(No Model.) 3 Sheets—Sheet 1.

G. E. DE GROAT & T. F. FARRELL.

SAND EXCAVATOR, SEPARATOR, AND CONVEYER.

No. 417,773. Patented Dec. 24, 1889.

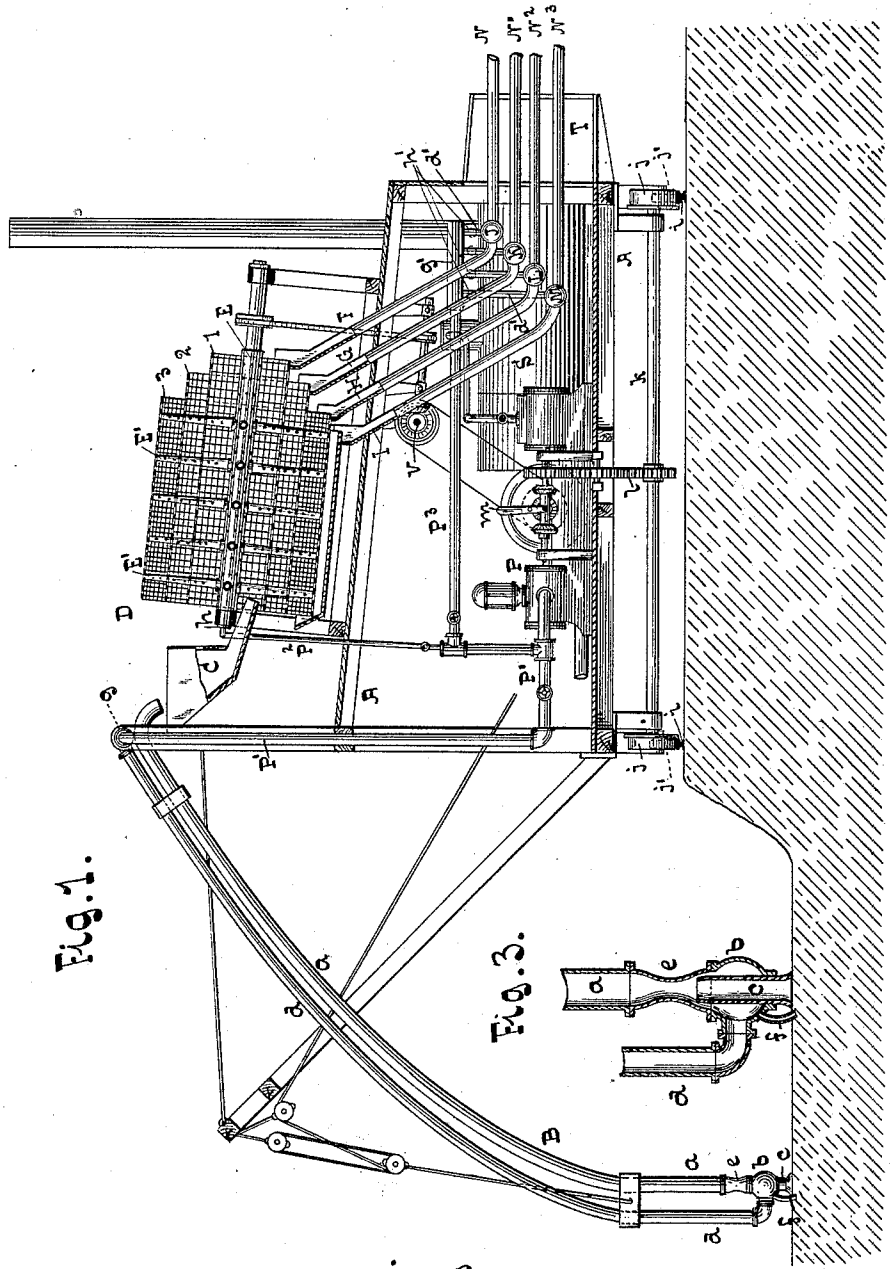


Fig. 1.

Fig. 3.

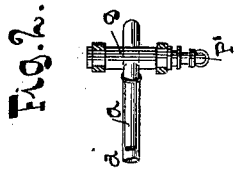


Fig. 2.

Witnesses:
A. Faber du Faur
Chas. W. Thomas.

Inventors:
George E. De Groat.
Thomas F. Farrell.
by A Faber du Faur
their Attorney.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

G. E. DE GROAT & T. F. FARRELL.

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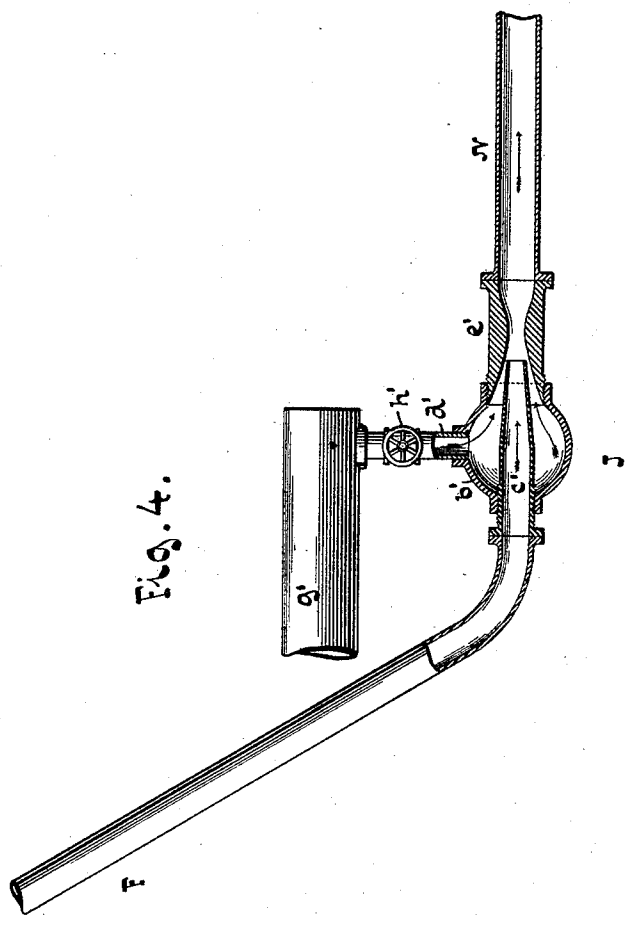


Fig. 4.

WITNESSES:
A. Faber du Faur
Frank Guile.

INVENTORS:
George E. DeGroat.
Thomas F. Farrell
BY
A. Faber du Faur
their ATTORNEY

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 3.

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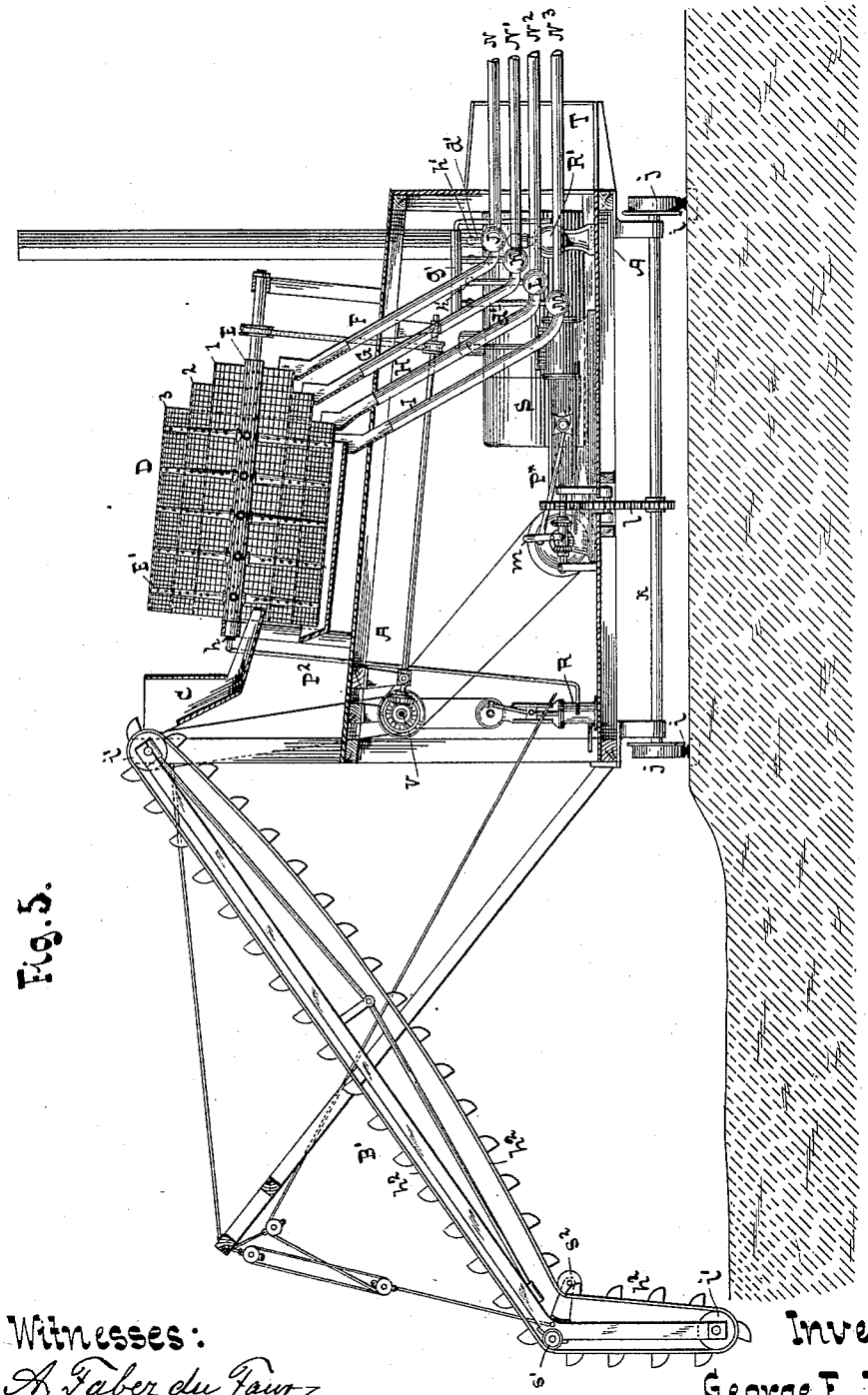


Fig. 5.

Witnesses:
A. Faber du Faur
Chas. W. Thomas.

Inventors:
George E. De Groat.
Thomas F. Farrell.
by A. Faber du Faur
their Attorney.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

GEORGE E. DE GROAT, OF NORTHPORT, NEW YORK, AND THOMAS F. FARRELL, OF PATERSON, NEW JERSEY.

SAND EXCAVATOR, SEPARATOR, AND CONVEYER.

SPECIFICATION forming part of Letters Patent No. 417,773, dated December 24, 1889.

Application filed May 24, 1889. Serial No. 311,989. (No model.)

To all whom it may concern:

Be it known that we, GEORGE E. DE GROAT and THOMAS F. FARRELL, citizens of the United States, and residing, respectively, at Northport, in the county of Suffolk and State of New York, and at Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Sand and Gravel Excavators, Separators, and Assorters, of which the following is a specification.

Our invention has reference to improvements in apparatus for automatically excavating, separating, or grading and removing sand, gravel, earth, &c.; and it consists in certain novel features in the construction and arrangement of the several parts whereby the operations of excavating, separating, or grading and removing are facilitated, all of which are more fully pointed out in the following specification and claims and illustrated in the accompanying drawings, in which—

Figure 1 represents a sectional elevation of our improved apparatus. Fig. 2 is a top view of a portion of the same. Fig. 3 is a vertical section through the nozzle of the hydraulic excavator, said figure being drawn to a larger scale than the preceding figures. Fig. 4 is a vertical section through one of the hydraulic conveyers. Fig. 5 is a vertical section on the same scale as Fig. 1, showing a modified form of apparatus.

Similar letters indicate corresponding parts.

In the drawings, referring at present to Fig. 1, the letter A designates a suitable frame or other structure containing or supporting the several operating parts of the apparatus. B is the excavator, which we have shown in this figure as operated by water, *a* being the delivery-pipe, which is carried upward above the roof of the structure and arranged to discharge into a suitable hopper C. The lower end of the pipe *a* is connected with a casing *b*, entered by an adjustable suction-nozzle *c*, arranged in line with said pipe, Fig. 3. Water under pressure or steam is supplied in a jet through a supply-pipe *d*, discharging into the casing *b*. The water passes through a cone *e* into the pipe *a*, thereby producing the requisite suction for raising the material upward through the delivery-pipe.

A suitable agitator *f* may be provided to loosen the material at the mouth of the suction-nozzle *c*. This agitator we have shown in the form of a bent pipe or nozzle communicating with the casing *b* or with the water-pipe, and arranged to direct a stream of water upon the material at or near the mouth of the nozzle *c*.

The upper end of the supply-pipe *d* is connected to a transverse drum *g*, Fig. 2, having suitable trunnions mounted in bearings on the structure, through which drum water is supplied to the same.

The delivery-pipe *a* is secured by any suitable means to the water-pipe.

A boom and suitable rope tackle are provided for shifting the position of the excavator.

On the roof of the structure is located an inclined revoluble separator or grader D, consisting of a number of screens 1, 2, and 3, arranged concentric and turning with a shaft E, having bearings at its opposite ends. The several screens differ in their mesh, the interior screen being the coarsest and the exterior screen the finest. The material discharged into the hopper by the excavator is conducted into the interior screen 1 of the separator, and the coarse material separated from the mass by said screen falls into a trough or pipe F, and is received by a hydraulic conveyer J and conducted to any particular spot, as will be subsequently explained. The next grade of material, as separated by screen 2, is carried through a trough or pipe G to a hydraulic conveyer K. The next grade, separated by screen 3, is conducted by a trough or pipe H to conveyer L, and, finally, the sand, passing through the third screen 3, is received by a suitable trough leading to the trough or spout I, and may be conducted directly to the ground or to a fourth conveyer M.

To wash away the fine dust and to facilitate the action of the several screens 1, 2, and 3, the shaft E of the separator D is made tubular and perforate, and water is supplied thereto through a pipe P^2, passing through a suitable stuffing-box *h* at one end of said shaft.

Water is also supplied to the separator through the radial arms E′, supporting the screens, which arms are made tubular and perforate and communicate with the interior of the tubular shaft E.

Each of the hydraulic conveyers for removing the graded material conducted thereto from the screens consists of a casing b', into which extends from one side a nozzle c', having its outer flanged end connected with the pipe or trough F, leading from one of the screens of the separator. (See Fig. 4.) The nozzle c' is arranged in line with and extends into a cone e', screwed into the casing b' and adjustable with respect to the nozzle c'. The outer flanged end of this cone e' is connected with the discharge-pipe N. Water under pressure is supplied to the casing through a suitable pipe d'. It is evident that water or steam could be injected through the nozzle c' and the sand, &c., drawn through the pipe d', with the same result as above.

In Fig. 1 we have shown the several water-supply pipes d' connected to a common header g', each pipe being provided with a valve h', for regulating the supply of liquid to the particular nozzle.

By conducting the several discharge-pipes N N′ N^2 N^3 of the several conveyers to different spots the various grades of material are assorted or collected in several distinct piles.

To move the structure A from time to time as the excavator exhausts the material within reach, Fig. 1, the structure is mounted upon four small wheels j' j', located at or near the four corners of the structure, said wheels running upon suitable rails i i, arranged along the bank. Between the said wheels are located two driving-wheels j j, the axle K of which is connected by a suitable train of gears l with the driving-shaft of the engine P, a suitable clutch m of any well-known construction being interposed to throw the gears l in and out of connection with the driving-shaft, or to cause the driving-wheels j j to turn in opposite directions.

The general arrangement of the motor and pump and the distribution of power or water to the several parts may be varied as desired.

In Fig. 1 of the drawings we have shown a combined engine and pump P, from the shaft of which a main shaft v is driven. From this main shaft the separator D is rotated by a suitable chain-and-wheel connection. The connection for moving the structure is as before described. A supply-pipe P′ from the pump-cylinder is connected with the drum g of the pipe a of the excavator, and a pipe P^2 leads to the shaft E of the separator D. A third pipe P^3 leads to the header g' of the conveying apparatus. Steam is furnished by a suitable boiler S, and in practice we provide a suitable tender T for the storage of coal, &c., said tender being located directly opposite the front of the boiler.

In Fig. 5 we have shown the hydraulic excavator replaced by an excavator and elevator B′, consisting of an endless belt h^2, running over two pulleys i' i', located, respectively, at its top and bottom. The lower portion of the belt is turned by guide-pulleys s' and s^2 at an angle to the main portion, the pulley s^2 being arranged near the edges of the belt, so as not to interfere with the buckets. This turning of the belt at an angle causes the buckets to be brought at a greater angle to the surface of the ground. Consequently less power is required for the belt, as the buckets do not scrape along the bottom of the trench. In this figure we have shown, also, a separate pump R, for supplying water to the separator D, a separate engine P*, for rotating the separator and for propelling the structure, and a separate steam-pump R′, for supplying water to the conveyer.

It is evident that wherever sufficient water is present with the material excavated a steam-jet can be used in place of a water-jet. Consequently we do not wish to confine ourselves to the latter.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a hydraulic separator, a horizontal drum g, turning about suitable bearings, a supply-pipe P′, communicating with one end of said drum, a supply-pipe d, connected with the drum and adapted to turn with the same in a vertical plane, a delivery-pipe a, attached to the supply-pipe d and having its upper end arranged to discharge into a hopper, a suction-nozzle on the end of the delivery-pipe, and means for adjusting the pipe, substantially as described.

2. In an apparatus of the character specified, a structure mounted on wheels, a separator located upon the roof of the said structure, an excavator discharging into the separator, a series of hydraulic conveyers communicating with the separator through suitable troughs or pipes passing through the roof, a pump for supplying water to the separator and the conveyers, and means, substantially as described for propelling the structure, substantially as set forth.

3. In an apparatus of the character specified, a wheeled structure, an excavator, a separator, a series of hydraulic conveyers, and a pumping-engine connected with the conveyers and the separator for supplying water under pressure to the same, and also connected with the driving-axles of the structure for propelling the latter, substantially as described.

4. In an apparatus of the character specified, the combination of a wheeled structure, an excavator, a separator, a series of conveyers, a pumping-engine for actuating the separator and supplying water to the excavator and conveyers, and a connection between the engine and the driving-axles of the structure, substantially as described.

5. The combination, in a hydraulic excavator, of a casing b, a water-supply pipe d, entering the casing from one side, a nozzle c, en-

tering the casing and extending above the mouth of the supply-pipe, a cone *e*, arranged above the casing in line with the nozzle and connected with the delivery-pipe, and an agitating-pipe *f*, communicating with the casing *b*, substantially as described.

6. In an apparatus of the character specified, a movable structure, a frame located on the roof of the latter, a rotary separator having bearings in said frame, an excavator arranged to carry the material to the separator, and troughs leading from the separator, substantially as described.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 21st day of May, 1889.

GEORGE E. DE GROAT.
THOMAS F. FARRELL.

Witnesses:
CHAS. G. HAYES,
A. FABER DU FAUR.