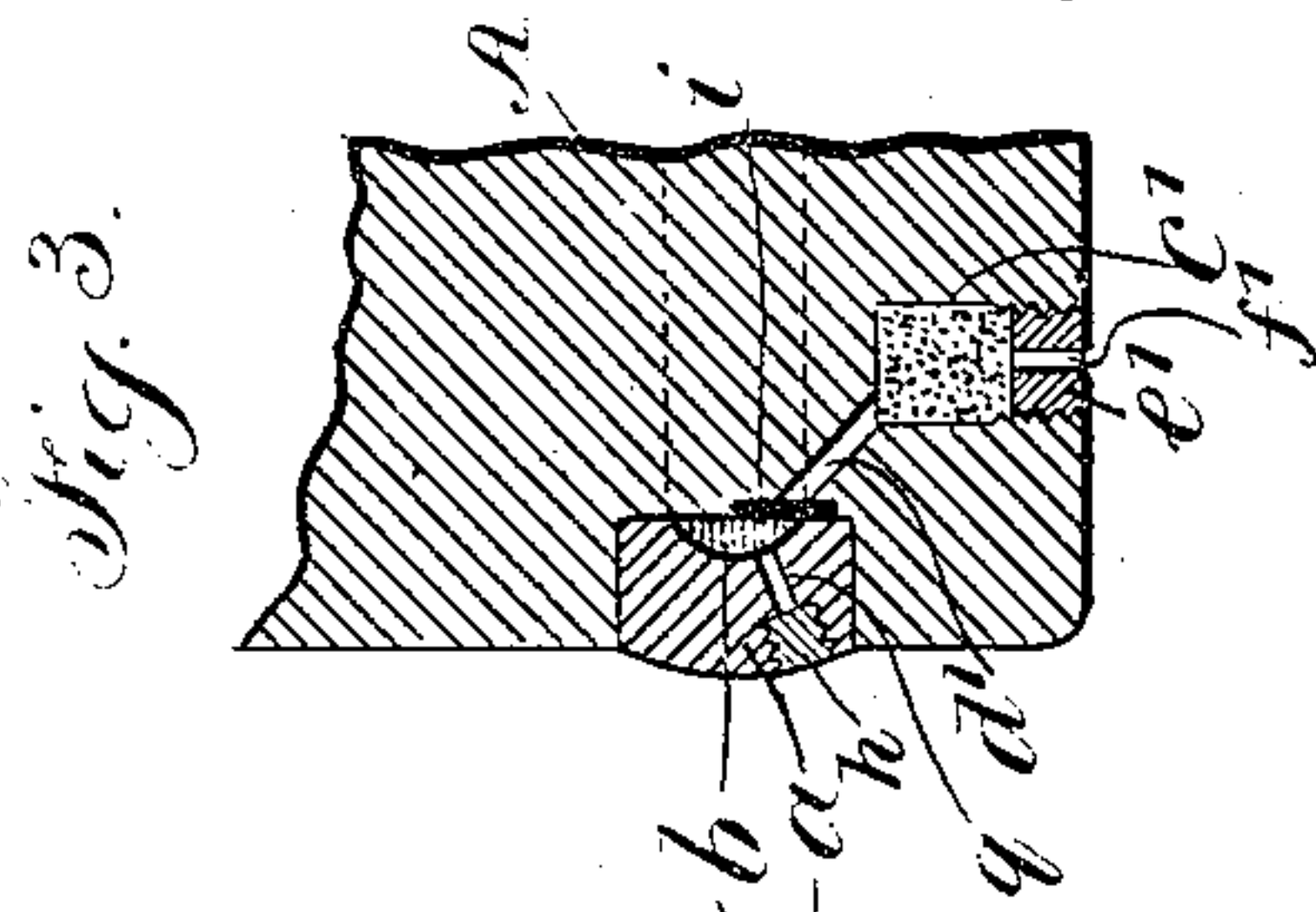
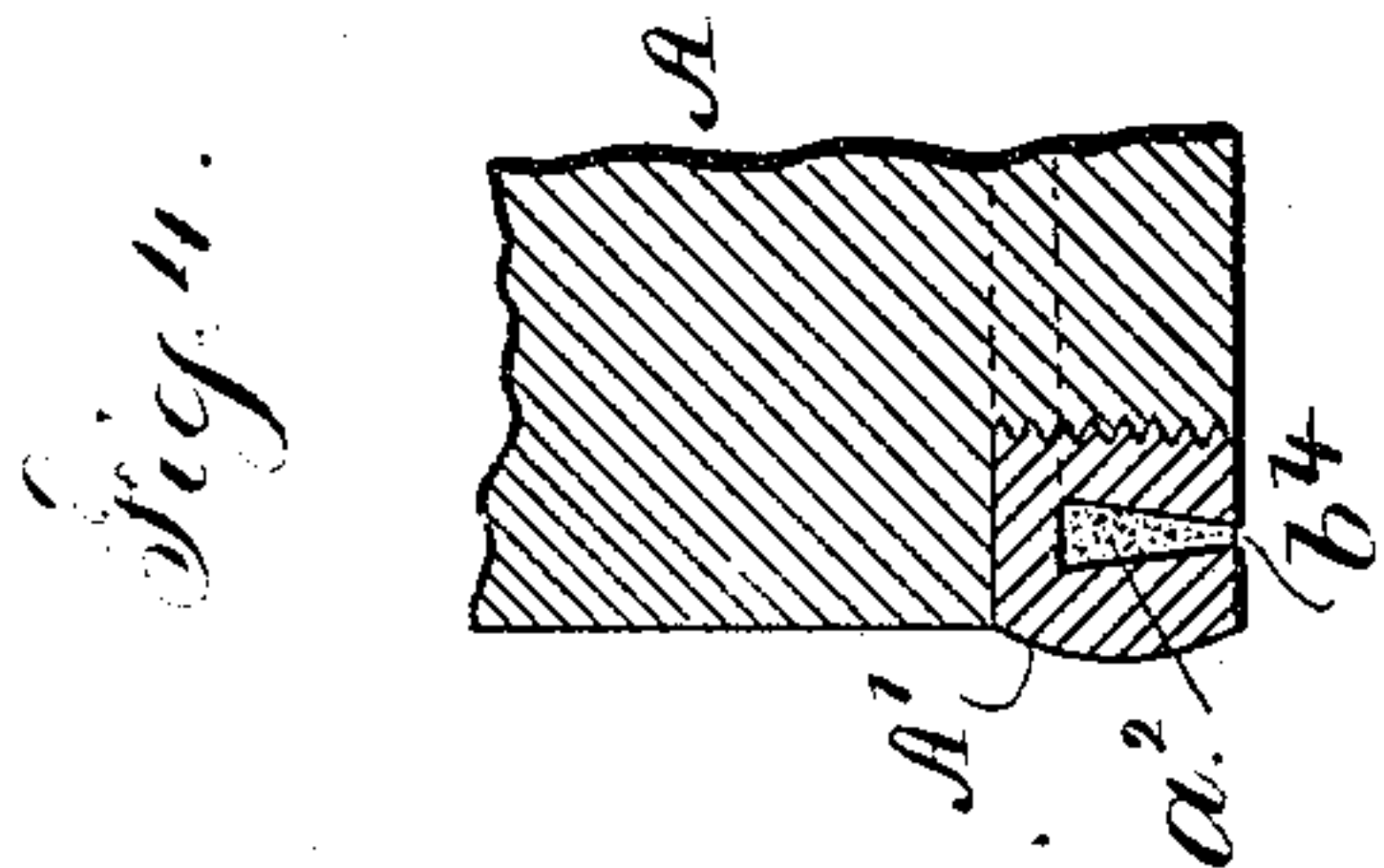
(No Model.)

A. NOBEL.

GAS CHECK FOR PROJECTILES.

No. 563,609.

Patented July 7, 1896.



Witnesses
Chas. H. Smith
J. Staib

Inventor
Alfred Nobel
per
Lemuel W. Perrell
Atty

UNITED STATES PATENT OFFICE.

ALFRED NOBEL, OF PARIS, FRANCE.

GAS-CHECK FOR PROJECTILES.

SPECIFICATION forming part of Letters Patent No. 563,609, dated July 7, 1896.

Application filed July 27, 1895. Serial No. 557,334. (No model.)

To all whom it may concern:

Be it known that I, ALFRED NOBEL, chemist, a subject of the King of Sweden and Norway, and a resident of 59 Avenue Malakoff, Paris, in the Republic of France, have invented certain new and useful Improvements in Gas-Checks for Projectiles, of which the following is a specification, reference being had to the accompanying drawings.

Projectiles are usually provided with driving-rings of copper or other soft metal, which, on being squeezed into the rifles of a gun, act also as gas-checks. Such provision for gas-checking has, however, been found inadequate to check all leakage of gas and prevent erosions in the bore of the gun which are the consequence of such leakage. The gas-check rings hereinafter described are so constructed as to operate with extreme rapidity by swelling out said rings sufficient to prevent leakage of gas. A charge of rapid-explosive material is introduced in the gas-check or projectile itself so as to act in expanding the gas-check.

In the drawings, Figure 1 is a sectional view showing an arrangement whereby the aforesaid result is obtained. Figs. 2, 3, 4, and 5 are sectional views of modifications of the gas-check.

A is the projectile; *a*, a driving and gas-checking ring of copper, aluminium, brass, or other soft and resisting metal.

b is a groove in the ring *a*, but said groove may be replaced by a corresponding groove in the projectile, as indicated by the dotted lines *b'*, or the projectile, as well as the ring, may be grooved.

c is a small outlet leading from the groove *b* to the rear of the projectile.

d is a screw which partly closes the opening *c*, leaving in its center the touch-hole *e*.

f is a small valve which may be conical or spherical, and which shuts automatically when the pressure within the cavity of the ring exceeds the pressure in the gun.

The aforesaid gas-check operates as follows: The groove *b* receives a charge of very quick powder, which is introduced through the opening *c*, which opening is then partly shut by the screw *d*. The powder charge should be so regulated by aid of well-known tables of powder-pressure as to obtain as near

as possible the pressure aimed at, which should be sufficient to swell the ring *a* and thereby secure immediate gas-checking without too violent action on the bore of the gun. A very convenient explosive for charging said groove or chamber is the one described in the patent for Great Britain of January 31, 1888, No. 1,470. It is easily made into strings of any size and of such porosity as to act as an instantaneous fuse and secure an extremely quick explosion. By duly proportioning the thickness of said string to the size of the groove so as to leave sufficient air cushioning overpressure is avoided. Through the inlet *c* said string may easily be slipped into said groove *b*, and if it is allowed to reach or extend beyond the touch-hole *e* it will catch fire very easily when the main charge of the gun is fired. Instead of such a string some other quick powder may be used, but the charging is less convenient and the pressure tends to be somewhat more localized.

By firing the main charge near to the touch-hole *e* the gas-checking action of the aforesaid ring can be still more accelerated, and to render it still more instantaneous electric firing might be effected in the touch-hole *e*, so as to fire first the special gas-checking charge herein described and let said charge fire in its turn the main charge of the gun; but experiments heretofore made have not appeared to show the necessity of resorting to such complication.

The small valve *f* is intended automatically to shut off the communication between the main powder-chamber and the small gas-checking chamber whenever the pressure in the latter is in excess. The gas thus completely confined keeps up its pressure tolerably well during the passage of the projectile through the entire length of the bore, and thus tends to act as a gas-check, not only in the rear, but throughout the whole length of the bore. Unless such prolonged gas-checking is exacted said valve can be dispensed with. Its presence necessitates making the gas-check ring very strong in order to prevent its bursting when the projectile leaves the gun.

As soon as the main charge of the gun is fired the ignition spreads inside the touch-hole *e* and catches the charge in the groove

b, which by the strong pressure produced swells out and forms a perfect gas-check. The time it takes is extremely short and can only be measured by its effect in preventing erosions.

Fig. 2 shows another arrangement serving the same purpose. *a* is the gas-check or driving-ring; *b*, the groove already described; *c*, one or more powder-chambers each communicating through an opening *d'* with the groove *b*. *e'* is a screw closing partly the powder-chamber *c'*. *f'* is a touch-hole, and *g* the valve already described. As soon as the powder charge in the chamber *c'* has been fired through the touch-hole *f'* the gas produced enters through the inlet *d* into the groove *b* and swells by its pressure the ring *a*.

In Fig. 3 the arrangement only so far differs from what is shown in Fig. 2 as the groove *b* is to be filled with water or some viscous or soft substance, such as soft glue or vaseline, which transmits to the ring *a* the pressure developed by exploded powder in the chamber or chambers *c'*. A small inlet *q* is provided for conveniently filling the groove *b* with the aforesaid liquid, viscous, or soft material, and it is then closed by a screw or plug *h*. *i* is a small plug or partition which the explosion removes, but which serves the purpose of separating the powder charge from the liquid or other viscous or soft substance contained in the groove *b*, which liquid or equivalent substance transmits the pressure of the powder-gas and accelerates the swelling out of the aforesaid ring *a*.

Fig. 4 shows an arrangement which somewhat differs from those heretofore described. *A'* is a hollow ring made to contain a powder charge of the volumetric density needed to effect, when ignited, the swelling out of said ring as requisite to make it act as a perfect and immediate gas-check. Said ring should be well secured on the projectile or otherwise fixed. *b⁴* is a touch-hole, through which the fire from the main charge is allowed to enter into the chamber *a²*, and through which said chamber may also receive its powder charge.

It is not absolutely necessary that said ring *A'* should be closed on all sides. It may be shaped as shown in Fig. 5, with a kind of groove or chamber *a²*, charged with some very quick explosive, such as highly-nitrated paper, and presenting all round an open slit *b²*, through which the inside charge can catch fire. Said contrivance can only act quickly enough for the purpose herein set forth if the aforesaid slit is very narrow and the inside charge very quick.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The projectile having a gas-checking ring around the same with a cavity, in combination with a charge of quick-firing explosive material within the gas-checking ring or the projectile, for expanding such gas-checking ring, substantially as specified.

2. The combination with the projectile, of a gas-checking ring around the same, and explosive material in a chamber provided for it in the projectile to expand the gas-check, substantially as specified.

3. The combination with the projectile, of a gas-checking ring around the same, and explosive material in a chamber provided for it in the projectile to expand the gas-check, and a non-compressible liquid intervening between the ring and the gas-pressure resulting from the explosive, substantially as specified.

4. The projectile and a gas-checking ring with a cavity in combination with a charge of quick-firing explosive material in the projectile or in the gas-checking ring, and a valve in the touch-hole that communicates with the explosive material for closing the touch-hole when the pressure within the gas-checking ring exceeds the pressure within the gun, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALFRED NOBEL.

Witnesses:

CARL TH. SUNDHOLM,
ERNST SVANQVIST.