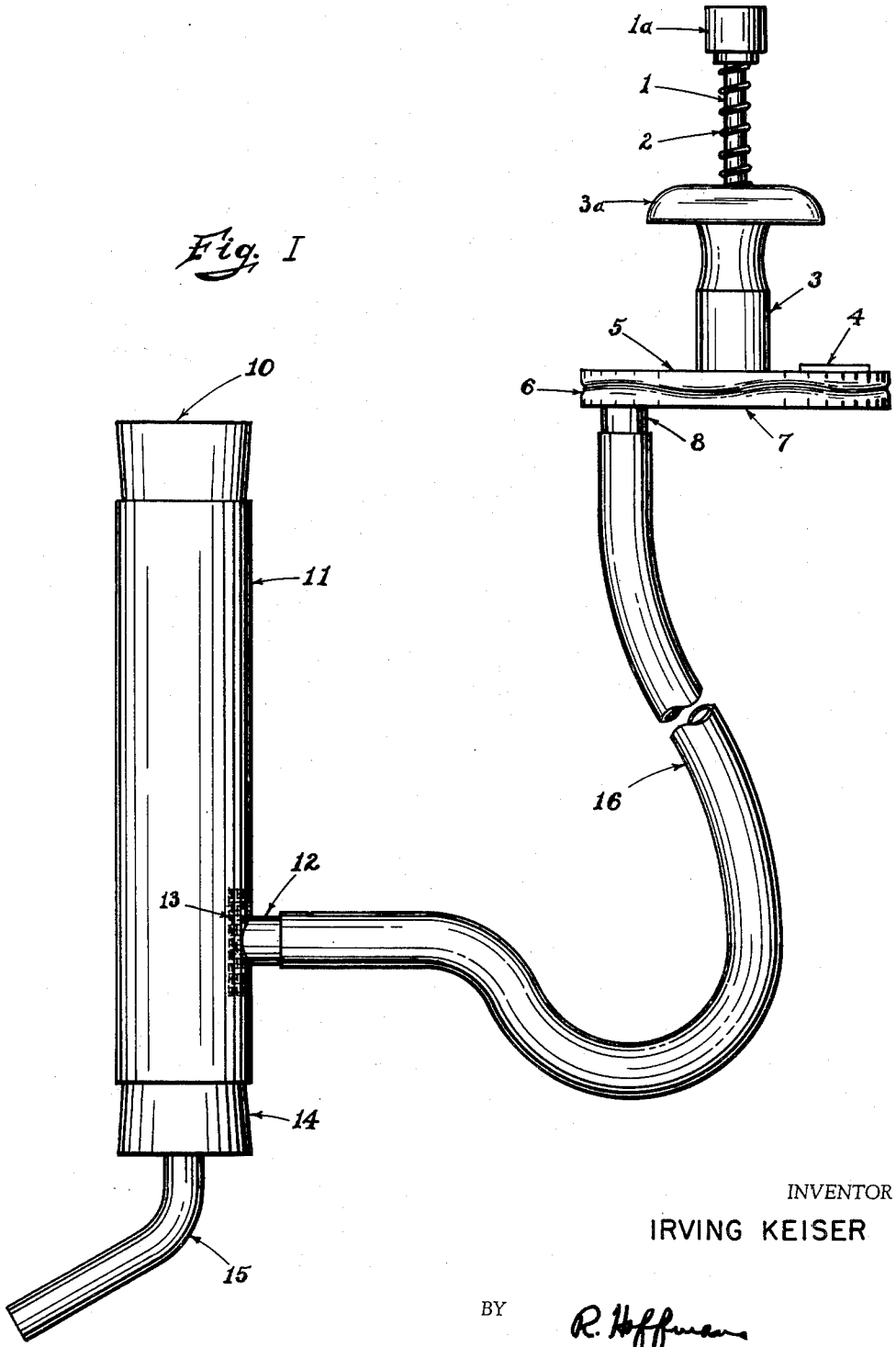
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Fig. I



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Fig. II

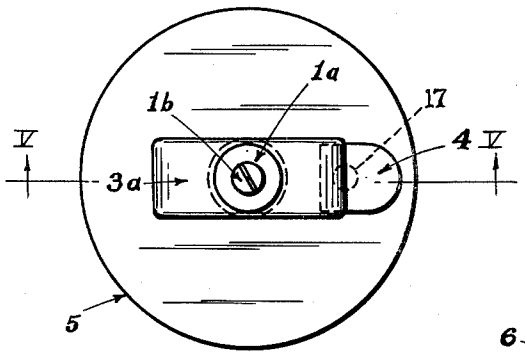
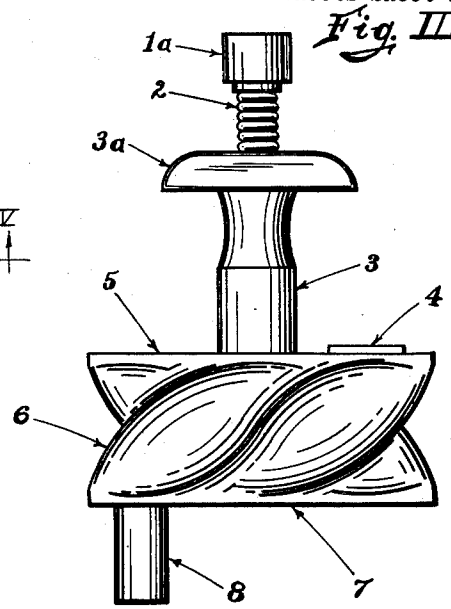


Fig. III



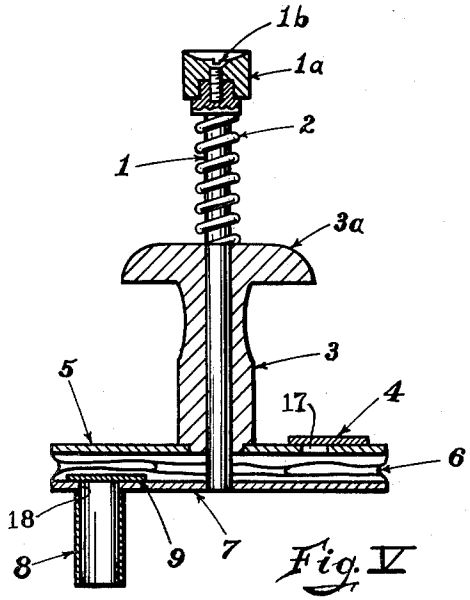


Fig. V

Fig. IV

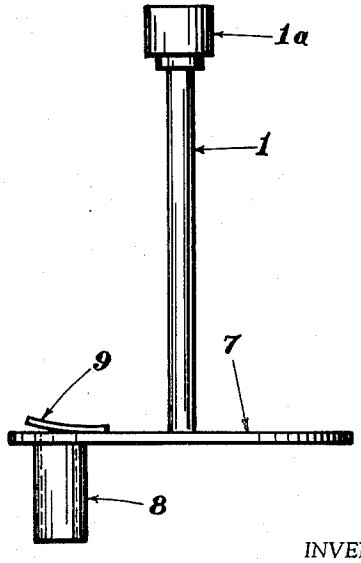
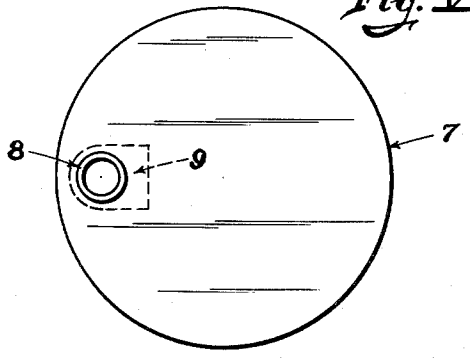


Fig. VI



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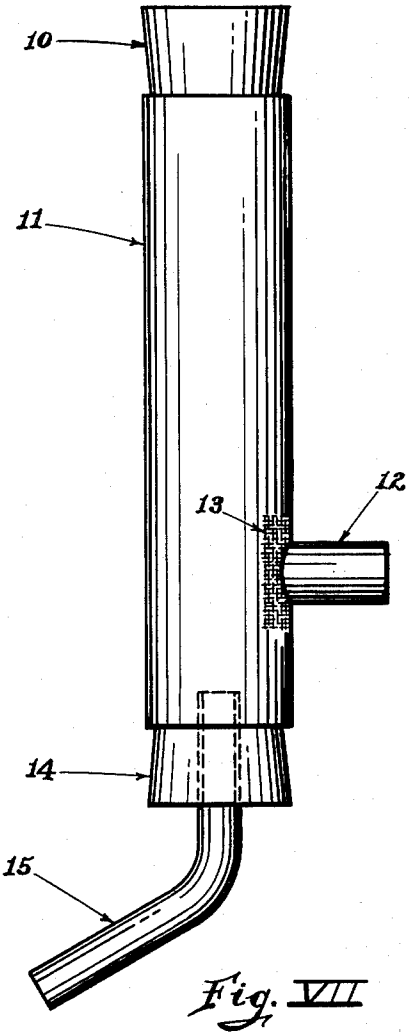


Fig. VII

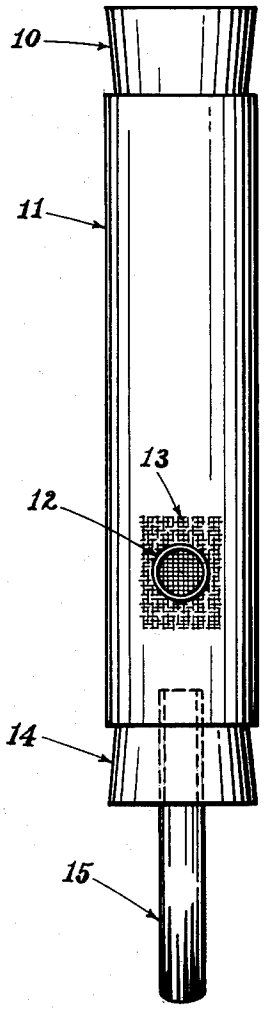


Fig. VIII

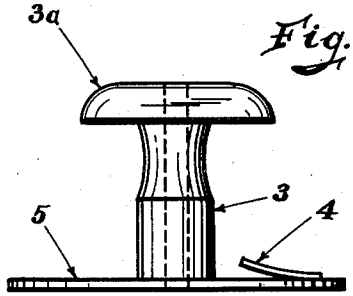


Fig. IX

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United States Patent Office 2,992,770 Patented July 18, 1961

2,992,770

HAND-OPERATED INSECT ASPIRATOR

Irving Keiser, Honolulu, Hawaii, assignor to the United States of America as represented by the Secretary of Agriculture

Filed Mar. 5, 1959, Ser. No. 797,824
1 Claim. (Cl. 230—160)
(Granted under Title 35, U.S. Code (1952), sec. 266)

A non-exclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

This invention relates to a device for collecting insects or other small objects. More particularly it relates to a hand-operated piston-type suction device connected to a collecting vessel for holding the insect.

Insect aspirators are known wherein suction is applied by mouth or by means of a rubber bulb.

One object of the present invention is to provide a device which avoids the unsanitary mouth aspiration. Another object is to provide a device wherein the suction can be applied more rapidly and sharply than is possible through the use of a rubber bulb.

In accordance with this invention, suction is applied to a collecting vessel by means of a novel hand-operated bellows. This device will be described below with reference being made to the accompanying drawings in which:

FIGURE I is an elevation view of the complete assembly;

FIGURE II is a plan view of the suction applying bellows;

FIGURE III is an elevation of the bellows in the expanded position;

FIGURE IV is an elevation of the bottom bellows plate and the piston assembly;

FIGURE V is an elevation in section of the bellows assembly taken on line V—V of FIGURE II;

FIGURE VI is a bottom view of the plate shown in FIGURE IV;

FIGURE VII is a front elevation of the collecting vessel;

FIGURE VIII is a side view of FIGURE VII; and

FIGURE IX is an elevation of the top plate construction of the bellows.

In a preferred form the suction device comprises an elongated member **1** forming a plunger which is provided at its top end with a knob **1***a* secured to the plunger by means of screw **1***b*. Plunger **1** is secured to bottom plate **7** by any suitable method. A top plate **5** is provided with a rigidly secured elongated hollow cylindrical sleeve **3** having a finger grip **3***a*. Plates **5** and **7** are connected by a flexible impervious member **6**, the plates **5** and **7** together with the flexible impervious member **6** forming a bellows. A compression spring **2** surrounds plunger **1** and is restrained by the upper surface of finger grip **3***a* and the under surface of knob **1***a*. In its normal position the spring tends to keep the finger grip and knob separated, thereby urging plates **5** and **7** together. Upper plate **5** is provided on its upper surface with a flutter valve **4** which covers hole **17**. A check valve may be used in lieu of a flutter valve. Lower plate **7** is provided on its lower surface with a short inlet tube **8** secured in

register with hole **18** and with a flutter valve **9** over the hole **18**.

The tube **8** on the bellows is connected by means of a length of flexible tubing **16** to an outlet tube **12** mounted on the insect collecting vessel **11**. A piece of wire screen or other suitable foraminous covering material **13** is secured to the inside of vessel **11** over the entrance of tube **12**.

The collecting vessel itself is preferably open at both ends. One end of vessel **11** is provided with a stopper **14** through which is passed a tube **15**, while its other end is closed with a solid stopper **10**. In this manner an insect sucked in through tube **15** may be recovered by merely removing the stopper **10** and inverting the collecting vessel.

To operate the device the thumb is placed on the plunger depressing knob **1***a* of the suction pump and the index and middle fingers are placed beneath finger grip **3***a*, which is an integral part of the plunger cylinder sleeve **3**. When the plunger **1** is pushed down into the cylinder sleeve **3** with movement of the fingers, it depresses the bottom bellows plate **7** to which it is attached, thus expanding the bellows **6**. The lower bellows board flutter valve **9** opens automatically as a result of this depressing movement, permitting air to be drawn from the connecting tube **16** and from the collecting vessel **11** into the opening bellows. This movement of air creates a partial vacuum in the vessel and the insect is sucked in through the receiving tube **15** with the inrushing air. Screen **13** prevents the insect from entering the bellows chamber. When the fingers are released compression spring **2** returns the plunger to its open position and flutter valve **4** on the upper bellows plate is automatically forced open, allowing air to escape from the closing bellows. The bellows folds return to their original alignment guided by the free-swiveling depression knob which is attached by machine screw **1***b*. After removal of the insect the device is now again ready for use.

The bellows plates, plunger, depression knob, plunger cylinder sleeve, and the collecting vessel may be fabricated of sheet and tubular plastic and they can be joined with a suitable plastic cement. The flutter valves may be cut from thin rubberized sheeting and glued to the bellows boards. The bellows may be cut from bellows cloth.

The device may also be used to kill an insect after it is sucked into the collecting vessel. In that case, the latter may be provided inside with a container for holding any suitable toxicant.

As will be apparent to those skilled in the art the size of the various parts may be varied to suit the general range of size of insects sought.

I claim:

In a device of the character described, suction means comprising a first and second plate; impervious flexible means connecting said first and second plate forming a bellows therewith; a first hollow elongated member secured to said second plate; holding means on the first elongated member adapted for holding said first elongated member in the fingers of one hand; a second elongated member within said first elongated member forming a plunger extending through said first hollow elongated member and having one end secured to said first plate, the other end extending a short distance outside said first elongated member; resilient means normally

urging said plates toward each other but adapted to permit their separation; air inlet means on said first plate; first valve means for permitting flow of air through said air inlet means only during separation of said plates; air outlet means on said second plate; and second valve means for permitting flow of air through said air outlet means only while said plates are urged together, said end of the plunger which extends outside the first elongated member being so placed with respect to the holding means on said first elongated member that said holding means may be held and the plunger operated with the fingers of one hand thereby to separate the first and second plates.

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