

*T*RAINING UNIT  
NUMBER I



STAKING BALANCE STAFFS

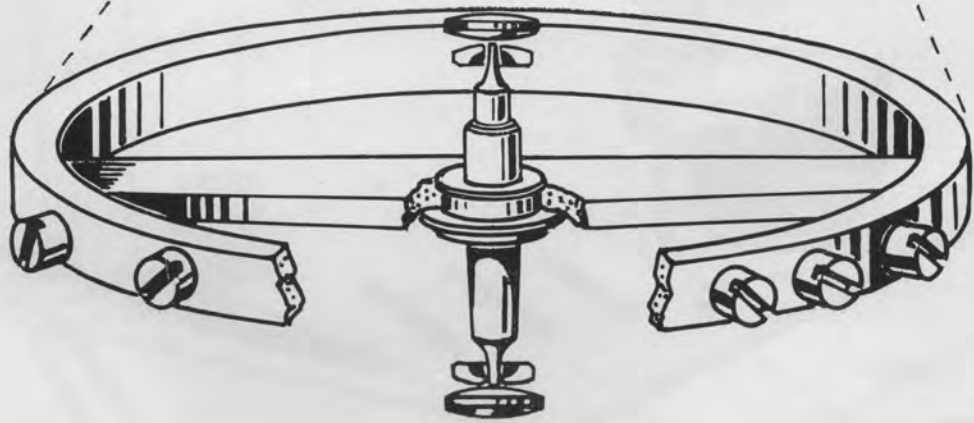
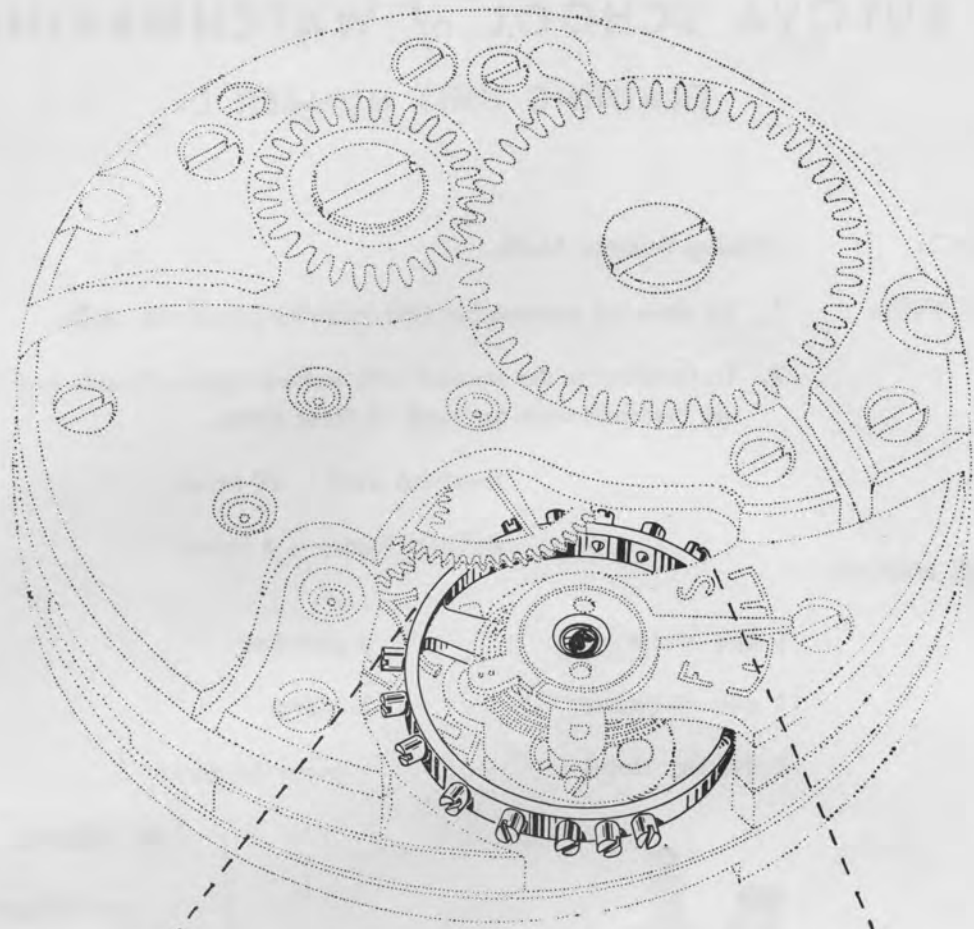
BULOVA SCHOOL *of* WATCHMAKING

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The balance wheel and hairspring unit is the time-keeping element of a watch. The shaft on which the balance wheel is mounted is known as the balance staff. This staff is supported in the plate and bridge by two pivots running in jeweled bearings. The balance wheel is fastened firmly to the balance staff by an operation known as "Staking".





BULOVA SCHOOL *of* WATCHMAKING



# BULOVA SCHOOL *of* WATCHMAKING

## TRAINING UNIT NUMBER 1.

SUBJECT: Staking Balance Staffs

- OBJECTIVES:
1. To develop reasonable skill in staking balance staffs.
  2. To familiarize the student with various types of staffs and the staking methods used for each of these types.

Practical work — 20 hours

Related theory — 4 hours

TOOLS NEEDED:

1 eye loupe

3 punches

1 pair tweezers

1 stump

1 staking stand

1 brass hammer

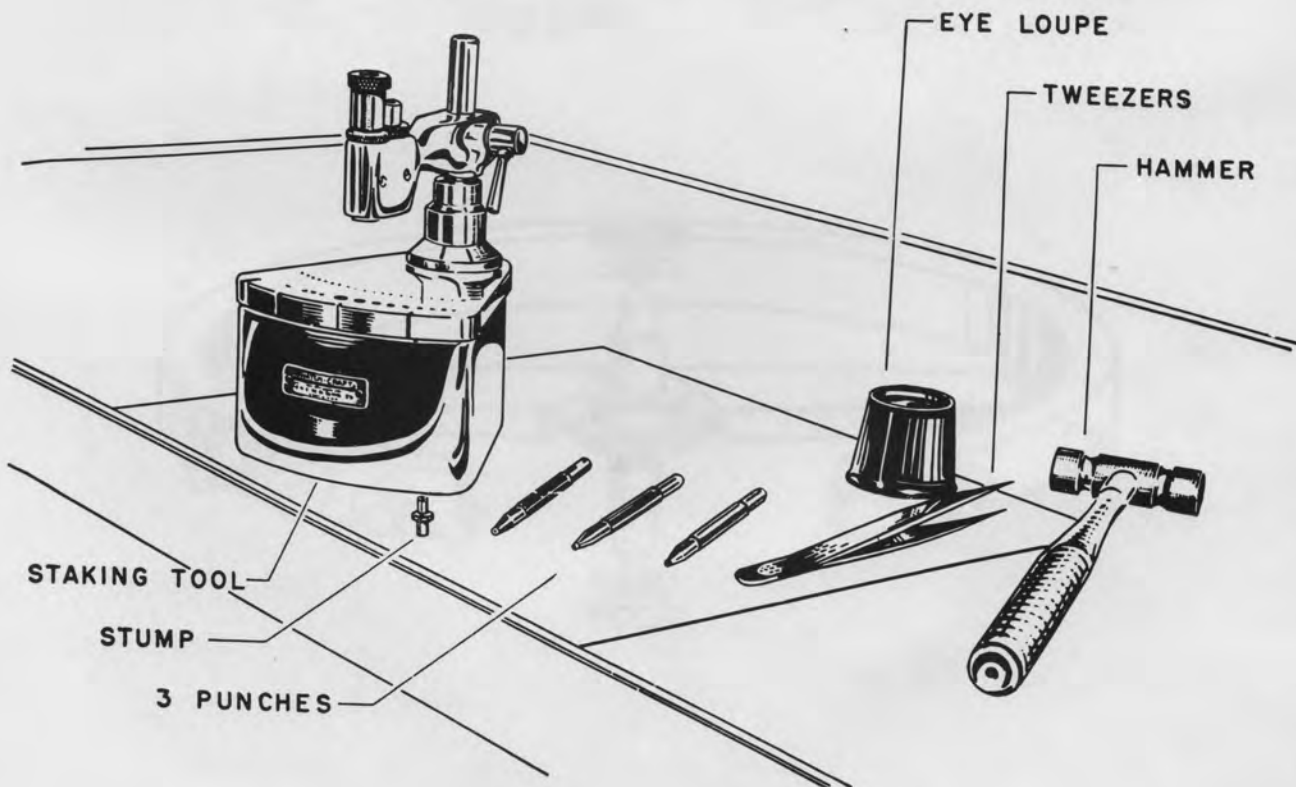


Fig. 1



## Training Unit Number 1.

A balance staff is the shaft on which the balance wheel is mounted. The rotating axis around which the balance wheel oscillates is formed by a line running through the pivots at each end of the staff. These pivots fit into jeweled bearings and are lubricated by minute oil reservoirs.

Fig. 2. Shows a typical balance staff with all parts named.

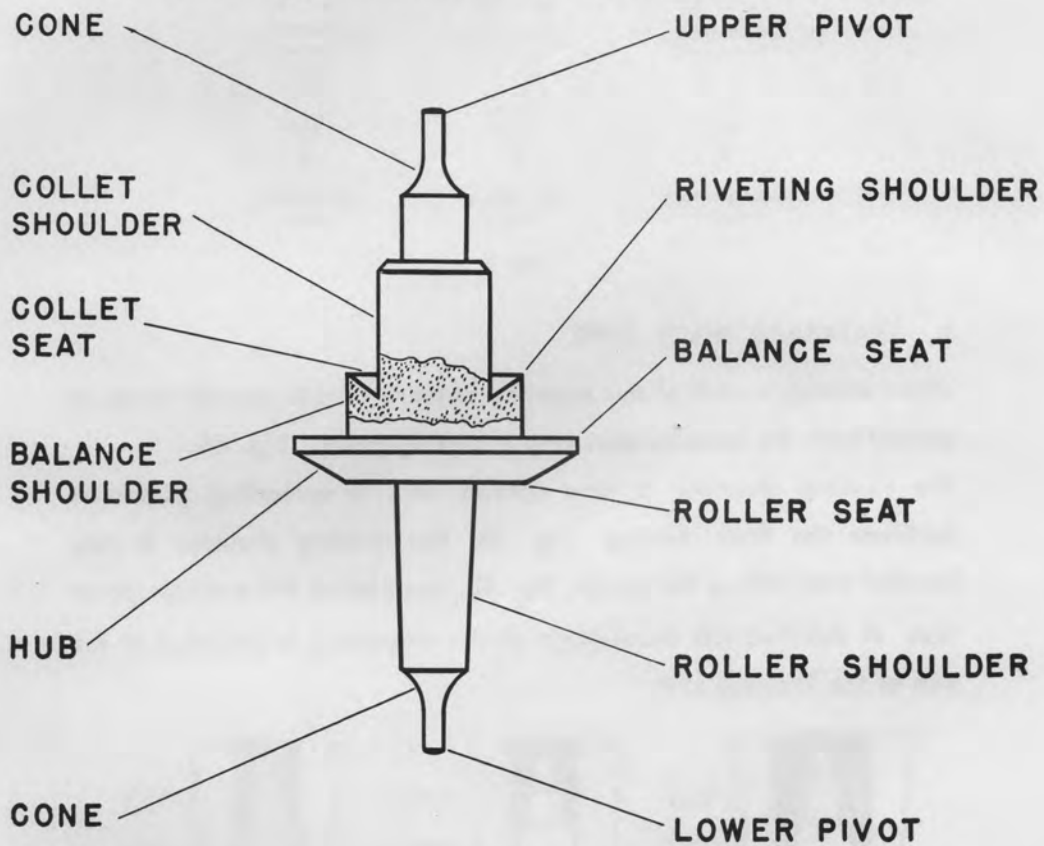


Fig. 2

In this entire course all reference to the staff will be made using the names shown here.



Two general staking methods are used in modern watches:

### 1. RIVETED STAFFS

In Fig. 3 several common forms of riveted staffs are shown.

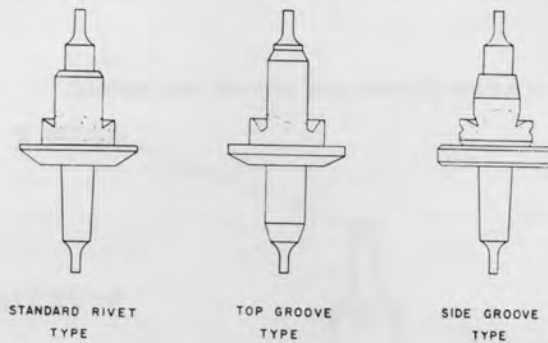


Fig. 3

#### A. STANDARD RIVET TYPE

When staking a staff of this type the balance arm is brought firmly in contact with the balance seat with a staking punch. Fig. 4A.

The riveting shoulder is now spread with a spreading punch to facilitate the final riveting. Fig. 4B. The riveting shoulder is now headed over with a flat punch, Fig. 4C, completing the staking operation. A detailed job breakdown of this procedure is included at the end of the Training Unit.

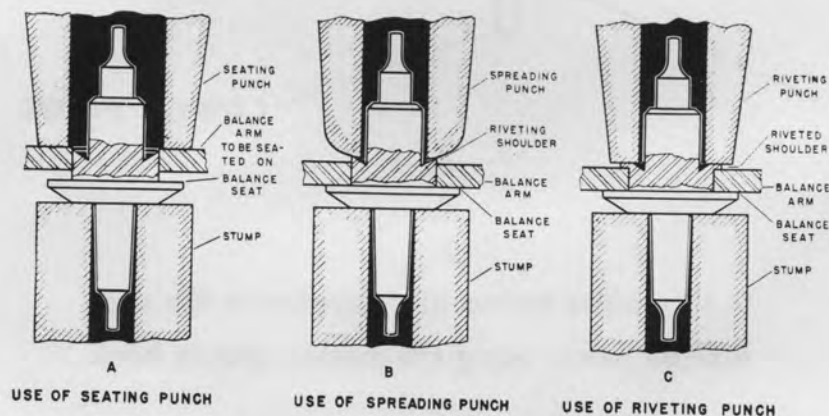


Fig. 4





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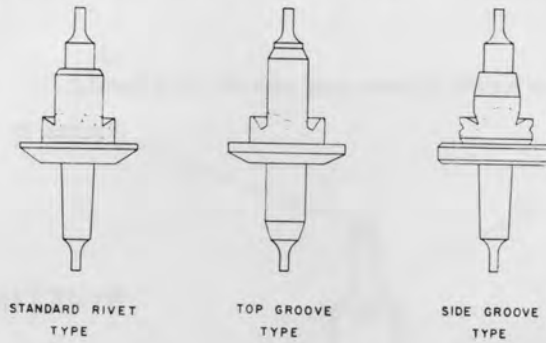


Fig. 3

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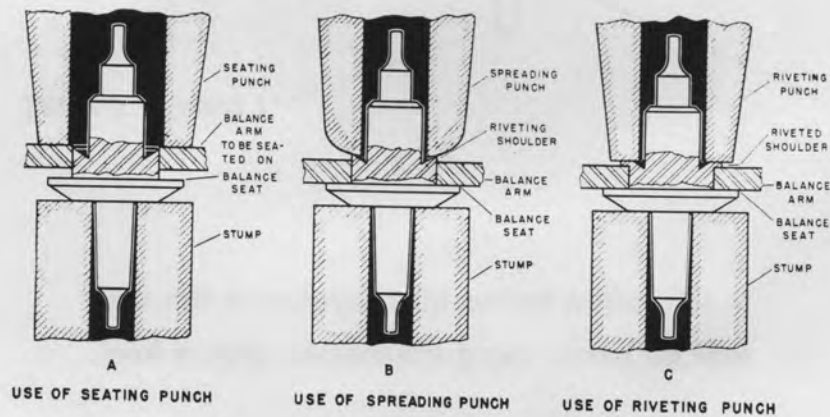


Fig. 4



**B. TOP GROOVE TYPE**

In Fig. 5 a Hamilton top grooved staff is shown. In staking this staff the spreading punch must *NOT* be used. A flat punch is used first to bring the balance arm firmly in contact with the balance seat. Fig. 5A. The final riveting is now accomplished with another flat punch as shown in Fig. 5B and C.

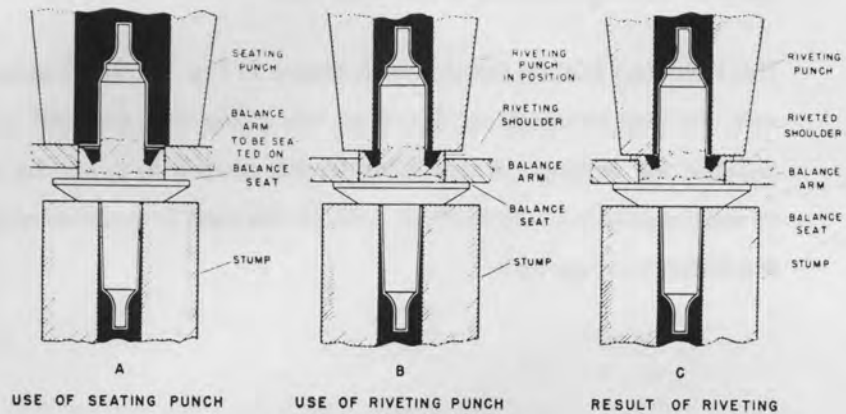


Fig. 5

**C. SIDE GROOVE TYPE**

The Elgin side grooved staff shown in Fig. 6A is staked in exactly the same manner as the Hamilton top grooved staff (see 6B and 6C). The key point to observe here is that the spreading punch is *NOT* used.

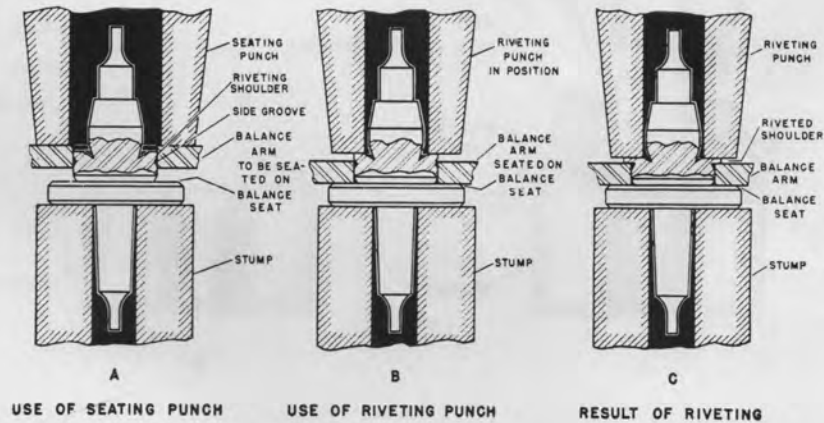


Fig. 6





## 2. FRICTION FITTED STAFFS

Fig. 7A shows a Waltham friction fitted staff. The staking process is clearly indicated. A round nosed staking punch is brought in contact with the roller seat. This insures that the hub seat can be brought into positive seating position in the blue hub.

The Hamilton friction fitted staff is shown in Fig. 7B. The balance wheel with the hub attached is placed on the stump and the staff is put into position for staking. A flat faced punch is used to press the staff into its seated position with the hub seat on the staff in positive contact with the balance wheel hub.

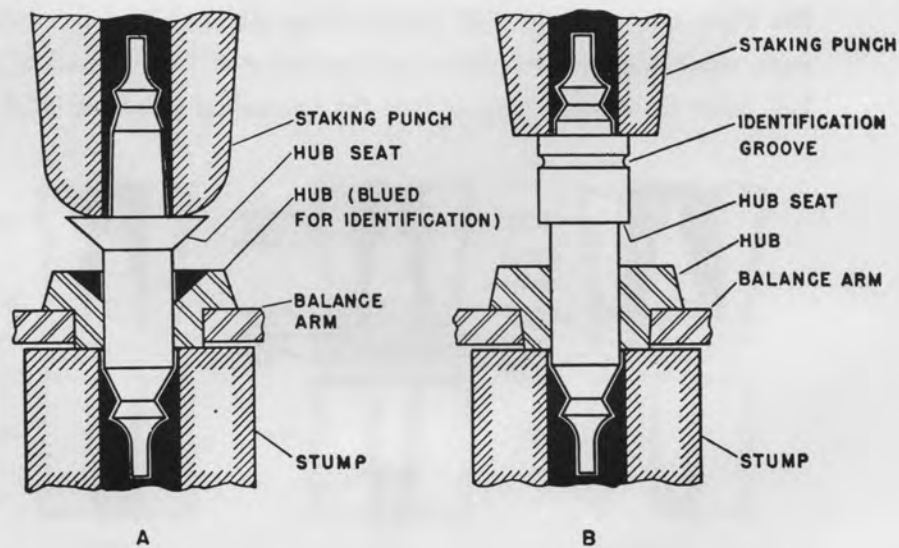


Fig. 7



SUMMARY OF THE STAKING PROCEDURE

Step 1. Establish the proper boundary lines...  
Step 2. Establish the bearing lines...  
Step 3. Establish the standard rivet type staff...  
Step 4. Establish the standard rivet type staff...  
Step 5. Establish the standard rivet type staff...

**SUMMARY**  
*of the*  
**STAKING**  
**PROCEDURE**  
*on the*

**STANDARD RIVET TYPE STAFF**

Step 1. Establish the proper boundary lines...  
Step 2. Establish the bearing lines...  
Step 3. Establish the standard rivet type staff...  
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Step 5. Establish the standard rivet type staff...



## SUMMARY *of the* STAKING PROCEDURE

Step 1. Select the proper stump and necessary punches as follows:

- a. The diameter of the stump hole must be large enough to accommodate the roller shoulder and small enough to insure a firm support for the staff during the staking operation. (See Fig. 8B).
- b. The *seating punch* must have a hole diameter very slightly larger than the balance wheel shoulder so it will clear this shoulder and rest only on the balance arm when the wheel is seated.
- c. The round nosed *spreading punch* must have a hole diameter very slightly larger than the collet shoulder and small enough to contact the riveting shoulder well in from the edge.
- d. The flat nosed *riveting punch* must have a hole the same diameter as the spreading punch.

NOTE: An inverted punch may be used as a stump in this operation.

Step 2. Place staking stand on the bench.

Step 3. Insert stump in the staking stand. Fig. 8A.

Step 4. Place balance staff in the stump with the balance seat up. Fig. 8B.

Step 5. Place balance wheel on staff with the balance arm down. Fig. 8C.

Step 6. Insert Seating Punch in staking stand and lower it to the balance arm. Fig. 8D.

Step 7. Force the Seating Punch downward with the left hand until the balance arm is in firm contact with the balance seat.

Step 8. Remove the Seating Punch and insert the spreading punch in its place.

Step 9. Lower the spreading punch until it contacts the riveting shoulder and hold it firmly in place with the left hand. Fig. 8E.

Step 10. Spread the riveting shoulder by tapping the punch several times with the brass hammer. Rotate the balance in the stump with the little finger of the left hand while using the hammer.

Step 11. Remove the spreading punch and insert the Riveting Punch in its place.

Step 12. Lower Riveting Punch to the riveting shoulder and hold it firmly in place with the left hand.

Step 13. Head over the rivet by tapping the riveting punch several times with a brass hammer. Rotate the balance in the stump as in Step 10 while hammer is being used. Fig. 8F.

Step 14. Remove the Riveting Punch from the staking stand.

Step 15. Remove the staked balance from the stump.

Stake the remaining balances using the above precedures.



on the STANDARD RIVET TYPE STAFF

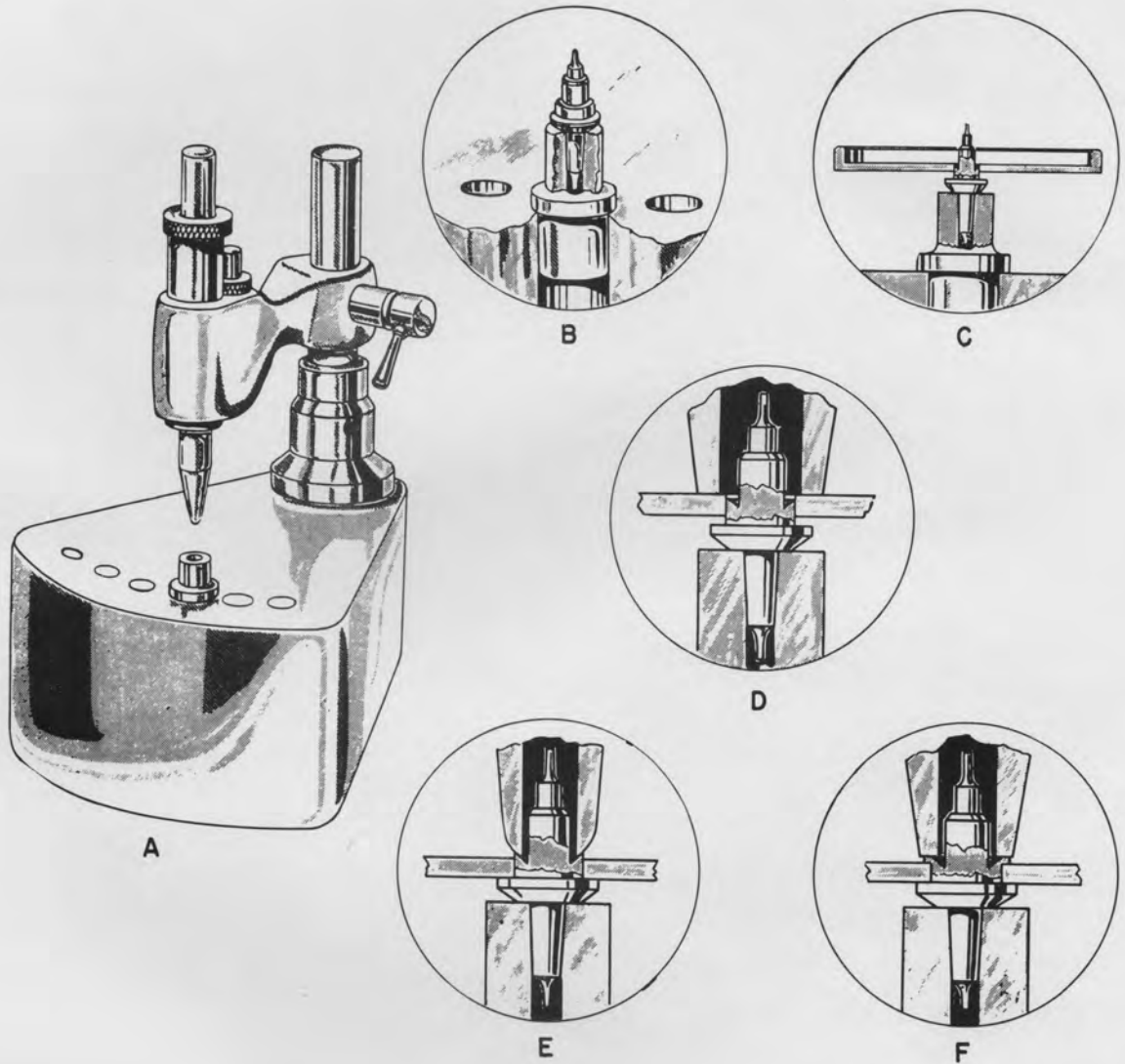


Fig. 8



