

No. 620,328.

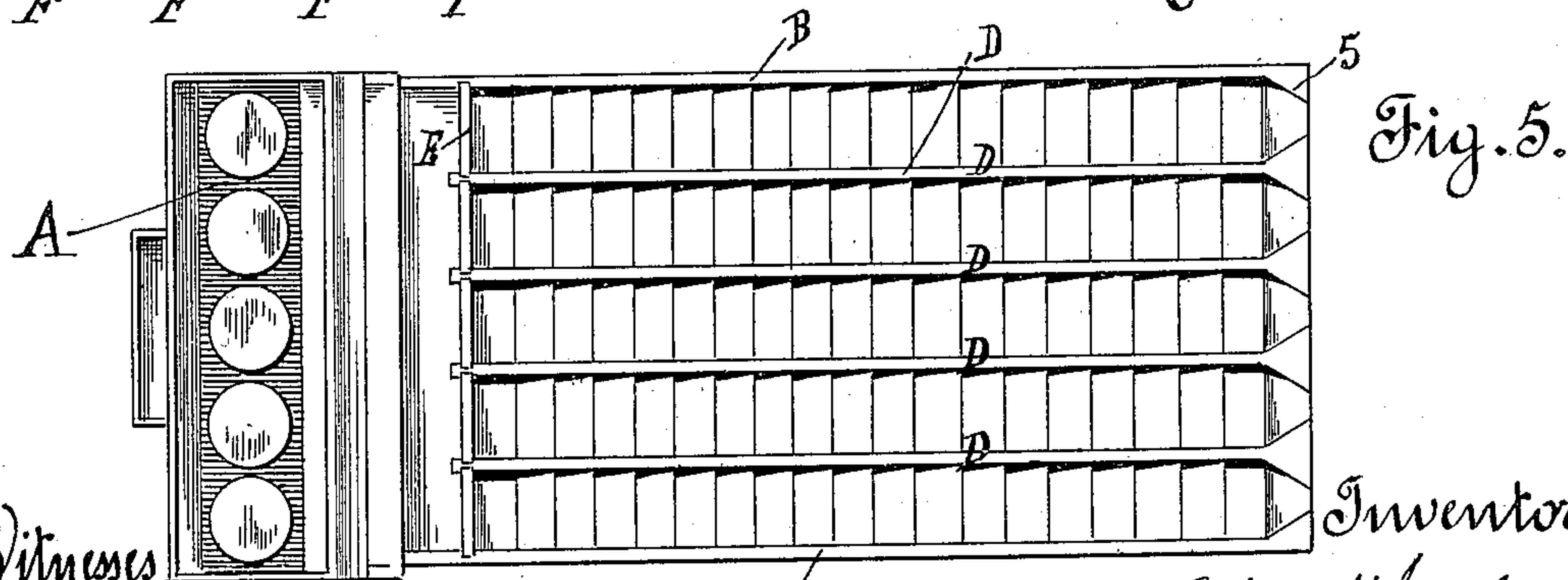
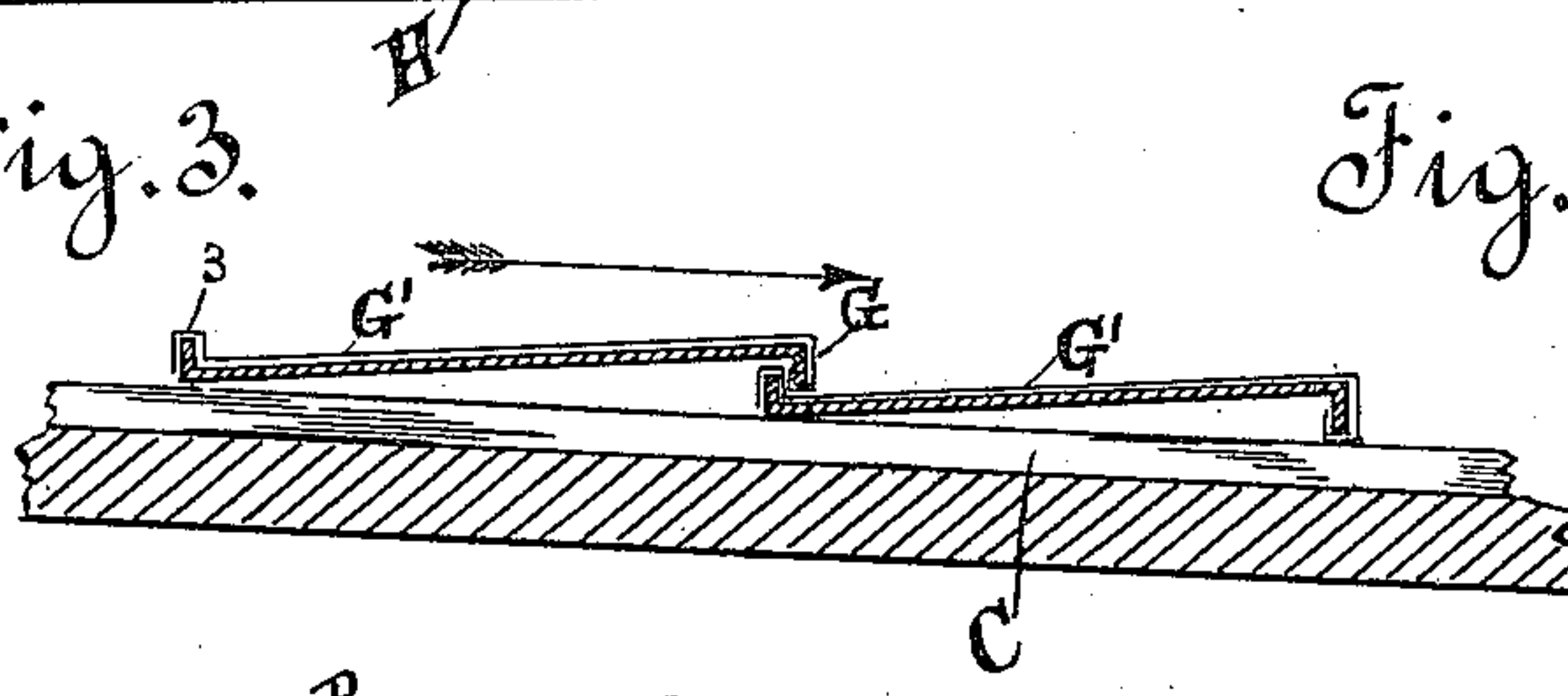
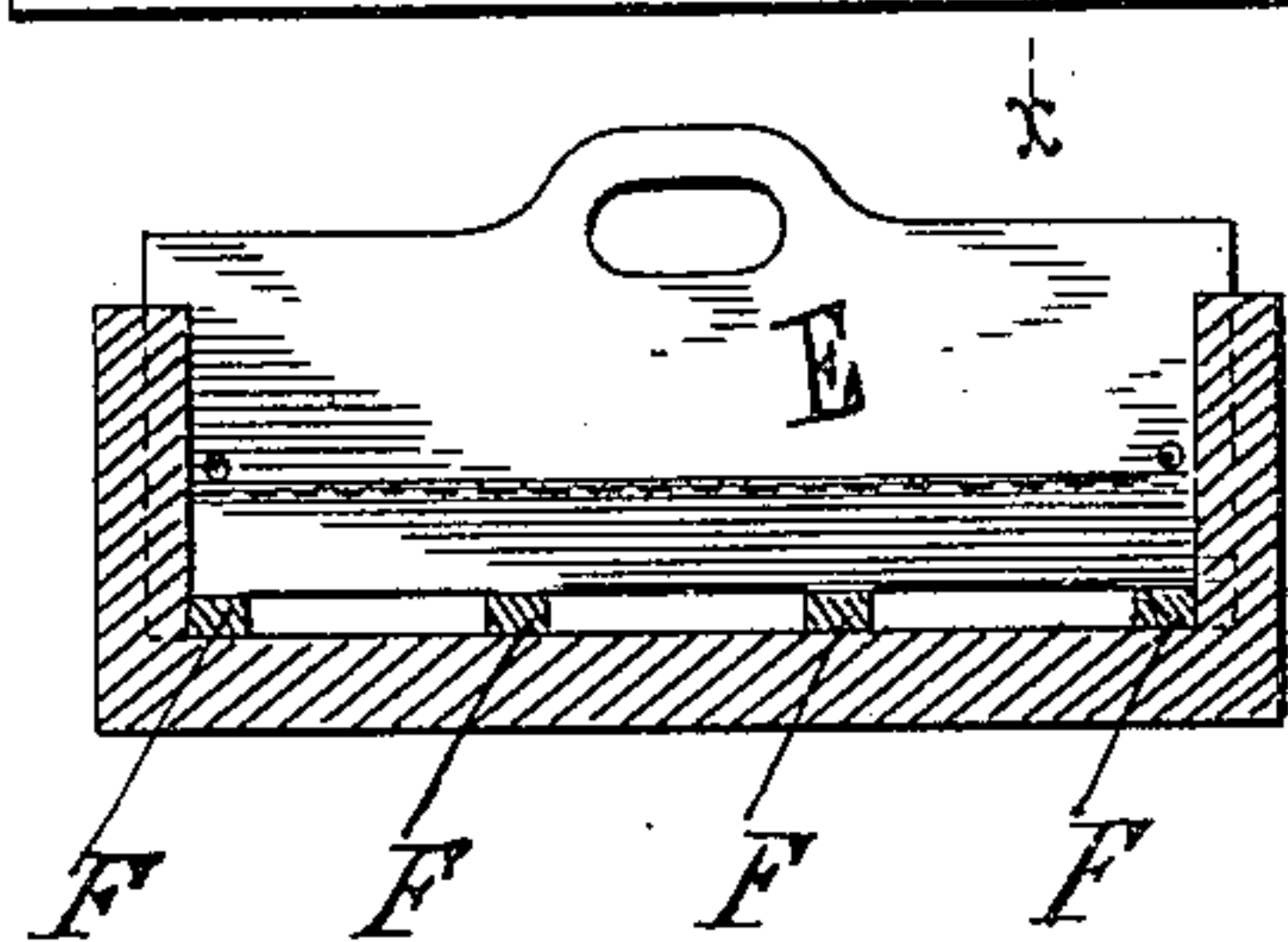
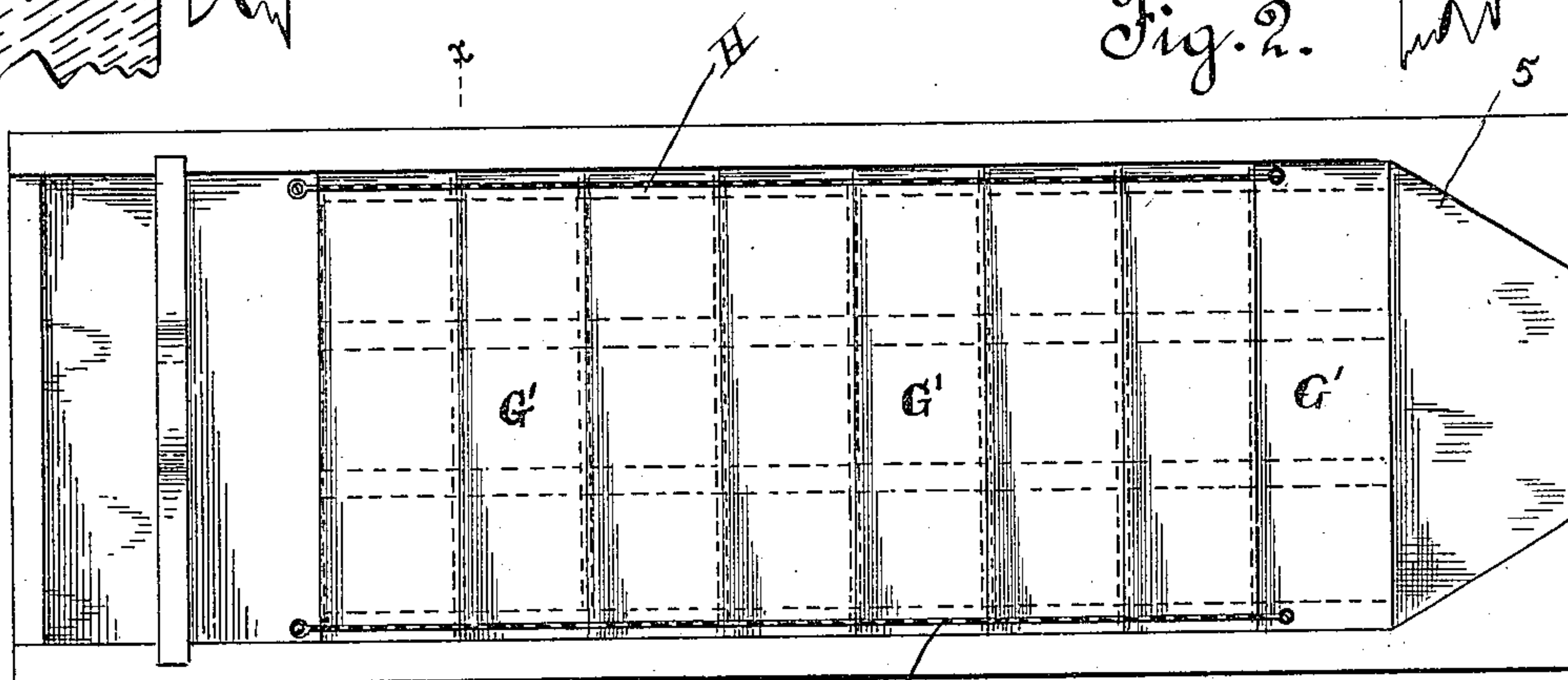
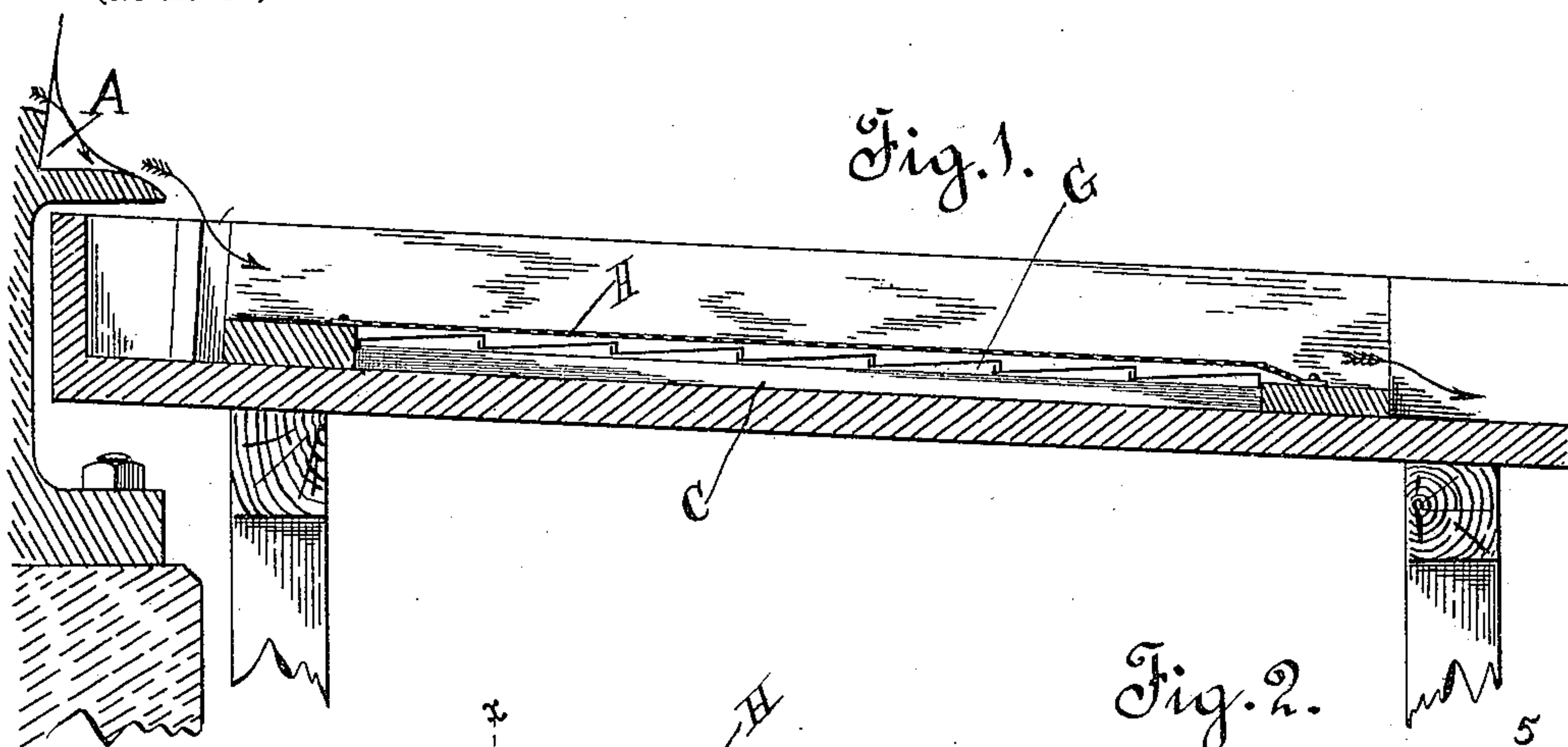
Patented Feb. 28, 1899.

A. H. JOCELYN.

AMALGAMATOR.

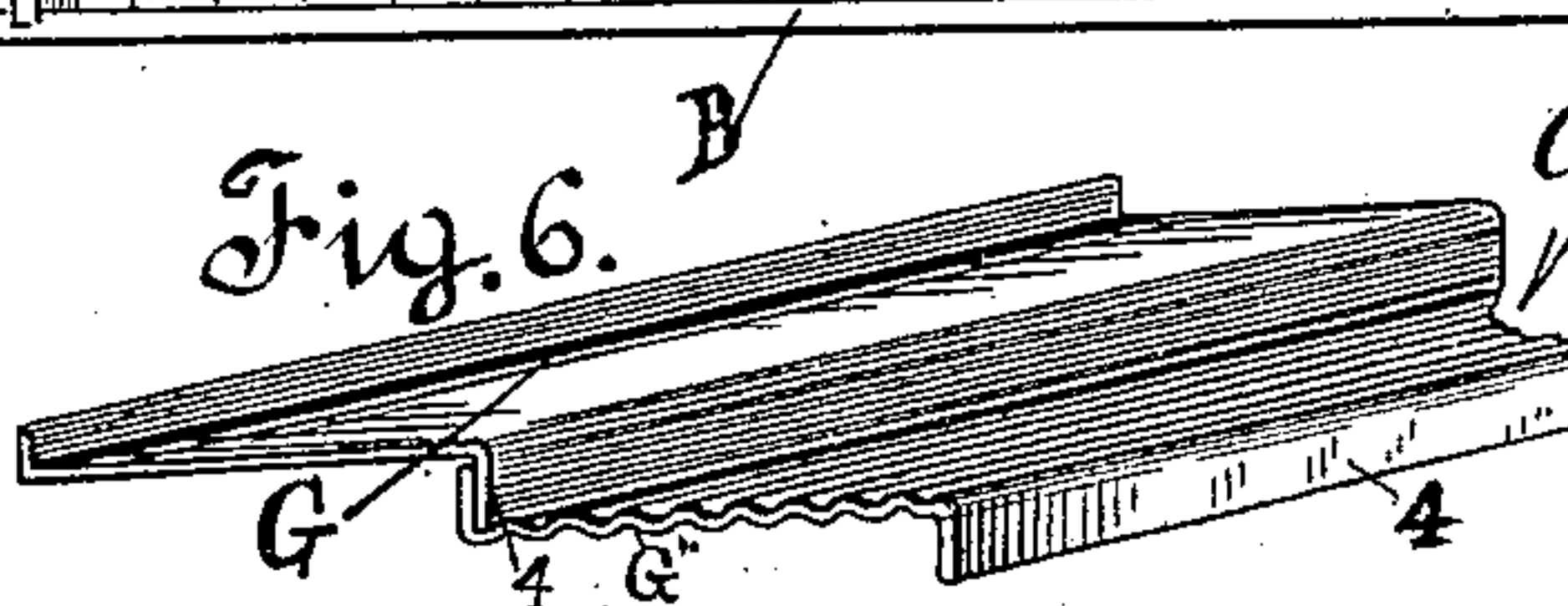
(Application filed June 8, 1896.)

(No Model.)



Witnesses  
H. Monteverde.  
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Fig. 6.



Inventor.

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By J. H. Miller  
His Atty.



# UNITED STATES PATENT OFFICE.

ALBERT H. JOCELYN, OF NEW YORK, N. Y.

## AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 620,328, dated February 28, 1899.

Application filed June 8, 1896. Serial No. 594,742. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT H. JOCELYN, a citizen of the United States, residing at the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Amalgamators; and I do hereby declare that the following is a full, clear, and exact description thereof.

10 This invention relates to amalgamators, and more particularly to plate-amalgamators.

One object of the invention is to provide an improved amalgamating device comprising a plurality of shiftable, interchangeable, 15 and removable amalgamating members or plates constructed and organized to facilitate the ready "cleaning up" thereof, and each of which amalgamating members or plates may comprise a backing or backing-plate and a removable facing or face-plate carried thereby and having an amalgamating-surface.

20 A further object of the invention is to provide an amalgamating-surface comprising one or more amalgamating members or plates comprising a stiff backing or body and a removable facing or face-plate composed of flexible or pliable metal or metal foil.

30 In the drawings accompanying and forming part of this specification, Figure 1 is a longitudinal sectional view of one form of amalgamating-sluice shown in juxtaposition to a battery, a part of which only is shown, a gate of the sluice being removed. Fig. 2 is a top view, on an enlarged scale, of a sluice having 35 but a single compartment, a gate thereof being in position to cut off the flow of pulp over said sluice. Fig. 3 is a cross-sectional view thereof, taken in line *xx*, Fig. 2. Fig. 4 is an enlarged detail sectional view of the removable amalgamating members or plates. Fig. 40 5 is a top view of a battery and a series of five sluices in position adjacent thereto; and Fig. 6 is a detail perspective view of two of the amalgamating-backings or backing-plates, 45 said view showing different constructions thereof.

Similar characters of reference designate corresponding parts in the different figures of the drawings.

50 In practice the construction of apron or sluice which is more generally used in connection with a battery for amalgamating pur-

poses is that in which large heavy previously silver-plated copper plates are fixedly secured in position by suitable fastening devices. These amalgamating-plates have, however, been found expensive in practice, owing to the time and labor necessary to secure the proper cleaning up thereof, as the plates being fixedly secured in position and not freely 60 separable or removable the clean-up cannot be made except at predetermined periods, without considerable labor, it being necessary to permanently cut off the flow of pulp or slime over the plates for a considerable length 65 of time to permit the amalgam to be scraped therefrom. This scraping action, which usually takes place where the plates are secured in position and which in itself is inconvenient and laborious, is also liable to injure 70 the plates, as it is often necessary to use chisels to scrape off the amalgam, thereby also scraping off the silver plating. Moreover, when the silver plating becomes worn or scraped off it is again necessary to cut off 75 the flow of pulp for a considerable length of time in order to remove the plates for the purpose of resilver-plating, and as they are usually sent to a factory for this purpose it follows that a material loss of the precious 80 metal results, since it is well known in the art that the plates become more or less impregnated with amalgam remaining permanently attached thereto and which is incapable of being removed by the usual modes 85 of cleaning up. In order to avoid these serious disadvantages and defects, an improved amalgamating means, comprising a series of improved amalgamating members or plates, is provided, in the use of which the 90 separation of the amalgam therefrom is facilitated and this without the loss of any appreciable amount thereof or without the liability of injuring the plates and without the necessity of cutting off the flow of pulp for 95 any appreciable length of time. As a preface to a further description of this improved amalgamating means it will be understood that the general construction thereof shown and described herein may be more or less varied 100 without departing from the general scope of the invention and that while the separable or removable amalgamating members or plates are shown herein carried by an ordi-



nary sluice it will be readily seen that this is not necessary, since they could be disposed in position in any other desired manner. In fact, they are adapted for use in old plants without material change of such plants and can be used over the old copper plates or aprons, if desired, thus avoiding a reorganization or reconstruction thereof. In one form thereof herein shown and described this improved amalgamating means is disposed adjacent to a suitable crushing-mill, (designated in a general way by A,) which may comprise a stamp-mill having a series of stamps, shown herein as five in number, although any other form of crushing-mill may be used. This improved amalgamating means is preferably disposed below the crushing-surfaces and adjoining the mill and comprises a suitable sluice-box constructed in any desired and suitable manner, preferably of timber, having the bottom or bed C and the side frames or timbers B. This sluice may be supported on a suitable framework or otherwise and is usually set at an inclination, the highest or pulp-receiving end being at the point where the pulp is delivered from the battery, for which purpose a suitable distributing-plate or delivery-apron 2, projecting over the upper end of the sluice, (see Fig. 1,) may be provided, if desired. This sluice may be divided into one or a plurality of longitudinally-extending compartments. (Shown, respectively, in Figs. 2 and 5.) When a multicompartment sluice is desired, these longitudinally-extending compartments may be formed and separated from one another by partitions D, formed of timber or any suitable material, Fig. 5. Each of these compartments is provided adjacent to its upper or pulp-receiving end with a suitable gate E, which may be opened or closed, as desired. In the present instance each compartment is shown provided with a vertically-sliding gate, although any suitable construction thereof adapted to cut off the flow of the pulp and water when necessary may be used.

In the present construction suitable longitudinally-extending cleats or strips F are disposed on the bottom or bed of the sluice-box for supporting the amalgamating-plates, which are disposed crosswise on the same. In this construction these strips F may act as tracks to permit the shifting of the plates and also permit the formation of a space between the under side of the amalgamating-plates and the bed of the sluice-box for flushing purposes. Each of these improved amalgamating members or plates, (designated in a general way by G,) in one form thereof herein shown and described, comprises a backing or body for supporting or carrying the amalgamating-surface, and which backing or body is shown herein comprising a stiff (preferably rigid) plate G'', which may be made of wood or metal or of any other suitable material and is preferably of greater length than width. Suitable means is provided for maintaining the plates in position relatively to each other

and to their support, and in the present construction the plates are provided with retaining means, shown in the present instance comprising interlocking or overlapping flanges or joints. For this purpose the opposite longitudinal edges of the plates are bent or turned in opposite direction, (see Figs. 4 and 6,) thereby forming an upwardly-extending flange 3 at the upper or rear edge of the plate when the plate is in its proper position in the sluice and a downwardly-extending or depending flange 4 at the lower or front edge thereof, whereby when the plates are assembled the depending flange 4 of each plate overlaps the upwardly-extending flange 3 of a companion plate, thereby forming interlocking joints adapted to permit the shifting of all the plates simultaneously and also to prevent the loss of the pulp.

The plates formed in the manner herein set forth may be struck out of sheet metal or cast, or such plates may have their flanges bent or folded in position, as may be found desirable.

Each backing-plate G'' is provided with a freely or readily removable amalgamating-surface shown herein comprising a facing or face-plate G', which may consist of any suitable amalgamating material adapted to be readily attached to the backing-plate—such, for instance, as a metallic covering or metal foil, which in practice may comprise a suitable pliable sheet or foil of precious metal—such, for instance, as silver-foil, which may be composed of pure or commercially pure silver or an alloy of silver, as is found desirable. In practice each of these face-plates is preferably formed of a thin layer or metal foil sufficiently pliable or flexible to permit it to be readily bent around the backing-plate, the flanges of which may form a means for holding such metal-foil face-plate in position. This foil is usually merely creased around and underneath the edges of the backing-plate, thereby to permit it to be easily removed when desired. In practice the surface of the backing-plate over which the metal foil is placed may be either smooth or corrugated, (see Fig. 6,) whereby in the latter construction the formation of a plurality of ruffles or depressions in each plate is obtained, thereby increasing the amalgamating-surface of the plate. By means of these removable face-plates G', which in practice when composed of silver may weigh about one ounce, the necessity of scraping the amalgam from the plates is avoided, as by removing the face-plate such plate, together with the amalgam thereon, can be shipped away, or the plate melted up with the amalgam thereon or separated therefrom in any desired manner, as by immersing it in warm or hot water to soften the amalgam, a new face-plate being readily and easily bent around the backing-plate in place thereof. Moreover, by having the face-plates removable and also formed of light as well as of pliable material, each of which, as above stated, in practice weighs about one



ounce, it will be seen that they can be readily folded or not, as desired, and may be sent by mail or otherwise shipped at a comparatively small cost to replace those that are worn out and can be quickly placed in position without shutting down the mill and by merely temporarily cutting off the flow of pulp from the particular sluice to which the plates are to be applied. Moreover, the cost of silver-plating, as well as the cost of the copper plates, is entirely done away with, and as these improved plates always keep a pure white highly-amalgamable silver surface and do not discolor and are absolutely non-corrosive they never have to be resilvered, as is the case with the copper plates, and when they have become unfit for use they can be readily melted up as bullion. In practice these amalgamating-plates G, each comprising a backing and a superimposed metal plate or foil and preferably of about twelve inches in length and three inches in width, are disposed crosswise in the sluice-box or of each compartment thereof, interlocking or overlapping with one another, (see Figs. 1 and 4,) thereby preventing leakage at the joints and so forming a loose-jointed amalgamating-bed. By this means of disposing the amalgamating-plates G a series of steps are formed, over which flows the ore pulp or slime from the battery. By having the plates constructed as above set forth it will be seen that a large number of steps or descents to each foot may be obtainable and which may, if desired, aggregate about an inch fall to the foot, whereby a more thorough distribution of the ore-pulp over the plates is obtained than is the case where the plates are of large dimensions—as for instance, the copper plates heretofore in use.

In the present construction each sluice-compartment is shown provided at its lower end with converging side walls 5, thereby forming a means for maintaining the shiftable amalgamating-plates in position against displacement while the ore-pulp is flowing thereover.

In the process of obtaining the precious metal quicksilver is smeared over the surface of the metal foil or face-plate and the crushing-mill started, a suitable quantity of water being supplied thereto in the usual manner. The gates E are then opened and the pulp and water flow by the same down and over the amalgamating-surface G', whereby the precious metals in the pulp are amalgamated upon the said surface. A "clean-up" from all the sluice-boxes may be made at once or from only one thereof, as desired. When a clean-up is to be made from any one of the separate sluice-boxes, its gate E is closed and the amalgamating-plates G, or such of them as may be desired, are removed, after which fresh or clean plates corresponding in number to the plates removed are inserted and the gate again opened for further operation. All the plates in a sluice-box, or any less number

thereof, or only one at a time, as the necessity of the case requires, may be removed. In practice, however, as the amalgamating-plates at the upper end of the sluice usually have the largest amount of amalgam thereon they are alone removed, the remaining plates being then shoved or drawn upward toward the top and a fresh or clean plate or plates corresponding in number to the removed plates disposed in the vacancy left at the bottom, this shifting of the plates being permitted, owing to the overlapping or interlocking flanges, whereby all of the plates are movable simultaneously on the strips F, which, as above set forth, serve as tracks for this purpose. When, however, it is desired to make a general clean-up, the crushing-mill is temporarily stopped and all the plates removed; but in practice it is usually only necessary to remove the plates or a part of them from only one sluice or sluice-box at a time by temporarily cutting off the flow of pulp and water through the gate of such sluice and allowing the flow to continue through the remaining sluices. By making a clean-up of one sluice while the others are in full operation the mill may be kept continually running, thus obviating the necessity of shutting it down at any time in order to make a proper clean-up. After the amalgamating plate or plates have been removed the metal foil or face-plate is stripped or removed from the backing-plate, the surplus quicksilver removed therefrom by squeezing or otherwise either by a press or by hand, and such foil, together with the amalgam thereon, then separated or melted up together, as desired. Since in practice I may use foil of approximately pure silver, it will be readily perceived that by this improved process there will be no loss in melting the face-plate or foil with the amalgam, as it will form a part of the resulting bullion and it will be a great saving of labor and expense over the old method of cleaning up.

From the foregoing it will be readily understood that by means of this improved construction of amalgamating-plates thin metal foil may be employed, which may be quickly applied and closely fitted to the backing-plate, whether the latter be plane-faced or corrugated, and since this face-plate is pliable and fits closely to the backing-plate and about the edges thereof it requires no independent fastening device and may be easily and quickly applied by hand without the aid of any tools whatever. It is therefore apparent that not only by reason of the facility of repair or replacement afforded, but also by the relatively small quantity of metal necessary to be used, the construction is a marked improvement upon the character of amalgamating means ordinarily used. In addition to this the foil face-plates can be readily squeezed or wrung to remove the surface of quicksilver preparatory to melting, and the fact that the plates are preferably thin they



may advantageously be of pure silver without impairing the product nor necessitate the subsequent separation thereof from the amalgam before melting.

5 Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. An amalgamating-plate consisting of a stiff supplementary backing or body and a  
10 removable metal foil attached thereto.

2. An amalgamating-plate consisting of a stiff supplementary backing or body having a corrugated surface, and a removable metal foil placed over said corrugated surface and  
15 attached to the said backing or body.

3. An amalgamating-bed composed of a series of separable plates each formed with edges adapted to interlock with those of adjoining plates; and a facing of thin metal foil  
20 carried about the interlocking edges, whereby the foil is firmly held in place.

4. An amalgamating apparatus consisting of a sluice-box; means for supplying pulp and water thereto, and for cutting off the  
25 supply; a series of interlocking but separate and removable backing-plates constituting a stepped bed; and metallic-foil facings applied one to each backing-plate, substantially as described.

30 5. An amalgamating apparatus consisting of devices for supplying pulp and water, a sluice-box and a loose-jointed amalgamating-bed arranged in said sluice-box, consisting of removable amalgamating-plates which interlock one with another so as to form a continuous amalgamating-surface and prevent  
35 leakage at the joints, each of said amalgamating-plates consisting of a stiff supplementary backing or body and a removable metal foil attached thereto.

6. The process of extracting precious metals from ores, which consists in passing the ores when finely pulverized and mixed with water over an amalgamating-surface consisting of a  
45 metal foil covered with quicksilver, and then melting the metal foil together with the amalgam thereon into bullion.

7. In a device of the class specified, the combination of supporting means; and a series of  
50 amalgamating-plates carried by said supporting means, each of said plates comprising a backing-plate and a removable silver-foil face-plate.

8. In a device of the class specified, the combination of supporting means; and a series of  
55 plates carried by said supporting means, one overlapping another, and each of said plates comprising a backing-plate and a removable silver-foil face-plate.

60 9. In a device of the class specified, the combination of supporting means; and a series of plates carried by said supporting means, each comprising a backing-plate having a depending flange and an upwardly-extending flange,  
65 one flange of each plate overlapping the flange of an adjoining plate, and another flange of

the same plate being overlapped by the flange of another adjoining flange, and a removable amalgamating face-plate overlapping said backing-plate and the edges of each of its  
70 flanges.

10. In a device of the class specified, the combination of supporting means; and a series of plates carried thereby, each of said  
75 plates comprising a backing-plate and a removable metal-foil face-plate, said backing-plate having a plurality of flanges, one flange of each plate overlapping the flange of an adjoining plate, and another flange of the same  
80 plate being overlapped by the flange of another adjoining plate.

11. In a device of the class specified, the combination of supporting means; and a series of shiftable and interchangeable plates carried by said supporting means, each having  
85 a plurality of flanges, one flange of each plate overlapping the flange of an adjoining plate, and another flange of the same plate being overlapped by the flange of another adjoining plate, and each of said plates comprising a stiff backing-plate and a removable  
90 metal-foil face-plate, and all of said plates being simultaneously shiftable on the removal of one or more of said plates.

12. In a device of the class specified, the combination of supporting means comprising  
95 a track; and a series of removable amalgamating members carried thereby, each comprising a backing or body and a removable metal-foil face-plate carried by said backing or body.

13. In an amalgamating device, the combination of a sluice having one or more compartments; a series of amalgamating members carried by said compartment and each  
100 comprising a backing or body and a removable metal foil carried thereby; and means for preventing the displacement of said amalgamating members.

14. In a device of the class specified, the combination of a sluice having one or more  
110 longitudinally-extending compartments; and a series of amalgamating members carried thereby, one overlapping another, and each comprising a backing-plate and a removable amalgamating foil face-plate, said sluice having converging walls at its lower end, and thereby forming a means for maintaining  
115 said amalgamating members in position.

15. An amalgamating member comprising  
120 a backing or body; and a removable precious-metal-foil facing thereon.

16. An amalgamating-plate comprising a backing-plate and a removable silver-foil face-plate disposed thereon.

17. An amalgamating-plate comprising a backing-plate having a flange; and a removable metal-foil face-plate superimposed on the face of said plate.

18. An amalgamating-plate comprising a  
130 backing-plate having a depending flange and an upwardly-extending flange; and a remov-



able face-plate of pliable amalgamating material overlapping the face of said backing-plate and the edges of said flanges.

19. In a device of the class specified, the combination of supporting means; and a series of removable amalgamating-plates carried by said supporting means, and each comprising a corrugated backing-plate and a removable silver-foil face-plate carried thereby.

20. An amalgamating-plate having a plu-

ality of ruffles therein and comprising a backing and a removable metal-foil facing superimposed thereon.

In testimony whereof I affix my signature, in presence of two witnesses, this 30th day of August, 1895.

ALBERT H. JOCELYN.

Witnesses:

HENRY C. DROGER,

HOWARD TRUMBO.