F. D. BELL.

HYPODERMIC SYRINGE.

APPLICATION FILED APR. 30, 1909.

938,951. Patented Nov. 2, 1909.

Fig. 1.

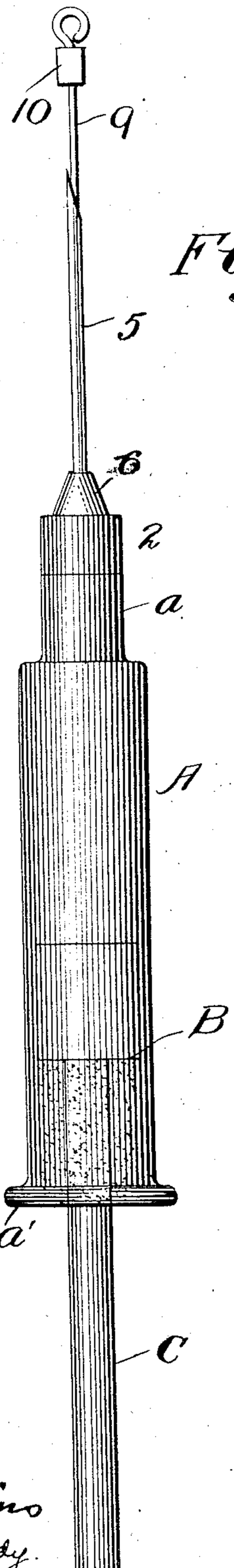


Fig. 2.

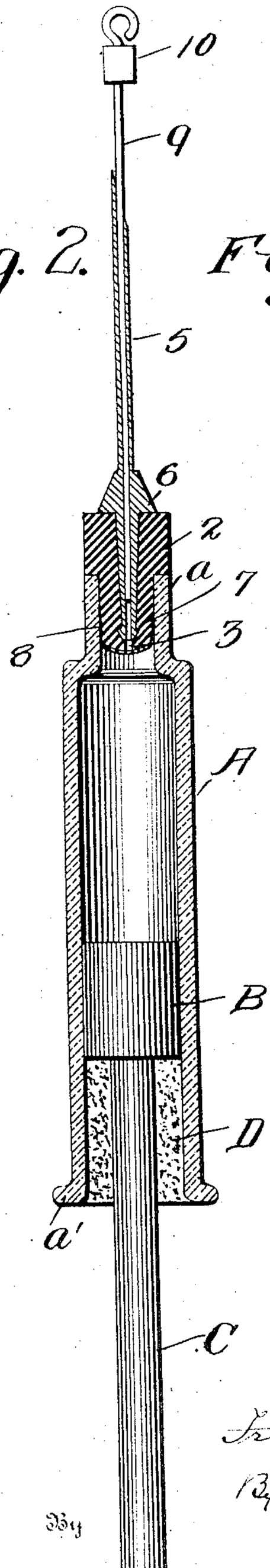
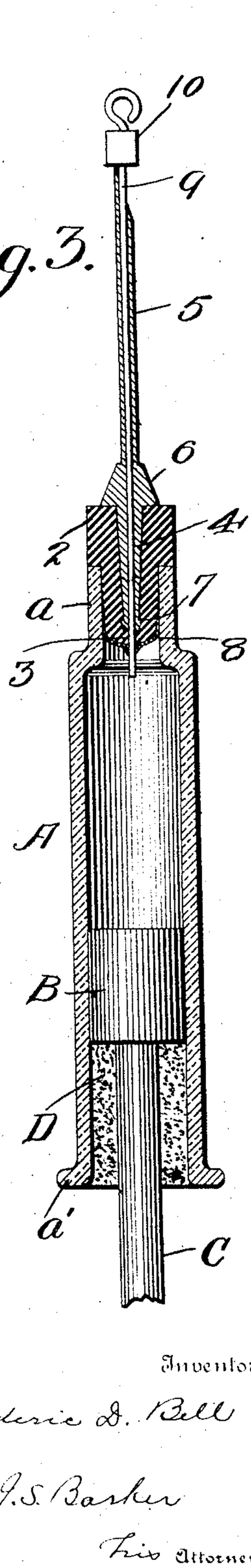


Fig. 3.



Witnesses

Jos. F. Collins

L. C. Brady.

Inventor

Frederic D. Bell

By J. S. Barker

His Attorney

UNITED STATES PATENT OFFICE.

FREDERIC D. BELL, OF GLEN RIDGE, NEW JERSEY.

HYPODERMIC SYRINGE.

938,951. Specification of Letters Patent. **Patented Nov. 2, 1909.**

Application filed April 30, 1909. Serial No. 493,203.

To all whom it may concern:

Be it known that I, FREDERIC D. BELL, a citizen of the United States, residing at Glen Ridge, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Hypodermic Syringes, of which the following is a specification.

My invention relates to hypodermic syringes adapted to be used in administering antitoxin or other serums, and serving also as containers for measured doses of the serums between the time when it is put up at the laboratory and that of use or administration; and the invention has for its object to improve devices of this character particularly as to the hermetic sealing of the container so that the charge it contains may be preserved indefinitely in an aseptic condition and free from contamination from the air or any other way.

In the accompanying drawings—Figure 1 is an elevation of a syringe and container embodying my invention, the container being hermetically sealed and the parts having the positions they occupy until the time comes for administering the charge of the container. Fig. 2 is a central longitudinal section, the parts occupying the positions represented in Fig. 1. Fig. 3 is a longitudinal section of the needle end of the syringe illustrating the method of rupturing the film that hermetically closes the container and piston barrel at that end.

In the drawings A designates the serum receptacle or container which is represented as being formed of a glass tube, one end of which is provided with a neck *a* and the other end with an outward extending flange *a'* adapted to be grasped by the fingers of the physician when making an injection. Within this cylinder is mounted a piston or plunger B which is operated by a stem C which may be integral with the plunger or separate therefrom, as desired. The open end of the cylinder A may, if desired, be closed by a stopper surrounding the stem C, such as a mass of paraffin, D, which hermetically closes the container and syringe barrel at this end.

While I have illustrated and described a plunger syringe I do not thereby wish to be understood as limiting my invention in its useful applications to a syringe of this character, as the latter is chosen merely to illustrate one well known form of syringe to which my invention may be applied.

The neck of the container A is closed by a stopper 2, preferably formed of soft rubber. Extending longitudinally through this stopper is an aperture 3, preferably formed at the time the stopper is made, and extending from end to end thereof. Into this aperture is inserted the stem 4 of the hypodermic needle.

The needle proper is designated 5 and is provided with an enlargement 6 that separates the needle from the stem 4 and serves as a hub by which the needle can be conveniently handled in forcing the stem 4 into the aperture through the stopper. The end of the stem of the needle is preferably provided with a bulbous enlargement 7 which is forced into the body of the material constituting the stopper as the latter is compressed about the stem of the needle on being forced into the neck of the container A, thus insuring a fluid-tight connection at this point. The length of the stem 4 of the needle is a trifle less than the length of the stopper so that when the hub or enlargement 6 comes into engagement with the end of the stopper the inner end of the stem of the needle, which it will be understood is perforated as is also the needle proper, lies close to the inner end of the stopper. A communication between the hollow hypodermic needle and the interior of the container and piston barrel is thus established so long as the passage 3 through the stopper remains open at its inner end. I provide, however, for closing the inner end of the passage 3 through the stopper and thus for sealing the needle end of the container whenever the stopper is inserted. This I accomplish by coating the reduced

end of the stopper, or that portion which enters the neck *a*, with a thin film 8 of rubber or other suitable material which is, by methods of treatment well known to those skilled in the manufacture of india rubber, made to adhere to the stopper or to become incorporated therewith in an intimate manner. This film exteriorly covering the end of the stopper to which it adheres, becoming a part thereof and closing the inner end of the passage through the same, may be applied either before or after the needle is inserted into the stopper, since the needle does not interfere with it as the stem does not extend beyond the end of the stopper, as has been stated, and hence does not come into engagement with the closing film, though it lies in close proximity thereto.

The stopper which I have described is a unitary structure permitting it to be manufactured as a complete article which can be readily inserted into or removed from the neck of the container. It constitutes a sufficiently firm seat for the needle, which is ordinarily inserted into the stopper, as illustrated in the drawings, before the latter is applied to the container.

9 indicates a wire such as is commonly inserted into the bore of a hypodermic needle for protecting it from the entrance of foreign substances. It is of a length somewhat greater than the combined length of the needle proper and the stem 4 thereof. When the tube is charged and sealed as indicated in Fig. 1, the wire is inserted into the needle and occupies the position there illustrated, that is to say, its inner end is contiguous to, but not in contact with, film 8 covering the end of the opening 3. When it is desired to administer the charge carried by the syringe the wire is first pressed inward until its end ruptures the film 8, when it is withdrawn, leaving a passage between the interior of the container or cylinder of the syringe and the bore of the needle.

As some little force is required to rupture the film the wire 9 is liable to move forward rapidly the instant the end punctures the film, with the result that the fingers of the person operating the wire will come forcibly into contact with the point of the needle, which is not only unpleasant, but may result in contaminating the needle. I therefore mount upon the wire 9 near its outer end a small piece of soft material capable of being thoroughly and practically sterilized. This is indicated at 10. It serves to protect the person from danger of injury by the needle when rupturing the seal or film 8, and protects the needle from contamination by reason of the fingers of the operator coming into contact with the point thereof.

It will be seen from this disclosure of my invention, that I provide a simple means for hermetically closing the needle end of a syringe and container and also provide for easily breaking the seal without, however, necessitating the handling of the needle, or in any way disturbing the closing parts of the container and syringe so that the serum or other material contained could possibly be subject to outside contamination.

What I claim is:—

1. In a hypodermic syringe, the combination of a perforated stopper adapted as a whole to be applied to or removed from the neck of a serum-containing receptacle, a hypodermic needle having a stem adapted to fit the perforation in the stopper, and a seal for closing the said perforation exteriorly applied to the inner end of the stopper and adhering thereto and constituting a part thereof.

2. In a hypodermic syringe, the combination of a stopper perforated lengthwise and adapted as a whole to be applied to or removed from the neck of a serum-containing receptacle, and a thin easily perforatable film for closing the perforation in the stopper at one end, exteriorly applied to the inner end of the stopper to which it adheres and becomes a part thereof.

3. In a hypodermic syringe, the combination of a stopper having a perforation through it lengthwise and adapted as a whole to be applied to the neck of a serum-containing receptacle, a needle having a stem seated in the said perforation, and a seal adapted to be easily punctured for closing the inner end of the said perforation, the seal being applied to the exterior of the stopper and of a material that will when so applied intimately unite with the material of the stopper so as to become a part thereof.

4. A perforated stopper for a hypodermic syringe of unitary structure and adapted to be inserted into or removed from the neck of a serum-containing receptacle, having a seal exteriorly applied to its inner end and adhering thereto and closing the inner end of the perforation therein.

5. In a hypodermic syringe, the combination of a stopper longitudinally perforated, a needle having a hub intermediate between its ends and a stem portion extending beyond the hub of less length than the stopper and adapted to be seated in the perforation therein, and a seal for hermetically closing the inner end of the said perforation applied exteriorly to the stopper.

6. A flexible stopper for a hypodermic syringe perforated longitudinally, in combination with a hypodermic needle formed with a stem adapted to enter the perforation in the stopper, the end of the stem having a bulbous enlargement, whereby when the

stopper is inserted into the neck of a receptacle there is formed a close connection between the stopper and the stem of the needle.

7. In a hypodermic syringe, the combination of a perforated stopper, a needle having a stem shorter than the stopper adapted to enter the perforation therein, an easily ruptured seal applied to the exterior of the inner portion of the stopper closing the inner end of the said perforation, and means adapted to be inserted through the bore of the needle for rupturing the said seal.

FREDERIC D. BELL.

Witnesses:
HELENE H. REED,
F. KARL SEITZ.