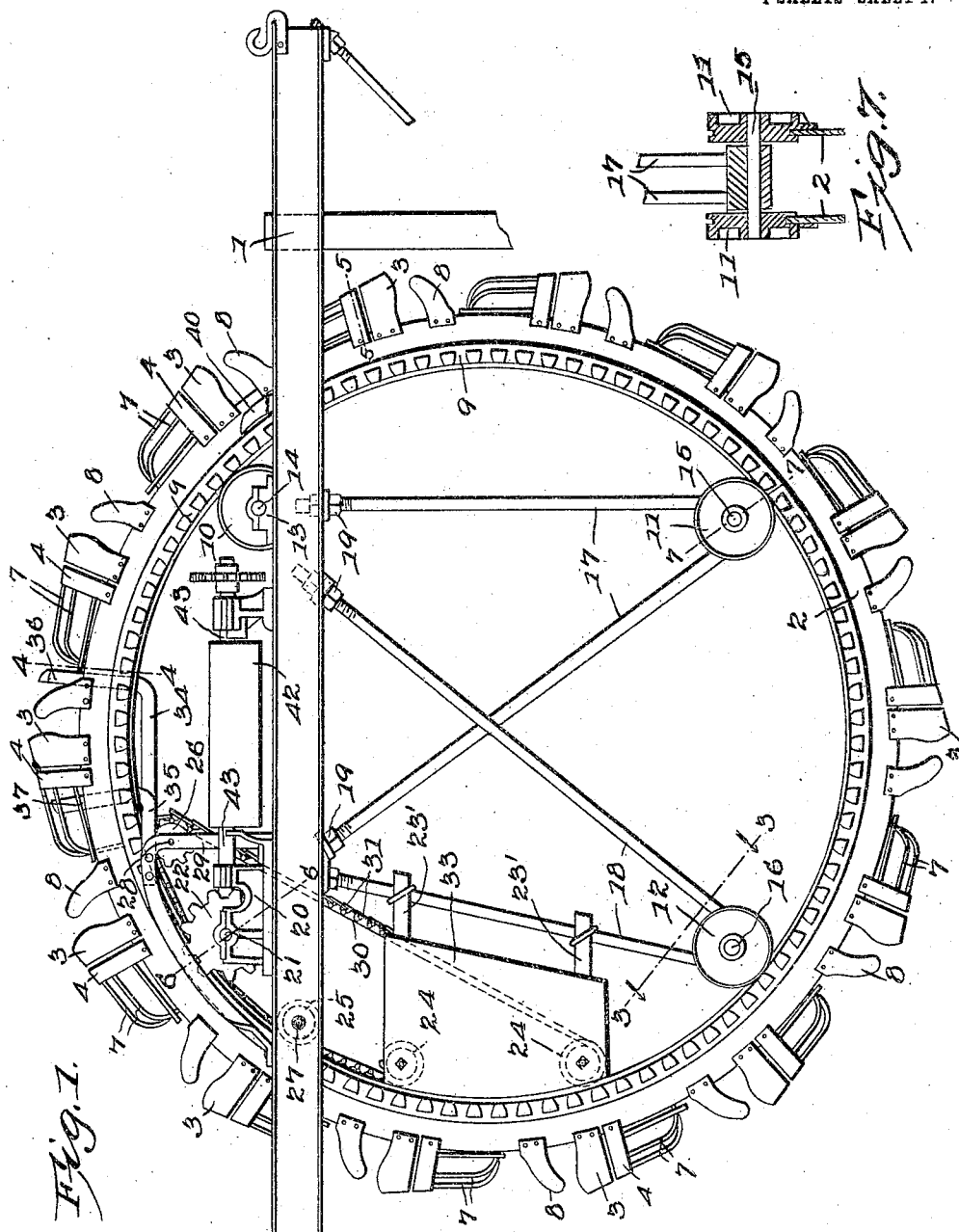


No. 828,208.

PATENTED AUG. 7, 1906.

J. B. HILL.
DITCHING MACHINE.
APPLICATION FILED MAR. 12, 1906.

4 SHEETS--SHEET 1.



WITNESSES:

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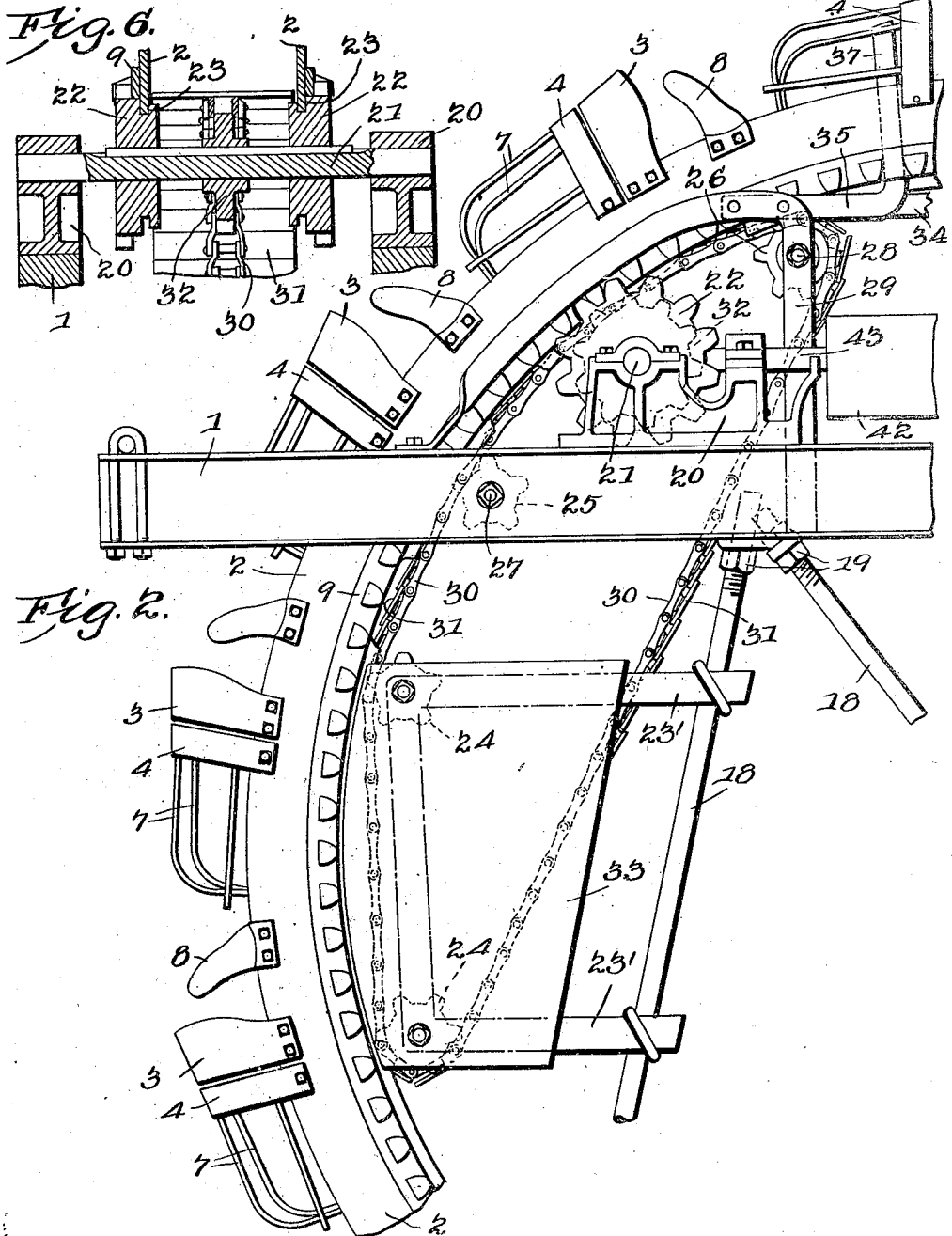
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4 SHEETS—SHEET 3.



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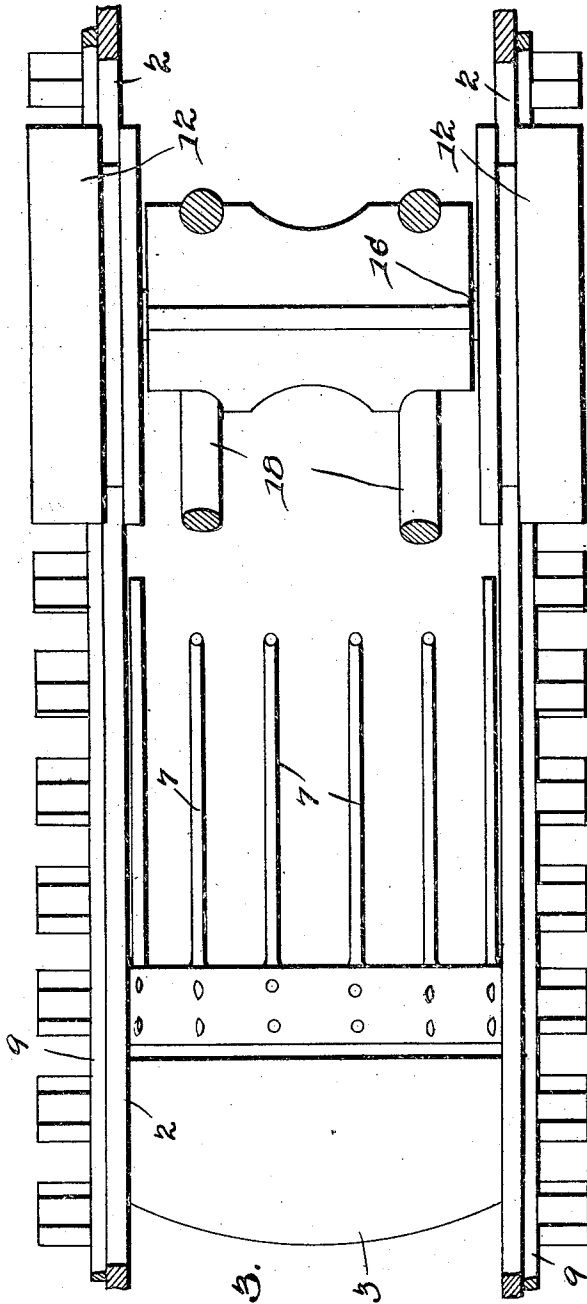


Fig. 3.

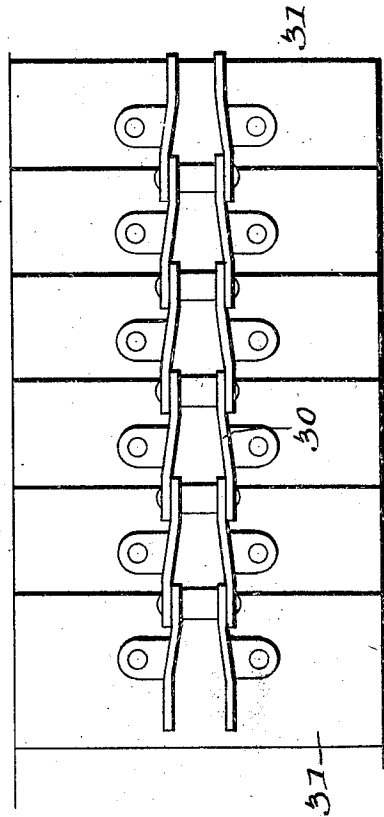


Fig. 8.

WITNESSES:
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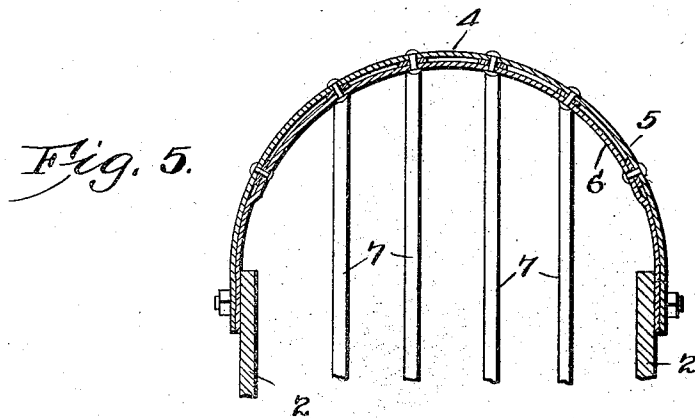
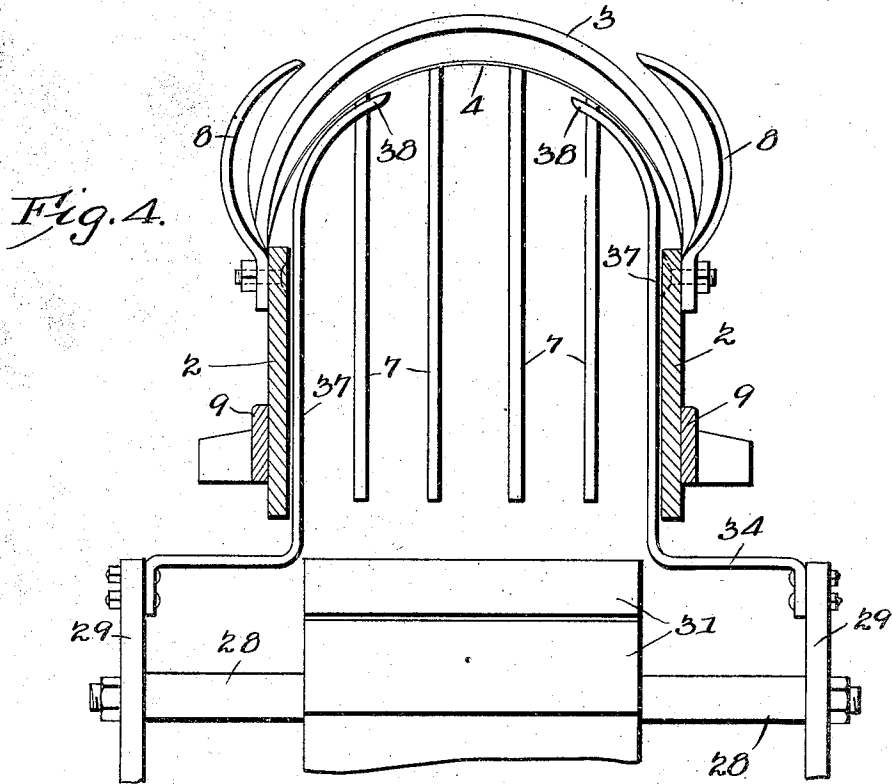
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4 SHEETS—SHEET 4.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JAMES B. HILL, OF FINDLAY, OHIO.

DITCHING-MACHINE.

No. 828,208.

Specification of Letters Patent.

Patented Aug. 7, 1906.

Application filed March 12, 1906. Serial No. 305,620.

To all whom it may concern:

Be it known that I, JAMES B. HILL, a citizen of the United States, residing at Findlay, in the county of Hancock and State of Ohio, have invented a new and useful Ditching-Machine, of which the following is a specification.

This invention relates to an improved ditching-machine of the type illustrated in Letters Patent of the United States, No. 523,790, granted to myself on the 31st day of July, 1894.

Among the objects of the present invention are to improve the construction of the rotary ditching or excavating wheel, to facilitate the elevation of dirt or excavated material and to avoid friction between the excavated material and stationary surfaces, to provide means for keeping the excavating-wheel free and clear from adhering sticky substances, to lighten and improve the bucket construction, to improve the supporting and driving means for the excavating-wheel, and to generally improve and simplify the construction and operation of the device with a view to specially adapt the same to operate in gumbo and similar sticky, waxy, and wet soils.

With these and other ends in view, which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations, and modifications within the scope of the invention may be made when desired.

In the drawings, Figure 1 is a side elevation showing the excavating-wheel and a portion of the carrying-frame of the ditching-machine constructed in accordance with the principles of the invention. Fig. 2 is a side elevation, on an enlarged scale, of a portion of the same. Fig. 3 is a sectional view, enlarged, taken on the plane indicated by the line 3 3 in Fig. 1. Fig. 4 is a sectional view,

enlarged, taken on the plane indicated by the line 4 4 in Fig. 1. Fig. 5 is a sectional view, enlarged, taken on the plane indicated by the line 5 5 in Fig. 1. Fig. 6 is a sectional view taken on the plane indicated by the line 6 6 in Fig. 1. Fig. 7 is a sectional detail view taken on the plane indicated by the line 7 7 in Fig. 1. Fig. 8 is a plan view of a portion of the endless carrier used in connection with the excavating-wheel.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

The present invention, as herein previously stated, is in the nature of an improvement of the device shown in Letters Patent No. 523,790, previously issued to myself, and reference is made to said patent for the general construction of a traction ditching-machine of the class to which the present invention belongs, it being understood that the present invention is confined mainly to the excavating-wheel and related parts.

1 designates the frame which supports the excavating-wheel, and it is to be understood that this frame is to be supported for adjustment in the same manner as the corresponding frame member in the patent to which reference has been made.

The excavating-wheel is composed of two rims or annular members 2 2, which are preferably made of sheet-steel of suitable dimensions to insure strength and durability. The two rims are connected together and spaced apart by the approximately U-shaped cutting members 3 3, which are suitably bolted upon or otherwise connected with the rims 2 2 at their opposite edges. The rims 2 2 are furthermore connected by the approximately U-shaped hoods 4 4, which are disposed slightly in rear of the cutting members 3, each of said hoods being composed of two plates or members—viz., an outer plate 5 and an inner plate 6—as will be best seen by reference to Fig. 5 of the drawings. Between the plates and members 5 and 6, which are preferably constructed of soft steel plates, are inserted the front ends of a plurality of spring-steel bars 7 7, which as they extend rearwardly are curved or converged, so as to form cage-like buckets that serve to carry the material which is being excavated. In

front of the cutting members 3 3 there are secured side cutters or advance cutters 8 8, said side cutters being secured to the individual rims 2 2, and said side cutters being sloped backward, as will be clearly seen in the drawings, so as to enable grass roots and similar obstructions to slide off said cutters without interfering with their successful operation.

Upon the outer faces of the rims 2 2 there are bolted or otherwise secured internal spur-gears 9, which are engaged by the driving or operating mechanism, to be hereinafter described. The teeth of the said spur-gears or segmental racks are spaced from the inner edges of the rims 2, so as to enable said rims to engage the annularly-grooved supporting-wheels 10, 11, and 12. The frame 1 is provided with bearings 13 for a shaft 14, carrying wheels 10. The wheels 11 and 12 are mounted upon shafts 15 and 16, supported by means of V-shaped braces 17 and 18, that are suitably connected with the frame 1 by means of adjusting-nuts 19, whereby the braces may be adjusted to compensate for wear upon the supporting-wheels and engaging parts. The frame 1 is also provided with bearings 20 for a shaft 21, which is adapted to be driven from some suitable source of power connected with the machine, of which the present invention forms a part. The shaft 21 carries spur wheels or pinions 22, having annular grooves 23 for the reception of the inner edges of the rims 2 2, said spur wheels or pinions being also in mesh with the internal spur-gears 9, which, as hereinbefore stated, are bolted exteriorly upon the rims 2 2. The excavating-wheel, as will thus be seen, is supported for rotation by the wheels 10, 11, 12, and 22 and is adapted to be continuously driven by the wheels or pinions 22.

Upon one of the arms of the V-shaped brace 18 there are secured arms or brackets 23', carrying idle pinions or guide-wheels 24. Similar idlers 25 and 26 are mounted upon shafts 27 and 28, which are supported, respectively, in the frame 1 and in brackets or braces 29, extending upwardly from said frame. These idlers serve to support an endless carrier consisting of a chain 30, the links of which are provided with overlapping plates 31, which are of a suitable length to fit between the rims 2 2 of the excavating-wheel, the endless conveyer thus formed being supported adjacent to the ascending side of the wheel and with its ascending lead in proximity to the inner edges of the rims 2 2. The endless conveyer is driven by a sprocket-wheel 32 upon the driven shaft 21, said sprocket-wheel engaging the endless chain 30, which, as will be readily understood, is driven at a speed exactly corresponding with the speed of the excavating-wheel. The arms or brackets 23' support

guard plates or fenders 33 for the purpose of preventing the endless conveyer from being clogged with dirt from the sides of the ditch or trench which is being excavated. Bolted upon or otherwise suitably connected with the bracket members 29 are a pair of forwardly-extending arms 34 and 35 of unequal length and provided with upturned or upwardly-extending terminal blades 36 and 37, which lie adjacent to the inner sides of the rims 2 2 and constituting cutters or scrapers that serve to clear the rims from adhesive or sticky matter of any kind. By making the arms 34 35 of unequal length the blades 36 and 37 will be supported one in advance of the other, the distance between said blades being in practice about twelve inches, which has been found productive of the best results. The blades 36 and 37 are preferably provided with curved inturned ends, as will be best seen at 38 in Fig. 4 of the drawings, so as to adapt them to the curvature of the cutters and the bucket members connected with the rims. Scrapers, as 40, are suitably supported upon the frame 1 to engage the outer sides of the rims of the excavating-wheel for the purpose of keeping the latter free from adhering dirt.

42 designates the transversely-disposed carrier, one of the shafts of which, 43, is suitably connected with the driven shaft 21, so as to receive motion from the latter. This carrier, however, is identical with the carrier shown in my former patent, and it is not to be considered as a part of the present invention.

From the foregoing description, taken in connection with the drawings hereto annexed, the operation and advantages of this invention will be readily understood by those skilled in the art to which it appertains. By the employment of the endless carrier, including the chain 30, the material that is being excavated will be elevated without frictional contact with adjacent surfaces. Loss or waste of power is thus under all circumstances avoided, and this is especially important when operating in wet or sticky soil, which would adhere to adjacent surfaces with such tenacity as to seriously interfere with the operation of the machine. For the same reason the improved bucket construction is of great importance. The cage-like structures formed by the hoods 4 and the resilient rods 7 will form efficient containers for the lumps of material that are being excavated, but will permit such lumps or masses of material to be dumped or discharged without difficulty. When sticky or waxy soil occupies a close bucket structure, it is a matter of serious difficulty to discharge such material, owing to the suction created between the material and the adjacent walls of the containing structure. By employing a cage-like struc-

ture, this difficulty is completely overcome, and the discharge of the material will be facilitated and accelerated when such cage-like structure, as is the case under the present invention, is composed in part of resilient rods or bars having free ends whereby such rods or bars are permitted to vibrate under the motion of the machine, thereby greatly assisting in discharging the contents. The discharge of the contents is furthermore greatly assisted by the blades 36 and 37, which serve to loosen the material from the inner sides of the rims 22. These blades, it will be noticed, are disposed directly above the carrier 42, which receives the material discharged from the excavating-wheel and conveys such material to one side of the machine, as is the case in my former patent.

An important feature of the present invention is the construction whereby the rims 22 of the excavating-wheel are directly supported by the annularly-grooved supporting-wheels 10, 11, 12, and 22. Direct stress or strain upon the gearing 9 will thus be avoided, and the strength and stability of the structure will be greatly increased.

Having thus described the invention, what is claimed is—

1. An excavating-wheel having annular rims, in combination with suitably-supported annularly-grooved rotary members directly engaging said rims.

2. A bucket for ditching-machines, comprising a relatively rigid member adapted to be connected to the dredging-wheel, and a plurality of resilient members suitably spaced apart and secured at their front ends to the first member and supported free at their rear ends.

3. A bucket for ditching-machines, comprising a relatively rigid member at the front end of the bucket, and an openwork structure secured at its front portion to the said member and supported free at its rear portion.

4. Annularly-grooved rotary supporting members arranged in pairs and spaced apart in the arc of a circle, and an excavating-wheel having annular rims or side plates directly engaging the annular grooves of the rotary supporting members.

5. Annularly-grooved rotary supporting members arranged in pairs and spaced apart in the arc of a circle, an excavating-wheel having annular rims or side plates directly engaging in the grooves of the rotary supporting members, an internal gear connected with the excavating-wheel, and a pinion upon one of the supporting members meshing with said gear.

6. Annularly-grooved rotary supporting members spaced apart in the arc of a circle, an excavating-wheel having annular rims or side plates directly engaging the annular grooves of the rotary supporting members,

an internal gear connected with the excavating-wheel, and a pinion connected with one of the supporting members and meshing with said gear.

7. An excavating-wheel having annular rims or side plates, hoods connecting and spacing said side plates, and rods connected with said hoods and having free terminal ends converging to form bucket structures.

8. An excavating-wheel having annular rims or side plates, hoods connecting and spacing said side plates each of said hoods being composed of two plates or members, and resilient rods secured between the hood members and having free ends converging to form bucket structures.

9. An excavating-wheel having annular rims or side plates, and cage-like bucket structures connecting and spacing said side plates, in combination with an endless carrier supported interiorly of the wheel adjacent to the ascending side of the latter.

10. An excavating-wheel having annular rims or side plates, and cage-like bucket structures connecting and spacing said side plates, in combination with an endless carrier supported interiorly of the wheel adjacent to the ascending side of the latter and including a chain having overlapping plates extending between the rims of the wheel.

11. An excavating-wheel having annular rims or side plates, and bucket structures connecting and spacing said side plates, in combination with an endless carrier supported interiorly of the wheel adjacent to the ascending side of the latter and including a chain having overlapping plates extending between the rims of the wheel, internal gears upon the wheel, a driven shaft having pinions meshing with said internal gears, and a sprocket-wheel upon the driven shaft meshing with the chain of the endless carrier.

12. An excavating-wheel having annular rims or side plates and cage-like bucket structures connecting and spacing said side plates, in combination with an endless carrier supported interiorly of the wheel adjacent to the ascending side of the latter, and fenders or guards supported adjacent to the sides of the endless carrier.

13. An excavating-wheel having annular rims or side plates, and bucket structures connecting and spacing said side plates, in combination with suitably-supported blades interiorly engaging said side plates.

14. An excavating-wheel having annular rims or side plates, and bucket structures connecting and spacing said side plates, in combination with suitably-supported blades interiorly engaging said side plates and spaced apart one in advance of the other.

15. An excavating-wheel having annular rims or side plates, and bucket structures connecting and spacing said side plates, a

supporting-frame, rotary supporting means
above and below said frame interiorly engag-
ing the annular rims of the excavating-wheel,
and scrapers and cleaners supported upon the
5 frame and engaging the outer sides of the
rims of the wheel.

In testimony that I claim the foregoing as

my own I have hereto affixed my signature in
the presence of two-witnesses.

JAMES B. HILL.

Witnesses:

C. B. DWIGGINS,

T. H. McCONICA.