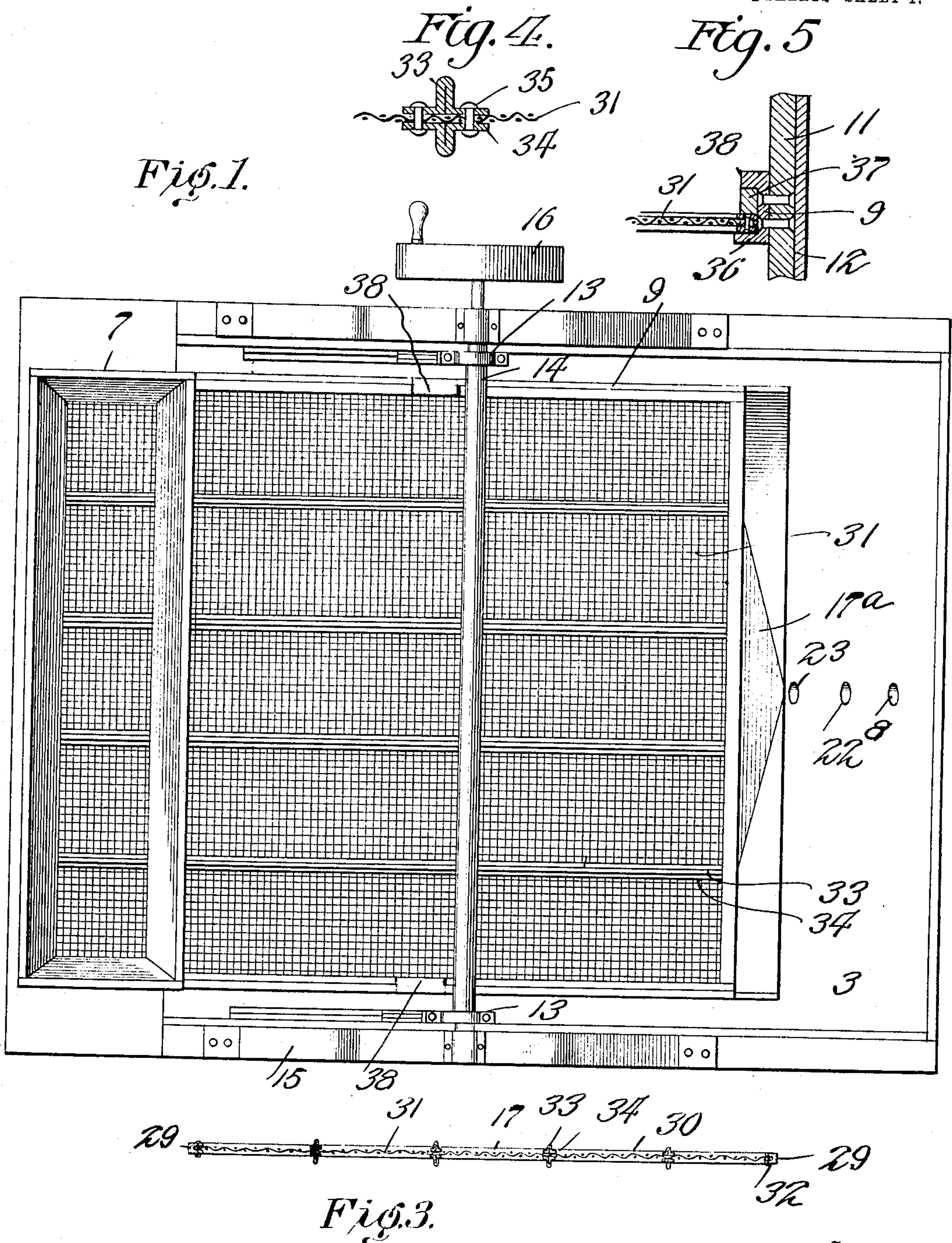


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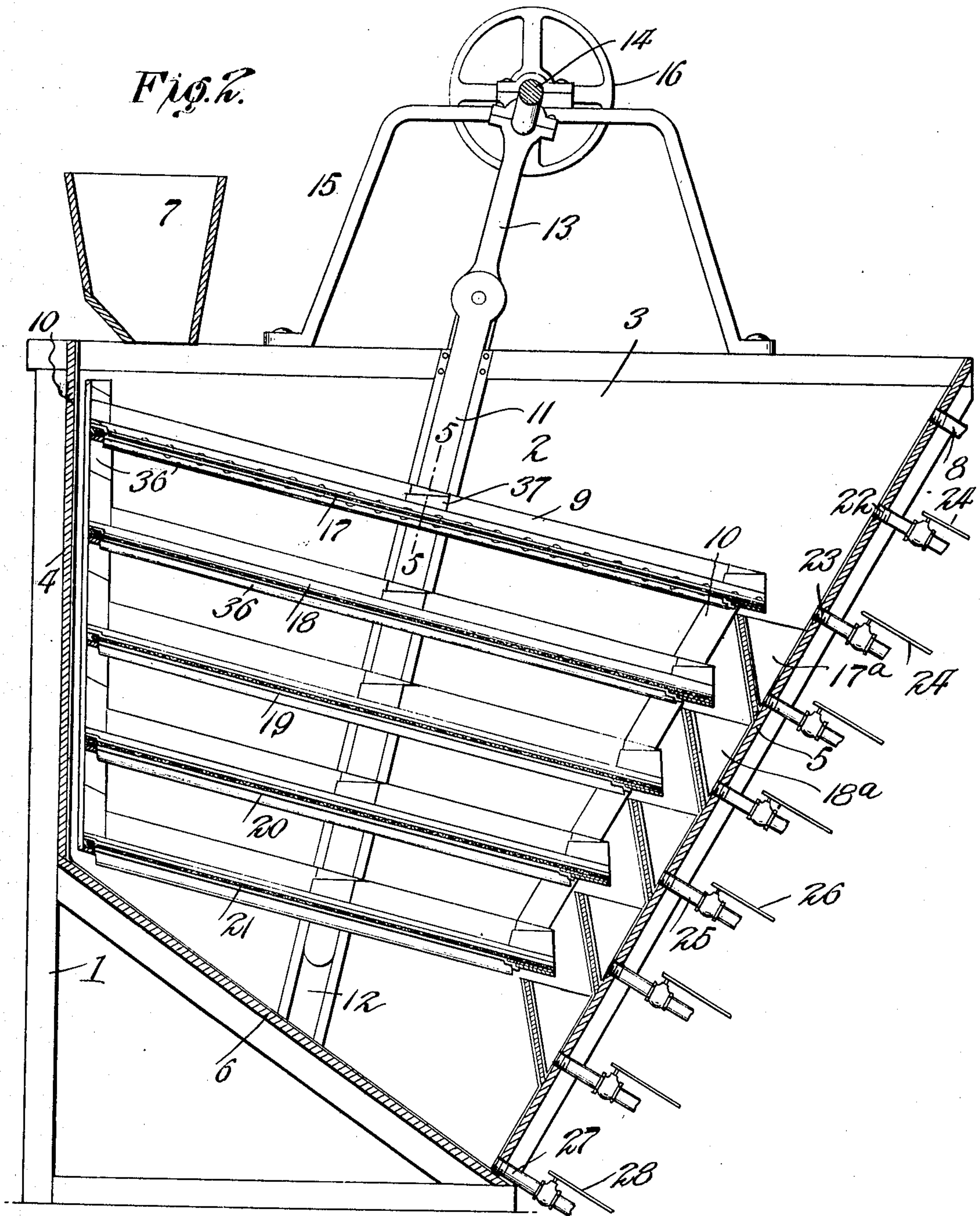
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ORE SEPARATOR.  
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2 SHEETS—SHEET 1.



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# UNITED STATES PATENT OFFICE.

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## ORE-SEPARATOR.

No. 918,461.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, FRANK M. MOTT, a citizen of the United States, residing at Douglas, in the county of Cochise and Territory of Arizona, have invented new and useful Improvements in Ore-Separators, of which the following is a specification.

This invention relates to improvements in ore separators of the shaking or vibrating screen type, and particularly to separators of such type employing a plurality of inclined screens of different mesh mounted in a vertically reciprocating frame, the screens being arranged to deliver the coarse and fine separated particles of the ore-bearing material into suitable receptacles.

The main object of the present invention is to provide a separator which is equally well adapted for dry or wet work, for treating crushed quartz or any character of wet screening or sizing, or for treating ore-bearing gravel or material from beds containing placer gold and other metals where the presence of clay renders the treatment of such materials unprofitable with ordinary machines; and a further object is a construction of screening mechanism which is simple, strong and durable, adapted to effect the perfect separation of the slimes from the sand, and in which the screens are readily removable so that screens varying widely in mesh may be quickly and conveniently applied for use to suit different conditions of service.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a top plan view of a separator constructed in accordance with my invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a transverse section through one of the screens. Fig. 4 is a similar detail section on an enlarged scale. Fig. 5 is a detail section on line 5—5 of Fig. 2.

Referring to the drawings, the numeral 1 designates a main frame, which may be of any suitable construction, and which supports a tank or vat 2, which may be constructed of wood or metal, or of wood and metal-lined, or of metal and wood-lined, according to the character of the material un-

der treatment, the inner surface of the tank being of some suitable material other than metal when the water is of an acid nature. As shown, the tank or vat is open at the top and formed of side walls 3, a rear wall 4, an upwardly and forwardly inclined front wall 5 and a downwardly and forwardly inclined bottom wall 6. A feed hopper 7 is supported upon the upper portion of the frame 1 above the upper front portion of the tank or vat, for the supply of the material to be treated to the highest portion of the upper screen of the series of separating screens. The apparatus may be employed for either dry or wet separation, the tank being filled in the former case with water to a level slightly below an overflow pipe 8, supported by the wall 5 for the discharge of the water above such level.

Arranged within the tank is a screen frame of open or skeleton form, and comprising a series of superposed bars or strips 9 at each side thereof, said strips being inclined in a downward and forward direction in horizontal alinement and parallel relation and connected at their upper and lower ends by upright end strips 10, to which said side strips are bolted or otherwise suitably attached to form a frame of the requisite strength. The screen frame thus formed is open at each end, and its side bars or strips are bolted or otherwise centrally connected with a pair of reciprocating rods or bars 11 sliding in guides 12 at the sides of the tank and connected at their upper ends by links 13 to the crank portions of a double-cranked drive shaft 14 supported in suitable bearings upon standards or yokes 15 mounted upon the frame 1 at opposite sides of the tank or vat. The shaft 14 carries a pulley 16 for co-operation with a drive belt, but may be driven in any preferred manner, and said shaft is preferably removably mounted in its bearings, so that by simply detaching the bearing-caps the shaft may be elevated to lift the screen frame out of the tank, in order that the screens in use may be removed for repairs or the substitution of new screens to adapt the apparatus for the treatment of different kinds of ore-bearing materials.

Carried by the screen frame is a series of screens 17, 18, 19, 20, and 21, arranged one above the other and inclining downwardly and forwardly with their upper ends dis-



posed immediately below the feed hopper 7 and their lower ends arranged to discharge the material from the surfaces thereof into boxes or receptacles 17<sup>a</sup>, 18<sup>a</sup>, etc., supported upon the inclined front wall 5. Communicating with the tank above the series of boxes or receptacles and between the upper box and the overflow pipe 8 are pipes 22 and 23 arranged at different levels for the discharge of the slime, each of said pipes being provided with a controlling valve or gate 24. With each box or receptacle also communicates a discharge pipe 25 provided with a controlling valve or gate 26, and with the bottom portion of the tank communicates a similar discharge pipe 27 having a controlling valve or gate 28, the said series of valved pipes being supported by the wall 5 and provided for the discharge of the slime and the different grades of sand received in the boxes from the several screens, such sand being conveyed through the pipes or by other means to any desired portion of the mill.

Each screen comprises a frame composed of channeled side strips 29 and a channeled rear strip 30, said frame being open at its front end and the channeled strip receiving the corresponding edges of the wire gauze or other screen material 31, which is secured therein by suitable fastening devices 32. Each screen is reinforced by a series of parallel longitudinal stays arranged in alignment upon the upper and lower surfaces thereof and extending in parallel relation to each other and to the side strips 39. Preferably, the stays are formed of sheet-metal folded centrally to provide a bracing rib 33 and bent laterally to form attaching flanges 34, the flanges of the opposing stays being secured to each other and to the screen material by rivets or equivalent fastenings 35. It will be understood that each screen is designed to be removably mounted in the screen frame, to which end the side strips 9 of said screen frame are provided with inwardly extending flanges or ledges 36 on which the side edges of the screens rest, said screens being clamped in position against said ledges by wedge blocks 37 arranged to slide between the upper surfaces of the side strips 29 of the screen and the lower inclined or beveled edges of lugs 38 provided upon the strips 9. When the screen frame is elevated, each screen may be removed therefrom by detaching its holding wedges 37, then slipping the screen endwise out at either the front or rear end of the screen frame, thus enabling the screens to be readily removed for repairs or the substitution of other screens of coarser or finer mesh according to the character of the material which is to be treated. The use of the longitudinal stays upon the screens renders each screen strong and durable, so that it may be of comparatively light weight and yet withstand the

strain and wear resulting from the passage of the ore-bearing material thereover and the action of the operating mechanism.

In operation, with the tank filled with water up to the described level in the treatment of material under the wet process, the screen mechanism as a whole is reciprocated vertically through the action of the crank shaft 14, whereby sliding motion is imparted to the operating rods 11, and the material is fed through the hopper 7 and drops upon the upper front surface of the upper screen 17. In the action of the screen, the material which is too coarse to pass through the screen 17 slides down over the surface thereof and is deposited in the box 17<sup>a</sup>, while the ore which passes through said screen 17 drops upon the screen 18, which is of finer mesh, and is again divided, the coarser parts going into the receiving box 18<sup>a</sup>, while the finer material falls through said screen onto the screen 20, where the operation is repeated, each screen being of finer mesh than the other, until all the coarser particles are deposited according to their relative degrees of fineness into the boxes 18<sup>a</sup>, while the finest grain of sand drops through the screen 21 into the chamber formed at the lower rear corner of the tank, whence it may be discharged through the pipe 27. The slime formed by the separation of clay and other soluble substances discharges through the pipes 22 and 23, while the overflow water passes out through the pipe 8, and the material discharged into the boxes 17<sup>a</sup>, 18<sup>a</sup>, etc., may be drawn off whenever desired through the communicating valved pipes.

It will be observed that the lift of the cranks is at a right angle to the surfaces of the screens, and that upon each operation thereof a complete up and down movement of the screens in the body of water will be effected, thus thoroughly agitating and washing the material so as to thoroughly separate the particles according to their degrees of fineness and specific gravity. While the crank shaft may be operated by power, if desired, the pulley 16 may be provided with a crank for the operation of the apparatus by hand power, which will be sufficient in small machines.

On the upward movement of the screens, the fine particles are forced down through the screens, while the coarse particles slide down over the surfaces thereof, while on the downward movement of the screens the pulp will be in effect lifted from the screens, as it will be held nearly in suspension during the entire period of the down movement in the water. Thus, on the subsequent upward movement of the screen the fine material will again be forced through the screens, while the coarse material will be washed over the surface of the same. Hence, it will



be apparent that the thorough and effective agitation thus afforded will separate the particles to a maximum degree and wash the screens so that the meshes thereof will not be choked by the larger particles, by which the efficiency of the apparatus and its capacity to handle a large amount of material within a given time is materially increased. Of course, it will be understood that by having the screens readily removable from the screen frame, the apparatus may be conveniently changed at any time by the substitution of different screens to treat different kinds or grades of material, and that in practice, the screens may be disposed at any desired inclination. The mode of use of the apparatus in dry screening will be apparent, and it will be seen that the construction of the device renders it effective for both wet and dry work.

Having thus fully described the invention, what is claimed as new is:—

1. In an ore separator, the combination of a tank, a frame arranged to reciprocate vertically therein, said frame being open at front and rear and provided with supports at the sides thereof and superposed lugs having their lower edges beveled or inclined to the plane of said supports, a series of screens slidably resting on said supports and insertible and removable through the open ends of the screen frame, and wedges inserted between the screens and said inclined lower edges of the lugs and clamping said screens against said supports.

2. In an ore separator, the combination of a tank having side walls, a rear wall, a downwardly and forwardly inclined bottom wall and an upwardly and forwardly inclined front wall, a series of superposed receptacles upon the front wall, guideways upon the side walls extending from the bot-

tom wall at an upward and forward inclination to the upper edges of the side walls, a downwardly and forwardly inclined vertically reciprocating screen frame arranged within the tank, said frame being open at front and rear and provided at its sides with inwardly extending flanges, a series of superposed screens insertible and removable endwise through the frame and slidably supported by said flanges, means for clamping the screens against the flanges to secure them within the frame, rigid guide bars at the sides of the frame and movable in said guideways, a crank shaft mounted above and extending across over the top of the tank, and connecting rods coupling said crank shaft with said guide bars.

3. In an ore separator, the combination of a tank provided with a series of superposed receptacles at the front thereof and having grooved guideways at the sides thereof, an inclined screen frame arranged within said tank, said frame being open at the front and rear and having side bars provided with supporting flanges and lugs above the flanges, said lugs having lower beveled edges, screens slidably supported upon said flanges, wedges inserted between the lugs and screens and clamping the latter against said flanges, guide bars secured to the side bars of the screen frame and movable in said guideways, a crank shaft mounted above and extending across the top of the tank, and connecting rods coupling said crank shaft with said guide bars.

In testimony whereof I affix my signature in the presence of two witnesses.

FRANK M. MOTT.

Witnesses:

W. F. NIHART,  
A. Y. WRIGHT.