July 19, 1927. 1,636,168

O. A. BUTTERFIELD

SAND CUTTING MACHINE

Filed Feb. 9, 1925 4 Sheets-Sheet 1

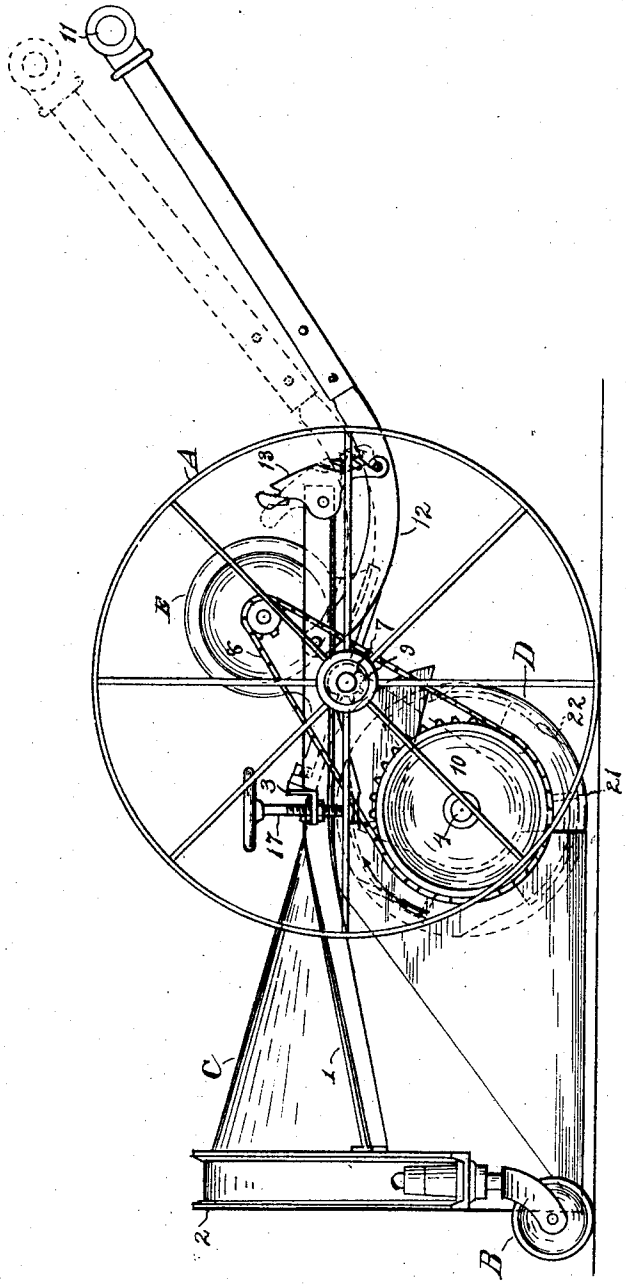


Fig. 1

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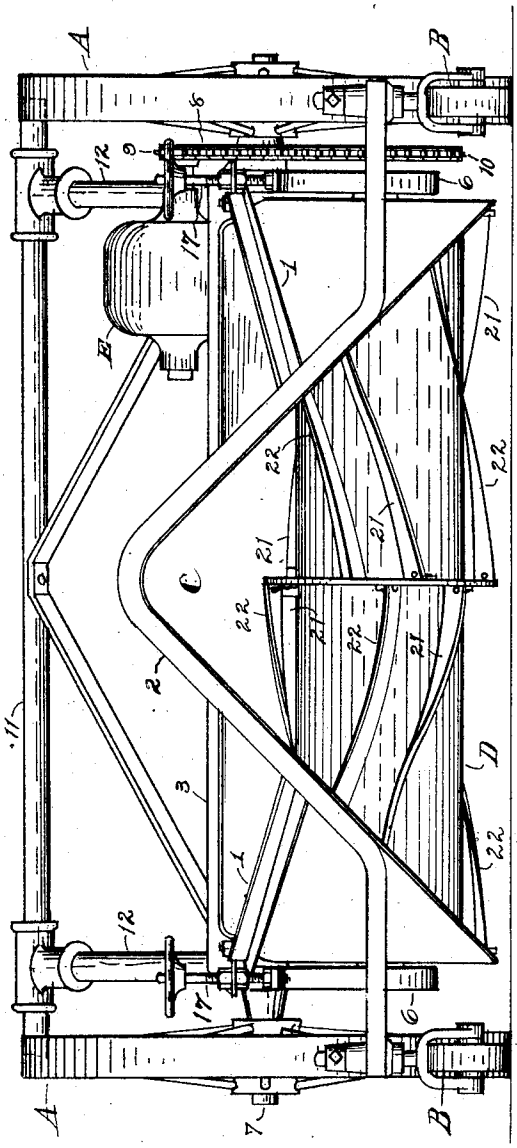


FIG. 2

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SAND CUTTING MACHINE

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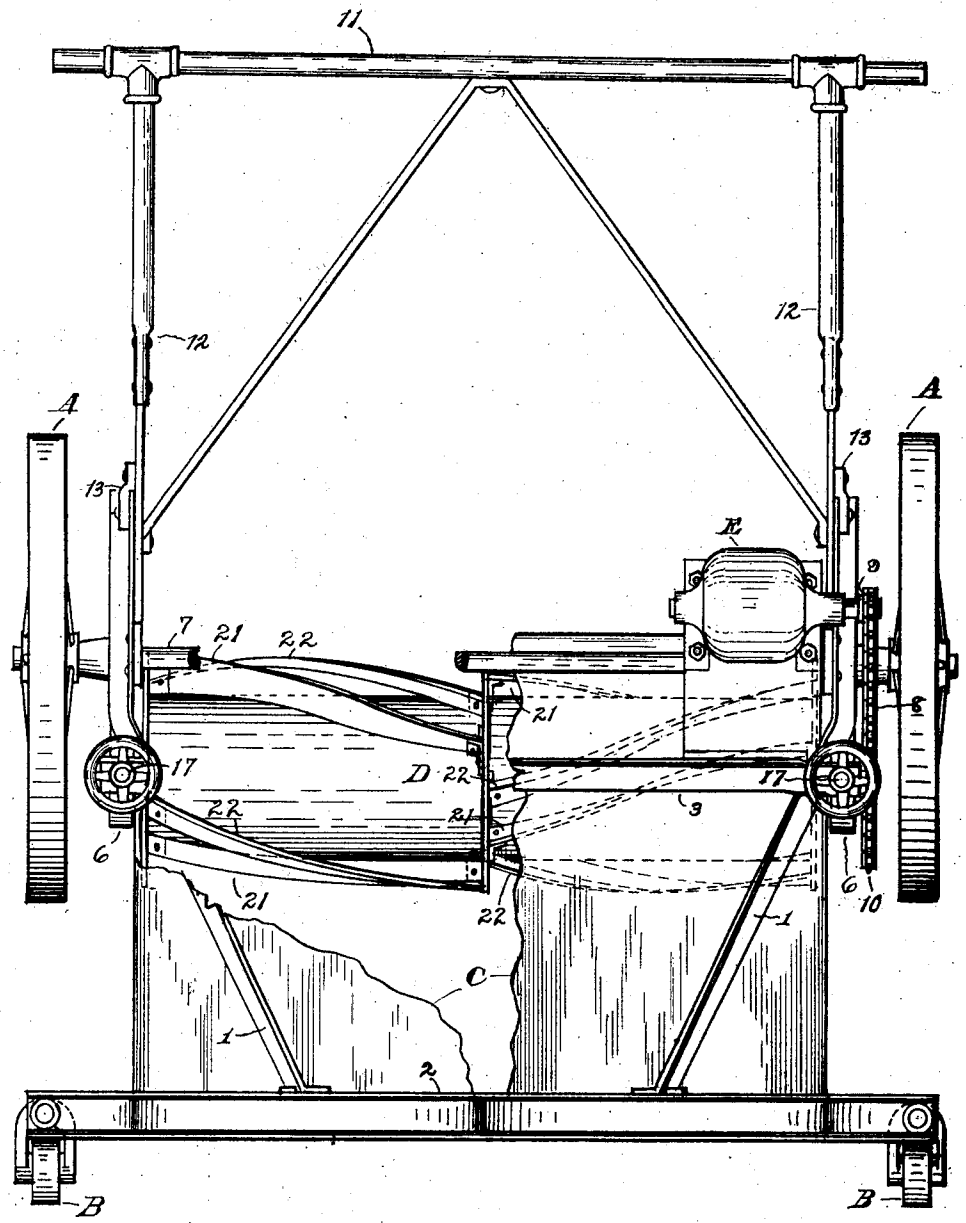


Fig. 3

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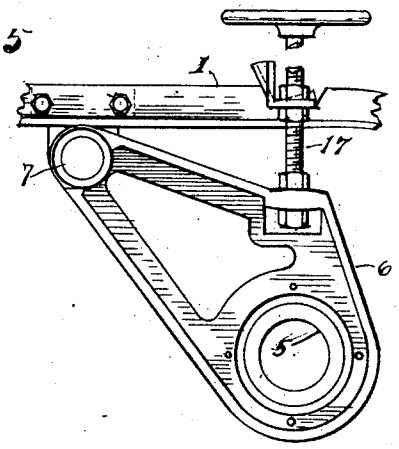
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SAND CUTTING MACHINE

Filed Feb. 9, 1925 4 Sheets-Sheet 4

Fig. 5



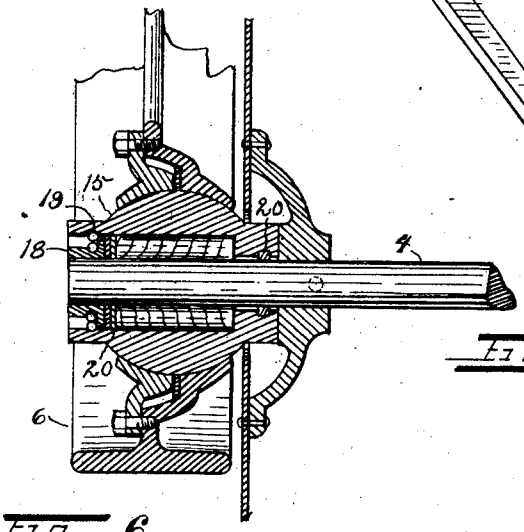


Fig. 7

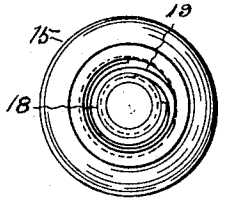


Fig. 6

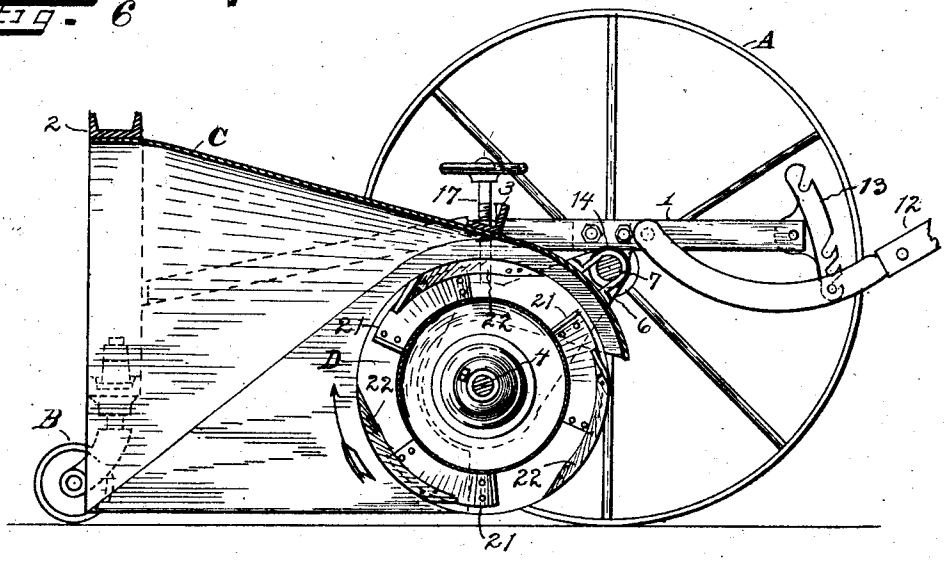


Fig. 4

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Patented July 19, 1927. 1,636,168

UNITED STATES PATENT OFFICE.

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SAND-CUTTING MACHINE.

Application filed February 9, 1925. Serial No. 7,974.

The present invention relates to machines for cutting, mixing and kneading sand used for moulding purposes in metal foundries and embodies certain features of construction whereby a maximum amount of work can be satisfactorily accomplished with a minimum of time and but little motive power and expense.

The present invention has for an object to provide a machine readily operable by two attendants and capable of going over a floor of sand and cutting, mixing and kneading the same, leaving the treated sand in a heaped row at the rear of the machine as the machine is moved over the floor, the movement of the machine over the floor being accomplished by the peculiar arrangement of the sand cutting blades.

The invention comprises a framework mounted on two major wheels and two caster wheels, the whole being journalled in relatively opposite positions at the ends of the frame with the major wheels in advanced position, the frame carrying a metallic hood having a rearwardly-disposed upwardly-inclined hip, the sides of said hood being parallel and forming skirting members along the sides of the machine, the forward part of the hood being disposed parallel with the axle to said major wheels, slightly curved downward between said wheels and open both at its forward and rear extremities, a motor-driven sand-cutting cylinder being journalled between the axes of said wheels and below said hood, and so disposed that it will cut sand in a downward direction as the machine is advanced over a sand floor and throw it in a mixed condition into a central position over which the machine travels, the arrangement of said hood facilitating the heaping of the treated sand in a row at the rear of the machine.

The invention further contemplates providing a sand-cutting cylinder having an imperforate shell carrying peripheral radially-extending spirally-arranged spading blades alternately spaced at the center of the cylinder, and sand-cutting knives spaced parallel in advance of said blades with their cutting edges tangent to a path circumscribed by the heel of said edges and concentric beyond the sweep of the outer edges of said blades, the arrangement of both blades and knives being designed to draw the treated sand to the center at the rear of the machine.

The invention further contemplates journaling the sand-cutting cylinder in bearings that will permit the frame to be warped in its travel over irregular ground without impairing the alignment of said cylinder in the operation of the machine.

The invention still further has for its object to provide means for adjusting the sand-cutting cylinder with respect to the ground over which it operates, said means including screw-threaded shafts operating through frame extensions and engaging ends of brackets attached to the machine axle, said cylinder being journalled in said brackets.

Still another object of the invention is to so place the motor for propelling the sand-cutting cylinder that the machine may be readily counterbalanced when it is necessary to raise the cylinder at the rear of the machine by a tilting process in moving the machine from one floor to another and for transporting the machine on its major wheels.

Another object of the invention is to so arrange a handle across the forward side of the machine that the attendant may raise or lower said handle as may be expedient, and whereby when said handle is elevated and latched at a certain position, by depressing the handle the machine may be tilted wholly on to its major wheels and be moved with ease.

The foregoing and other objects and advantages will be readily apparent to those familiar with foundry practice where a thorough and effective treating of the sand is necessary for moulding purposes.

In the drawings forming a part of this specification, Figure 1 is a side view of an embodiment of my improved sand-cutting machine.

Fig. 2 is a rear view.

Fig. 3 is a plan view of the machine with parts broken away to disclose the sand-cutting cylinder.

Fig. 4 is a central section of the machine.

Fig. 5 is a detail side elevation of a bracket in which an end of the sand-cutting cylinder is journalled, and shows a screw-threaded shaft and its attachment for regulating said bracket in adjusting said cylinder.

Fig. 6 is an enlarged detail longitudinal section of a cylinder bearing and part of a cylinder head and its shaft.

Fig. 7 is a detail end view of a cylinder bearing.

In the drawings, like marks of reference refer to corresponding or equivalent parts in the different views, in which A represents the major or large supporting wheels to my machine; B, the follower caster wheels; C, a metallic hood carried by a frame consisting of two angular side bars 1, a centrally and upwardly curved rear girt 2 and a forward cross girt 3; D, a sand-cutting cylinder suspended on a shaft 4 below said hood in appropriate bearings 5 carried at the ends of brackets 6, said brackets being attached near opposite ends to an axle 7 on which the wheels A are mounted; E, a motor carried immediately forward of the axle 7 and connected to the sand-cutting cylinder by an appropriate link drive belt 8 operating on sprockets 9 and 10, respectively.

As shown, the motor is of the electric type. However a gas engine as motive power would be satisfactory for the purpose.

The frame side bars 1 extend beyond the axle 7 at their forward ends, at which places a machine-directing handle 11 is pivotally connected to said ends by side members 12 of said handle and is stabilized in serrated edged brackets 13 carried at the ends of said bars.

Immediately at the rear of the axle 7 the cross-girt 3 is mounted with its ends slightly beyond the side bars 1, and at the rear of the frame a cross-girt 2 is carried. This girt is bowed upward centrally and its ends extend beyond the inwardly-curved ends of the side bars 1 and are supported by the trailer casters B.

Within the frame a hood C is carried. This hood is of sheet metal and at its rear end conforms to the upwardly-curved portion of the girt 3 and its sides project angularly below said girt to a point near the ground, its edges being disposed parallel to each other and forming a skirt for preventing sand cut by the cylinder from escaping at the machine sides. From the curved point of the girt 3 the hood tapers downwardly and forwardly below the axle 7 to which it is attached by a strap 14. The forward end of the hood is disposed parallel with the axle 7 and is spaced sufficiently above a sand bed to permit the machine to be moved over the bed after the castings have been shaken out. On both sides of the hood where the sand-cutting cylinder is received into the machine, the hood is cut away as shown in Fig. 1. The object of this hood is to catch the sand treated by the cylinder and direct it into a heaped-up row at the central rear end of the machine in readiness for preparing moulds.

The cylinder D is journalled in oscillating anti-friction bearings 15 in the ends of adjustable brackets 6 at both ends of the machine. These brackets are secured at one end to the axle 7, and are variably adjustable at their opposite ends (together with the cylinder D which they carry) by means of hand-operating screw-threaded shafts 17 pivotally journalled at their lower ends to said brackets and operated through threaded bearings at the ends of the cross girt 1 of the frame.

The bearings 15 are supplied with any appropriate anti-friction mechanism, and as herein shown are fitted with a well known type of rollers for the purpose. These bearings are enclosed at their outer ends by means of a grooved ring 18 into which a retaining spring-coil 19 is fitted, the outer portion of the coil being received into a concentric groove formed in a bored-out portion of the bearing, both ends of said bearings being protected from dirt by means of appropriate flexible washers 20 encircling the cylinder shaft 4.

The sand-cutting cylinder D is journalled below and within the hood C to the shaft 4 disposed parallel between the axes of the supporting wheels and operates in the direction taken by the supporting wheels when moving as indicated by the arrows. This cylinder comprises an imperforate shell carrying upon its periphery a series of radially-extending longitudinally-disposed sand-spading blades 21 and a series of sand-cutting knives 22, the latter being parallel to the former and at the outer edges thereof, with the cutting edges in advance, the cutting edges of the knives being tangent to a heel of their beveled edges and concentric above a path circumscribed by the outer edges of the sand-spading blades, whereby sand being operated on will be first cut by the knives, then caught by the spading blades and from said spading blades be hurled in radiating directions rearwardly from the cylinder and for the most part be caught by the sloping sides of the hood D and directed into a heaped-up row at the rear of the machine.

A preferred method of arranging the spading-blades and cutting knives on the cylinder shell is to have them disposed spirally and terminate at the center of it in equidistant mis-matched positions with the outer ends of both blades and knives forward of their opposite ends, and with the knives preceding the blades in the operating direction of the cylinder, whereby by the peculiar angularity of the spading blades and sand-cutting knives, together with the outwardly-flaring hood, the sand will be worked toward a common center at the rear of the machine and left in a neat and uniform ridge.

From the foregoing description, taken in connection with the drawings, the objects and advantages and general utility of my invention it is believed will be apparent to those familiar with foundry practice.

In accordance with the provisions of the patent statutes I have set forth the principles of my invention and have shown a machine which I now consider to represent the best embodiment thereof, but I desire to have it understood that the mechanism illustrated may be modified and carried out in various details other than herein shown and described, and I reserve the right to make such changes as would come within the spirit and scope of my invention without relinquishing my right thereto.

Having set forth my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sand-cutting machine, the combination with a frame having supporting wheels on both sides thereof adapted to hold said frame uniform in distance from the path over which it is moved, adjustable brackets suspended from said frame between said wheels, a sand-cutting cylinder journaled in said brackets and between the axes of said wheels, means to rotate said cylinder, means to guide the movements of said machine, a hood carried by said frame over said cylinder adapted to gather the sand into a sloping-sided ridge at the rear of the machine as said machine is moved over a floor of sand.

2. In a sand-cutting machine, the combination with a frame having supporting wheels on both sides thereof adapted to hold said frame uniform in distance from the path over which it is moved, of adjustable brackets suspended from said frame between said wheels, a sand-cutting cylinder journalled in said brackets between the axes of said wheels, means to rotate said cylinder, means to guide said machine in its movements including an adjustable handle attached to the forward end of said machine, a hood carried by said frame over said cylinder adapted to direct the sand cut by said cylinder into a sloping-sided ridge at the rear of said machine as the same is moved over a floor of sand.

3. In a sand cutting machine comprising a frame supported by four wheels, two of said wheels being the leader or major wheels and two being follower or caster wheels, the same being relatively disposed on opposite ends of said frame, a hood carried by said frame, said hood forming a sand-directing guide having a rearwardly and upwardly disposed ridge with tapering sides disposed parallel below the ends of said frame and open at its ends, the forward edge of said hood being disposed between said major wheels and curving downwardly, a sand-cutting cylinder carried by said frame within and below said hood and journalled to rotate between the axes of said wheels, means to rotate said cylinder including a motor mounted on said frame forward of the axes of said major wheels, and a directing handle forward of said motor connecting with said frame.

4. In a sand-cutting machine, the combination of supporting wheels, a framework supported by said wheels on both sides thereof adapted to hold said frame uniform in distance from the path over which it is moved, a rotary sand-cutting cylinder journalled within said frame and embodying an imperforate shell carrying longitudinally-arranged radially-disposed sand-cutting blades and forwardly-disposed parallel spaced sand-cutting knives disposed with their cutting edges tangent to a path circumscribed by the shells of the cutting edges of said knives, and a hood carried by said frame over said cylinder adapted to direct the sand cut by said cylinder into a heaped ridge at the rear of the machine as said machine is moved over a floor of sand.

5. In a sand-cutting machine, the combination of a frame comprising side members and cross girts, an axle attached to said frame at one side of said girts, supporting wheels journalled at the end of said axle, the outer or rear of said girts being curved upward centrally, caster wheels mounted at the outer ends of said upwardly-curved cross girt, a sand cutting cylinder journalled within said frame parallel with said axle and between said supporting wheels and said caster wheels, means to rotate said cylinder, a hood disposed with its forward edge below said axle and parallel with said cylinder, said hood arranged to extend rearwardly and upwardly and to conform to the curve of said rear girt and to extend down at its ends parallel with the line of tread of said wheels and wholly cover said cylinder, whereby the treated sand in passing from said cylinder will be conducted into a sloping-sided ridge intermediate the tread of said wheels in the operation of the machine, and a guiding handle connected with said machine in advance of said supporting wheels.

6. In a sand-cutting machine, the combination with a frame having supporting wheels including one main wheel and one caster wheel on each side of said frame disposed in relative opposite positions, of brackets carried by said frame, bearings carried by said brackets, a sand-cutting cylinder journalled in said bearings between the axes of said wheels, means including a motor to rotate said cylinder, means including screw-threaded shafts connecting said frame with said brackets to variably regulate said cylinder to and from said frame, said bearings

being capable of oscillatory movement in said brackets whereby said cylinder will be self-aligning in its bearings in the travel of said machine over uneven ground.

7. In a sand-cutting machine comprising a frame having side bars and cross girts, the side bars being disposed parallel at their forward ends and curving inwardly at their rear ends, a rear girt extending beyond the inwardly-curved ends of the side bars and curved upwardly intermediate its ends, a front girt extending beyond the side bars at the juncture with their inwardly-curved portions, a supporting axle disposed across the side bars of said frame forward of said front girt, supporting wheels journalled at the ends of said axle, caster wheels mounted at the ends of said rear girt, brackets mounted on said axle, a sand-cutting cylinder journalled in said brackets below said front girt, means to adjustably regulate said brackets from the ends of said front girts, means to rotate said cylinder, an adjustable guiding handle for directing the movement of said machine attached at the forward ends of said side bars, and a sand-gathering hood mounted in said frame over said cylinder, said cylinder and said hood being so disposed as to gather the sand cut by said cylinder into a sloping-sided ridge at the rear of said machine as said machine is passing over a floor of sand.

8. In a sand-cutting machine, the combination of a sand-cutting cylinder having an imperforate casing and carrying peripheral extensions, radially-disposed sand-spading blades carried by said extensions, parallel and spaced cutting knives forward of said spading blades at their outer edges, the cutting edges of said knives being tangent to a path circumscribed by the heel of said cutting edges, said blades and knives being alternately disposed with their outer ends in advance of their inner ends during the operating movement of the cylinder, whereby sand being cut will be directed in the path centrally to a plane over which said cylinder is moved.

9. In a sand-cutting machine, the combination of a sand-cutting cylinder having an imperforate casing with a centrally-disposed annular flange and end extensions, sand-spading blades radially disposed on said casing and attached at their ends to both said extensions and to said annular flange, sand-cutting knives disposed in parallel spaced arranged arrangement forward of said blades in the rotative movement of said cylinder, said knives having their cutting edges tangent to a path circumscribed by the heel of said cutting edges outside of said sand-spading blades, whereby sand cut by said knives will be directed on to said blades and be hurled outwardly to the rear of said machine.

10. In a sand-cutting machine, the combination with a frame, an axle supporting one side of said frame, of brackets suspended at one end on said axle, bearings carried by said brackets at their ends opposite to their suspension, a sand-cutting cylinder mounted in said bearings, screw-threaded shafts operative through correspondingly formed threaded extensions of said frame and engaging said brackets near said bearing ends whereby said cylinder may be adjusted in its relation to said frame.

11. In a sand-cutting machine, the combination with a frame and an axle crossing said frame on which its major supporting wheels are journalled, of a bracket hinged at either side of said frame to said axle and adjustably movable with respect to said frame at their opposite ends, bearings mounted in said brackets opposite to their hinged ends, a sand cutting cylinder journalled in said bearings, said bearings being capable of oscillatory movement in said brackets whereby said sand cutting cylinder will be self-aligning on its journals in the warping of said frame.

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