

Dec. 19, 1939.

B. A. MILLER

2,183,971

CONCENTRATING TROUGH

Original Filed June 1, 1936

2 Sheets-Sheet 1

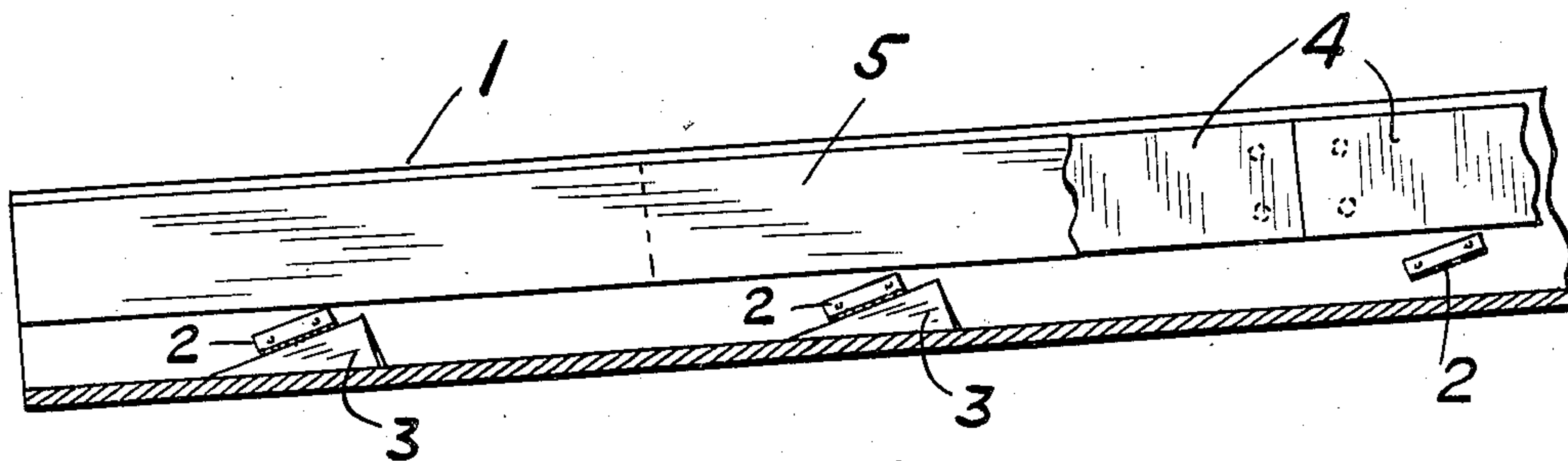


FIG. 1.

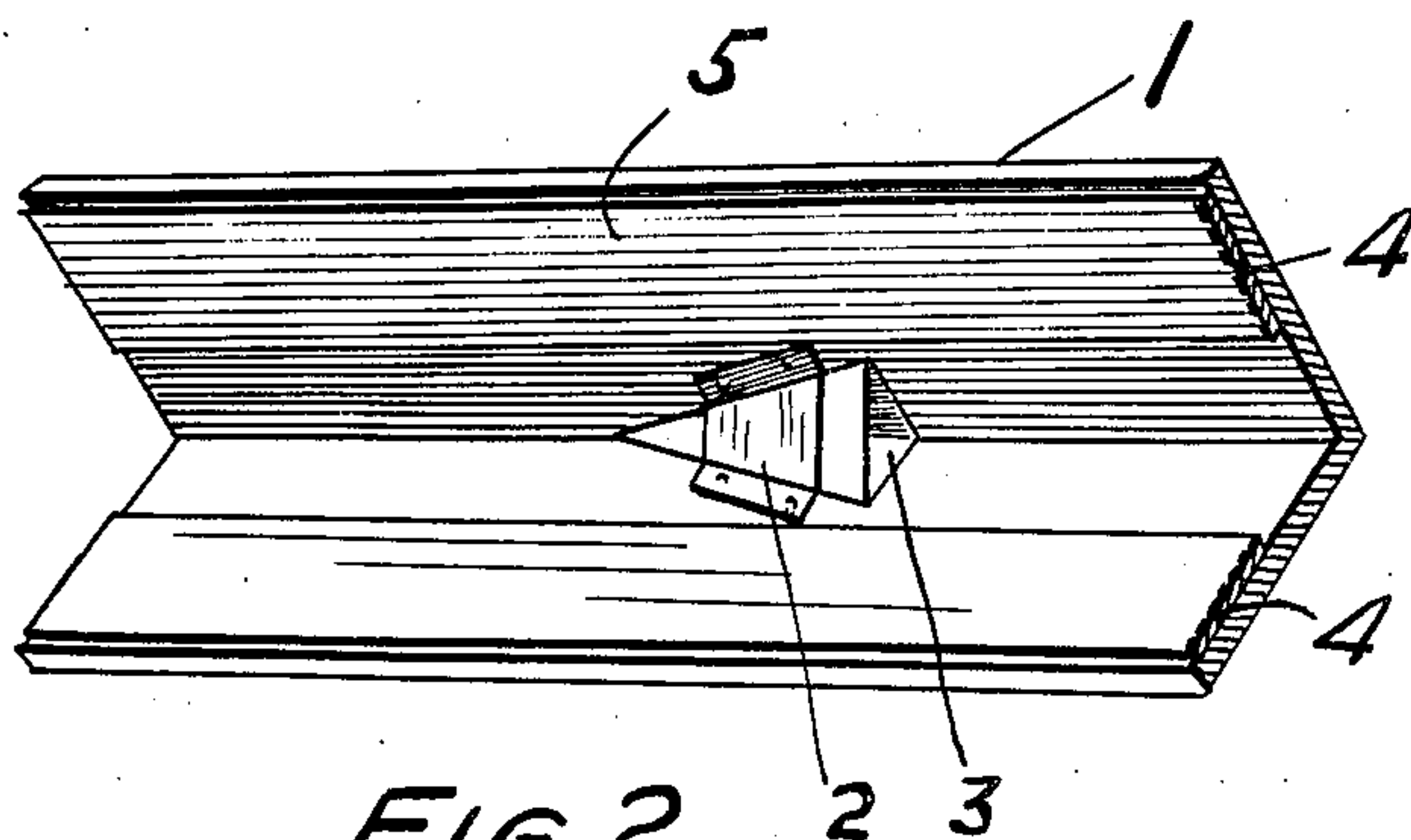


FIG. 2.

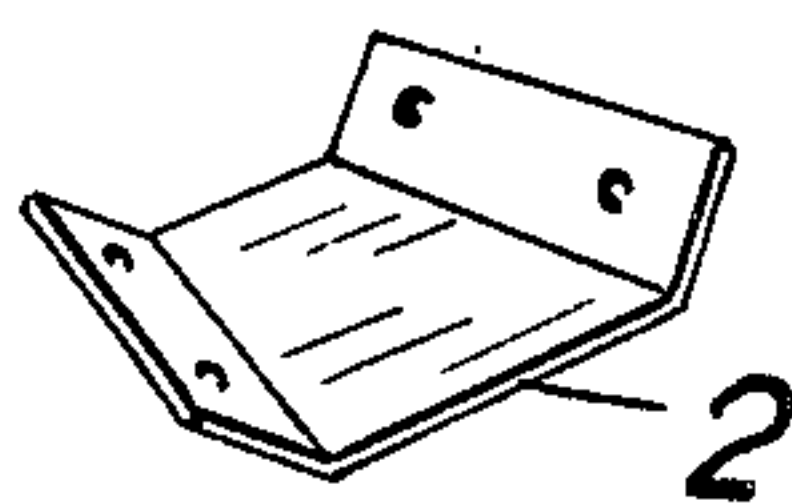


FIG. 3.

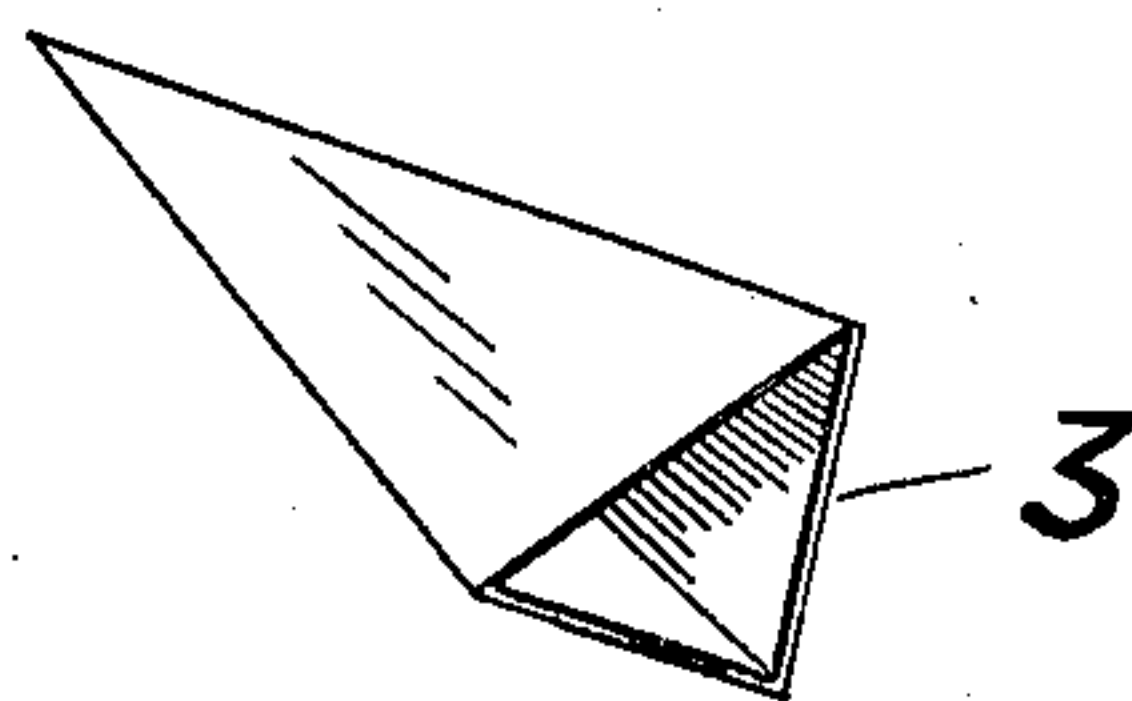


FIG. 4.

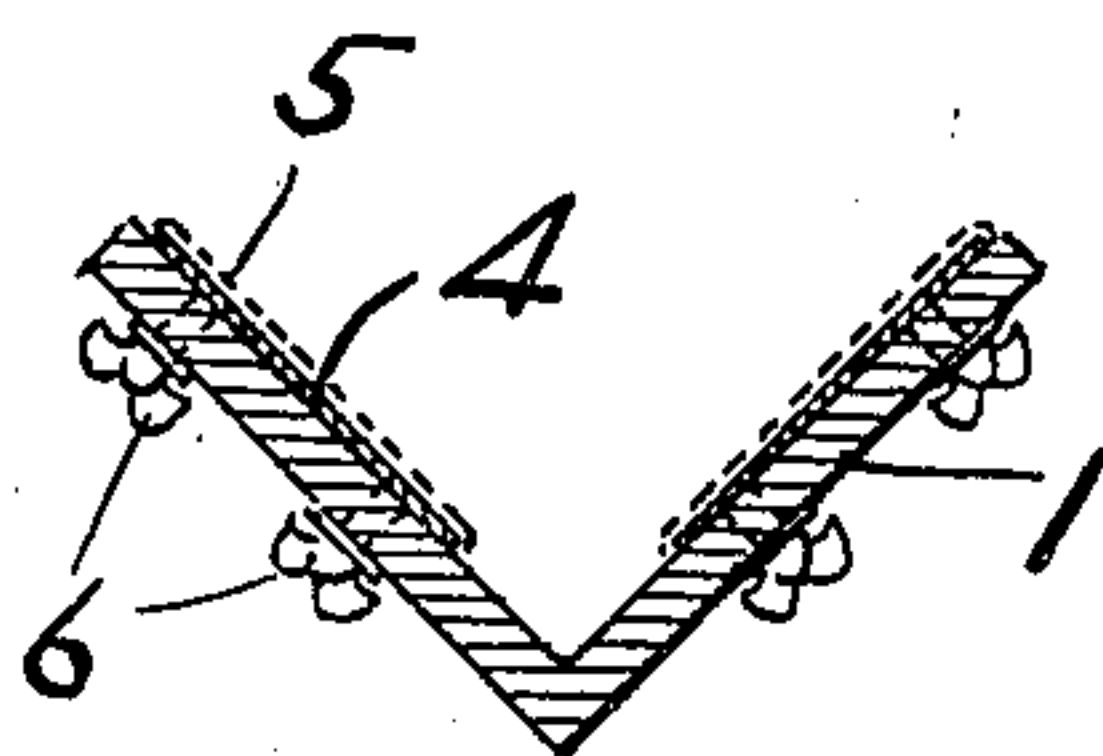


FIG. 5.

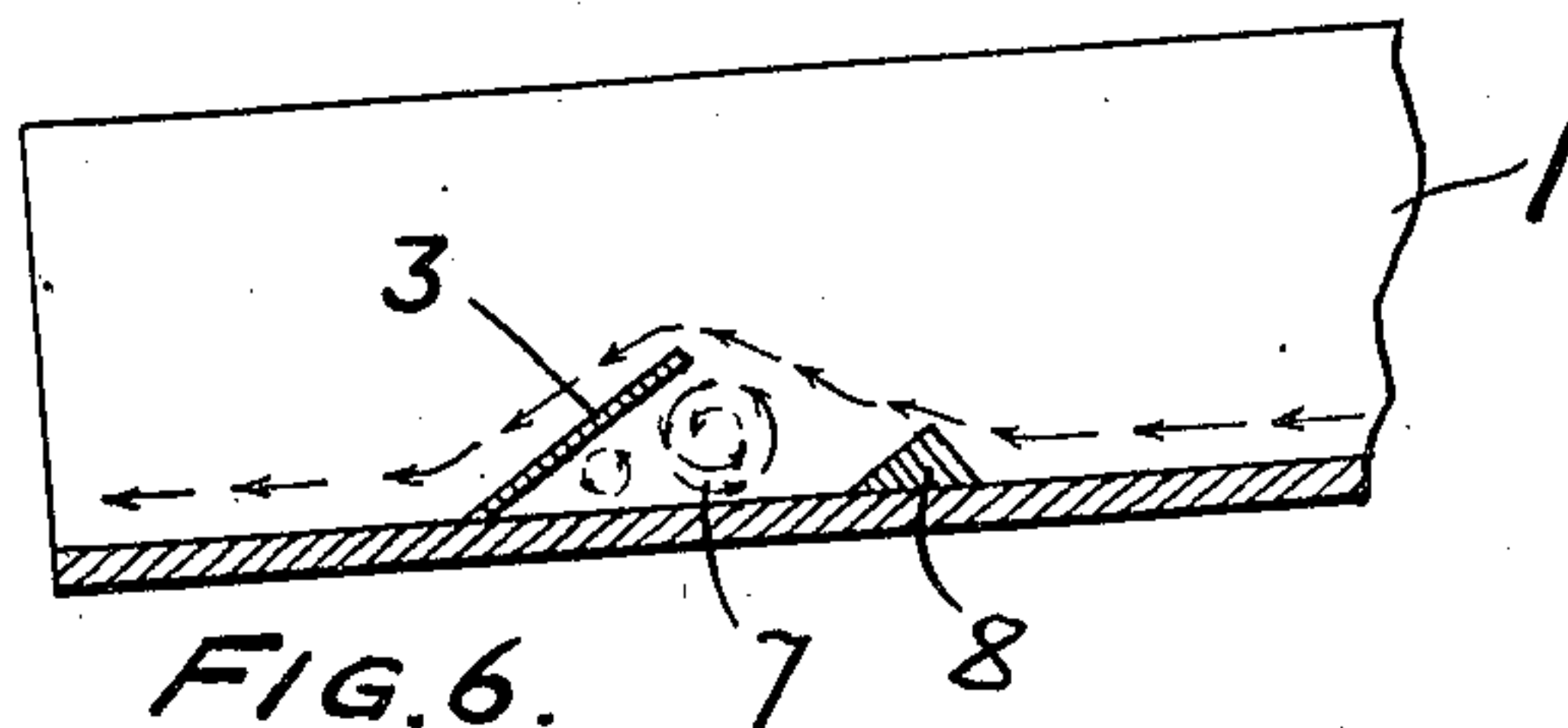


FIG. 6.

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2 Sheets-Sheet 2

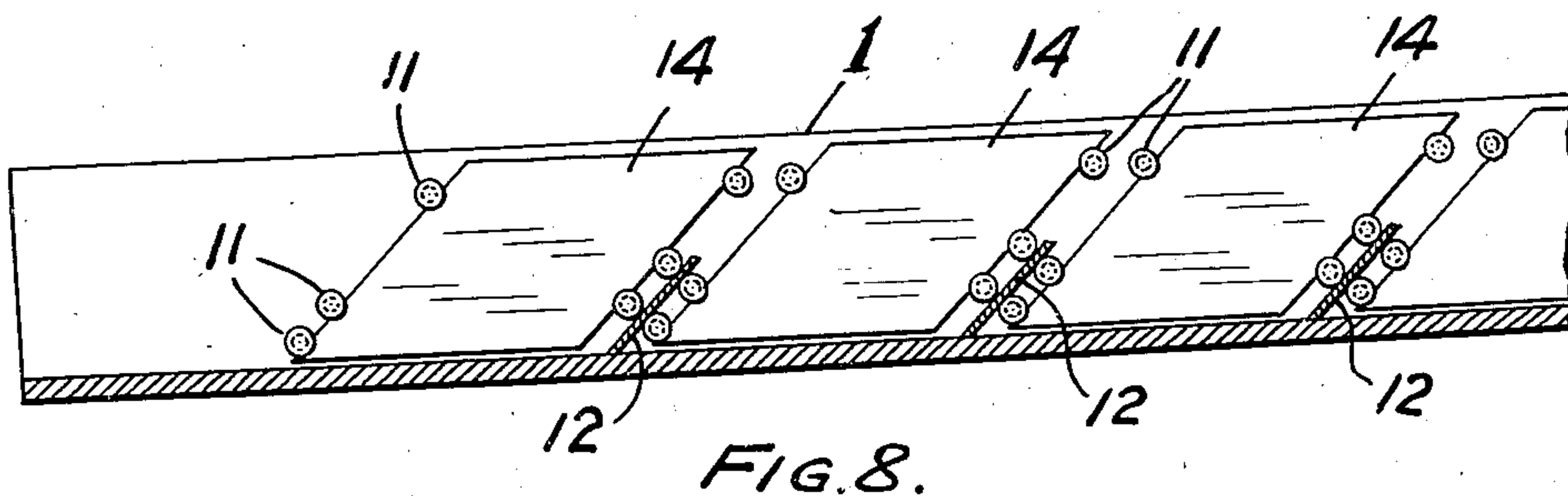


FIG. 8.

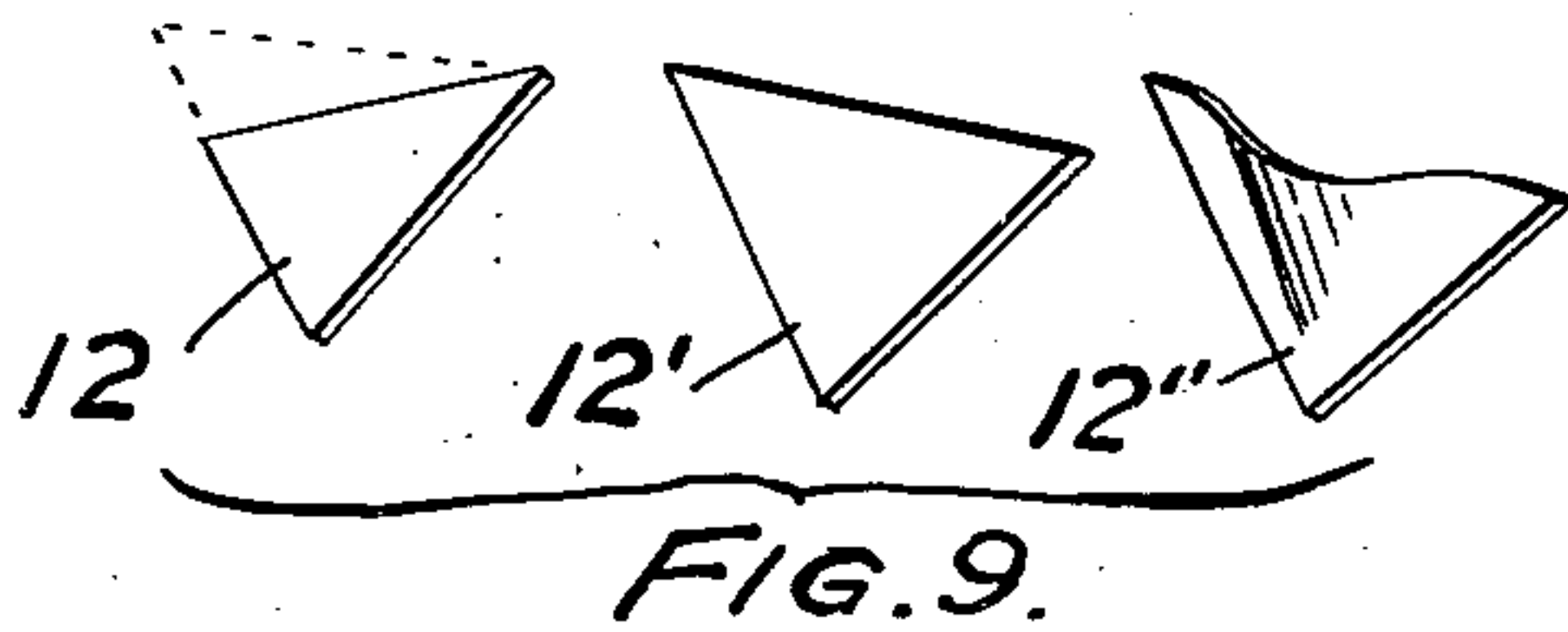


FIG. 9.

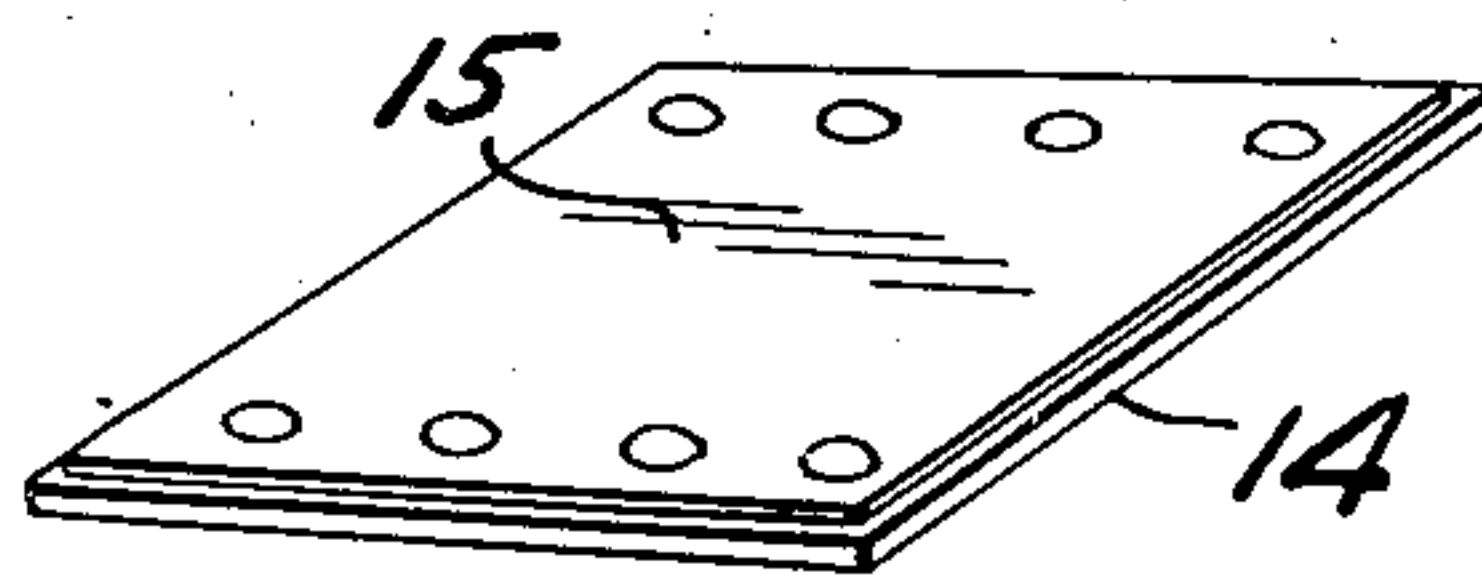


FIG. 10.

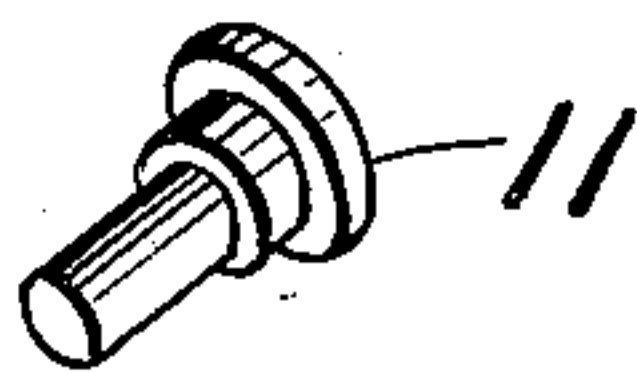


FIG. 11.

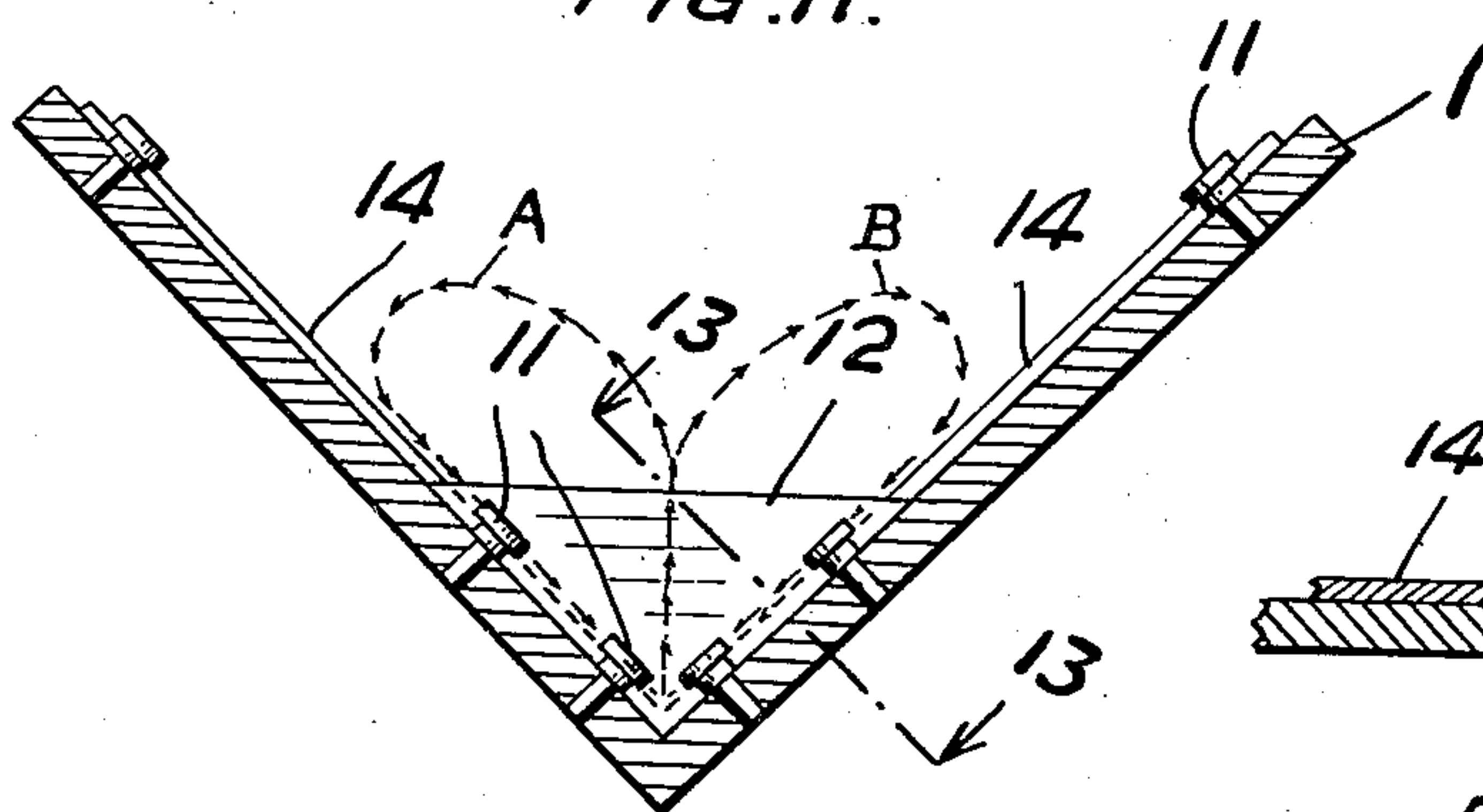


FIG. 12.

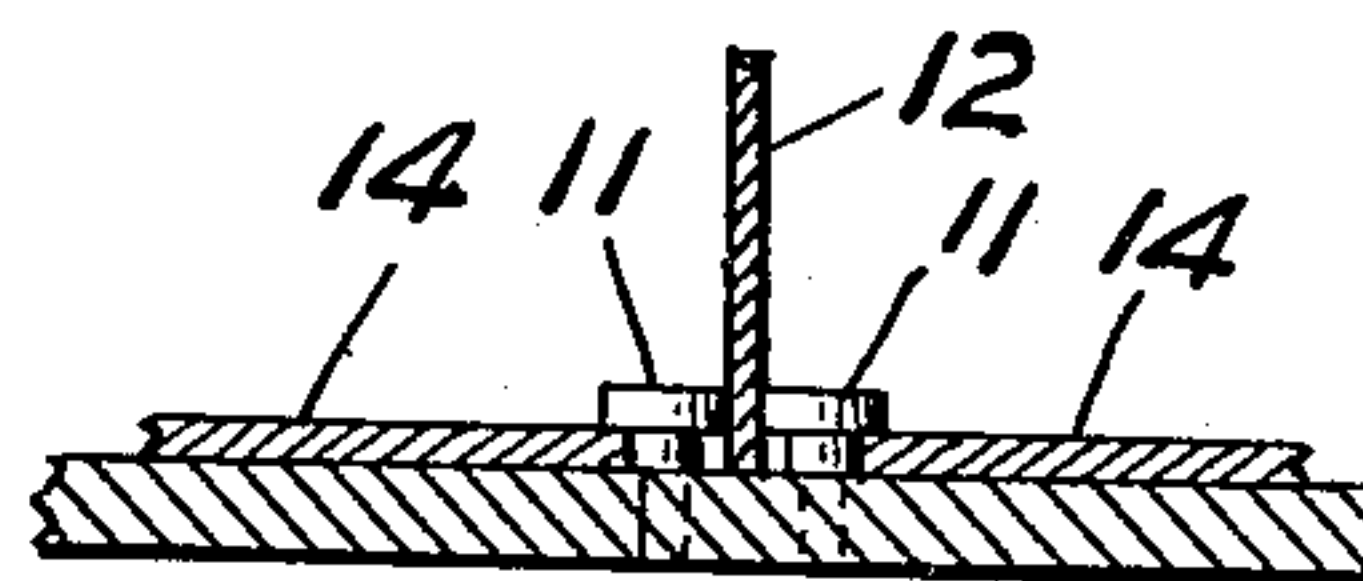


FIG. 13.

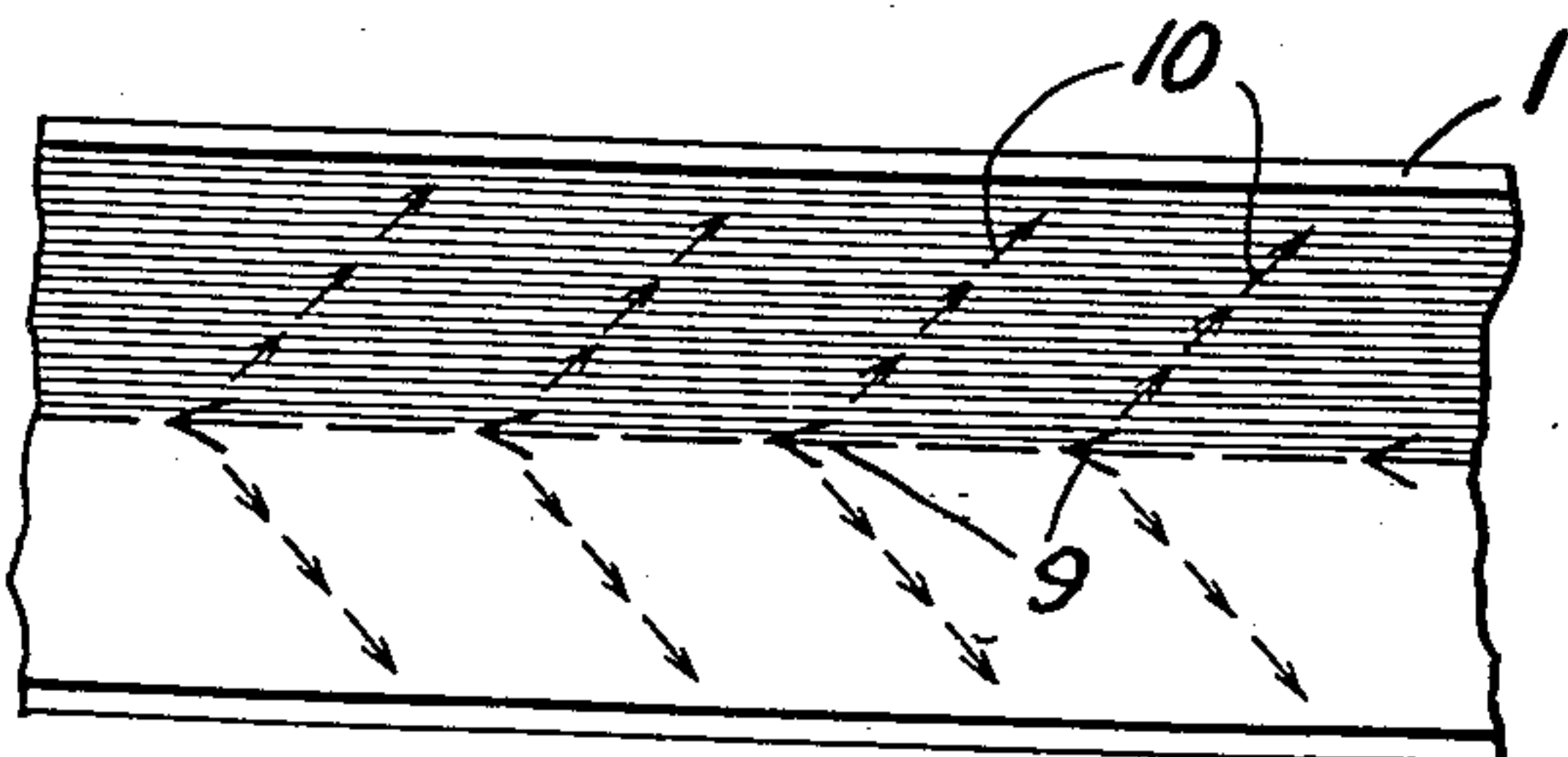


FIG. 7.

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CONCENTRATING TROUGH

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Application June 1, 1936, Serial No. 82,769

Renewed July 22, 1939

4 Claims. (Cl. 209—12)

The present invention relates to methods of and apparatus for the recovery of valuable metals from their associated rock, and an object is to produce two dissimilar co-ordinating concentration actions in a V-shaped flume.

A second object is to employ for this purpose, not only more efficient apparatus than any now in use, but apparatus with greatly reduced installation and operating costs.

A third object is to effect the concentration of fine mineral particles that are in suspension in a moving stream which cannot be saved by any other practice.

I have discovered that when water and mineral-bearing sand or pulp are given a progressive movement, in a V-shaped inclined flume, more perfect gravital stratification results than would be the case in a square-bottomed sluice-box, due to the converging sides of the V forming an angle of repose for the heavier metallic particles, while accelerating the forward movement of the gangue. I likewise cause the lower portion of the stream to undulate thereby creating a transverse circulatory movement, ensuring the contact of all suspended material with collecting plates at the sides of said V-shaped flume.

In the accompanying drawing, illustrating a preferred form of apparatus, for carrying out my invention,

Fig. 1 is a longitudinal section of a V-shaped flume, with triangular riffles and holders in the bottom, and removable collecting plates coated on their exposed face with an adhesive compound.

Fig. 2 is a fragmentary part of a similar flume containing a riffle and holder.

Fig. 3 is a detail view of a riffle holder.

Fig. 4 is a similar view of a riffle.

Fig. 5 is an end view of a V-shaped flume showing collecting plates with the riffle and holder omitted.

Fig. 6 is a longitudinal section of a flume and riffle showing a vortex and hill of concentrate.

Fig. 7 is a plan view showing the surface of the stream.

Fig. 8 is a longitudinal section of a flume containing removable collecting plates secured to the sides between studs and removable riffles set at an acute angle to the longitudinal axis of said flume.

Fig. 9 is a perspective view of the riffles shown in Fig. 8, which are a modification of riffles shown in Fig. 1.

Fig. 10 is a similar view of a removable collecting plate and adhesive compound thereon,

Fig. 11 is a similar view of a stud.

Fig. 12 is an end view of a flume showing removable collecting plates and a riffle, and indicating a stream action.

Fig. 13 is a cross section of Fig. 12 at 13—13 of said Fig. 12.

Referring to Fig. 1, numeral 3 denotes a triangular recess forming riffle with the mouth facing the flow. This element produces a panning movement throwing the stream up with a whirling action. A vortex, indicated by numeral 7 is formed, while the concentrate 8 which is held in the bottom by the pressure displaces the waste. With proper adjustment of the variable-ness between the velocity and resistance, black sand and iron, together with the gangue, will be displaced by the valuable metal to be selectively saved. The normal pressure in the lower layer is sufficient to keep much material in the bottom, but this tendency is augmented by riffle 3 whose violent action forces all lighter grades up to the middle layer from where the stream momentum lifts it to the top layer. When the flow is shut off for a clean-up, riffles 3 are removed, a receptacle is placed at the discharge end of flume 1, and the concentrate is gently washed into receptacle with a water spray.

Numeral 9, of Fig. 7, indicates the center of the top of the stream where the velocity is greater than at any other part of the flow. Hence the pressure at 9 creates eddys and currents, represented by 10, which project valuable float metal to the sides where it is absorbed by an adhesive compound. Numeral 4, of Figs. 1, 2, 5, denotes removable collecting plates arranged longitudinally in flume 1. Numeral 5, of said figures indicates an adhesive compound coated on the exposed face of said collecting plates without the compound coming in contact with the inner walls of the flume. A preferred product for this purpose is made with heavy petroleum, such as Stillwax, modified with silicate of soda. The proportions thereof will vary according to the kind of ore to be treated, but 5 lbs. of Stillwax to 1 lb. of silicate of soda usually gives satisfactory results. When the compound has absorbed sufficient gold, silver or platinum, the plates are removed and the precious metal recovered by the usual bullion-room procedure. Said plates can be removed and replaced, without stopping the operation. For the treatment of some ores, it is feasible to substitute a coating of mercury upon the collecting plates instead of the compound, and concentrate the valuable metal by amalgamation.

In Fig. 8, numerals 14 denote removable col-

lecting plates cut at an angle of 45 degrees. Said plates are a modification of plates 4 of Fig. 1, and are kept in place by studs 11. Numeral 15, of Fig. 10, indicates cloth fastened on the exposed face of plate 14. This cloth is coated with the compound. During clean-ups the plates and cloth are removed, and replaced by others. Riffles 12 are a modification of the riffles 3, forming corresponding recesses at the lowest point in flume 1. Like riffles 3, they produce sharp positive resistance to the flow, deflecting one grade of valuable metal, (the heavier particles) downward and causing said metal to be entrained in the bottom of the flume.

By changing the shape of riffles 12, the suspended material can be thrown to the bottom or sides to suit the convenience of the operator. And by reducing the height of said riffles it is possible to reduce the resistance at desired stations, ensuring the passage of a larger volume of material through flume 1 without danger of obstruction.

It should be obvious that both collecting plates and riffles can be used alone, and they have been so claimed. Where the appended claims make use of the term "converging bottom", this term is meant to convey the idea of a flow or device having converging portions on opposite sides of its median line, and also a V-shaped flow or device truncated at the bottom.

I claim:

1. An apparatus for separating valuable metals from gangue comprising a sluice having

downwardly converging side walls, a collecting medium having an affinity for the metal to be collected supported by said side walls, and baffling means in the bottom of said sluice constructed and arranged to cooperate with the converging walls of the sluice to cause the liquid medium suspending the gangue to move through the sluice in a series of vortices having axes parallel to the general direction of extension of the sluice, and peripheries tangential to the collecting medium supported by the side walls.

2. The structure of claim 1 wherein the baffling means comprises heavy value collecting pockets obstructing the bottom of the sluice and having upstream opening mouths.

3. An apparatus for separating valuable metals from gangue comprising a sluice having downwardly converging side walls, a collecting medium consisting of grease said collecting medium supported by said side walls, and baffling means in the bottom of said sluice constructed and arranged to cooperate with the converging walls of the sluice to cause the liquid medium suspending the gangue to move through the sluice in a series of vortices having axes parallel to the general direction of extension of the sluice, and peripheries tangential to the collecting medium supported by the side walls.

4. The structure of claim 3 wherein the collecting medium is applied to plates removably supported by the side walls of the sluice.

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