

A. TOUPIN.

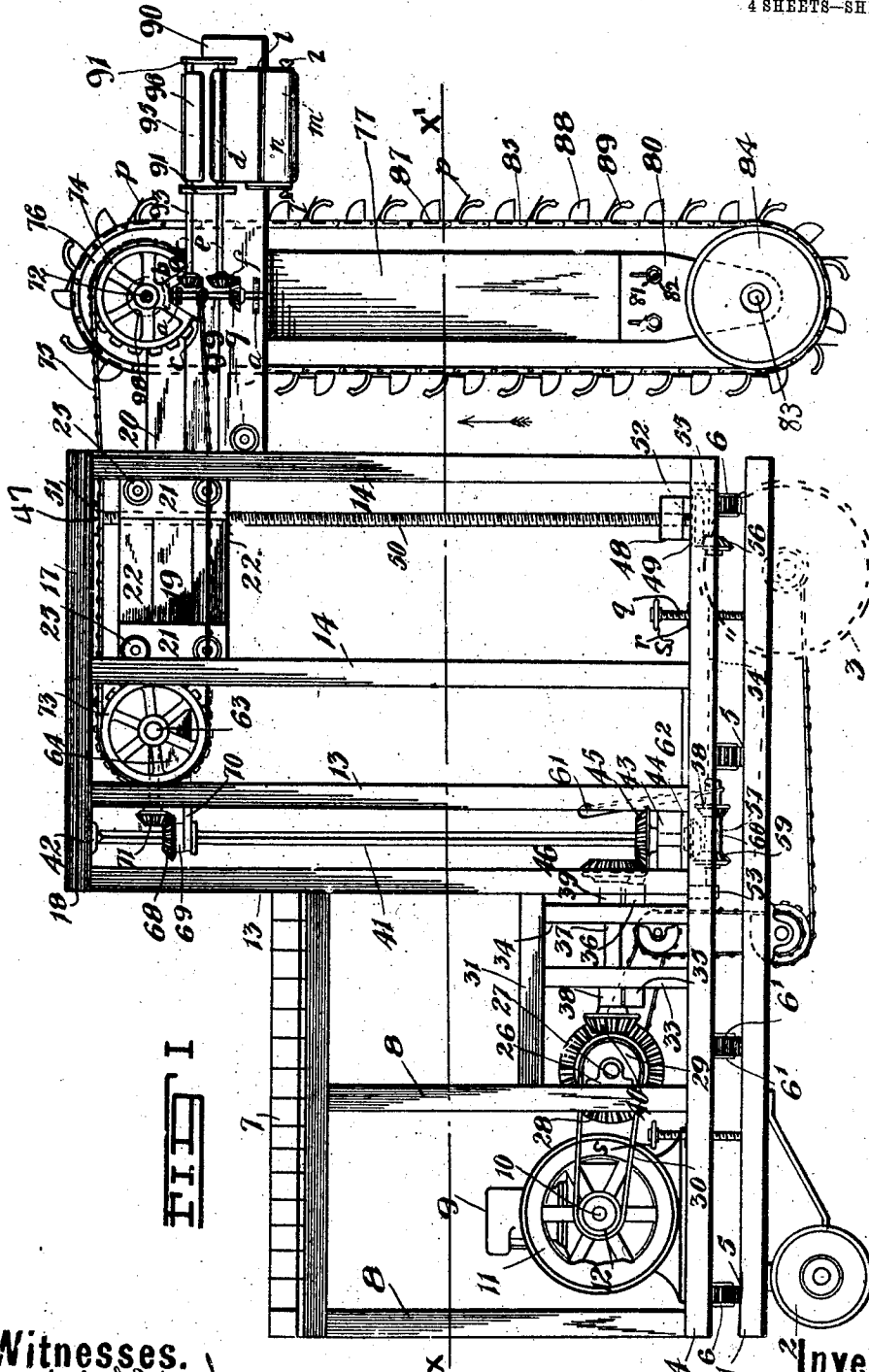
EXCAVATOR.

APPLICATION FILED JUNE 15, 1908

940,752.

Patented Nov. 23, 1909.

4 SHEETS—SHEET 1



Witnesses.

Wm. S. Robinson
Jas. M. Tapley

Inventor

A. Toupin
By *Frank S. Lusk*
His Atty.

A. TOUPIN.

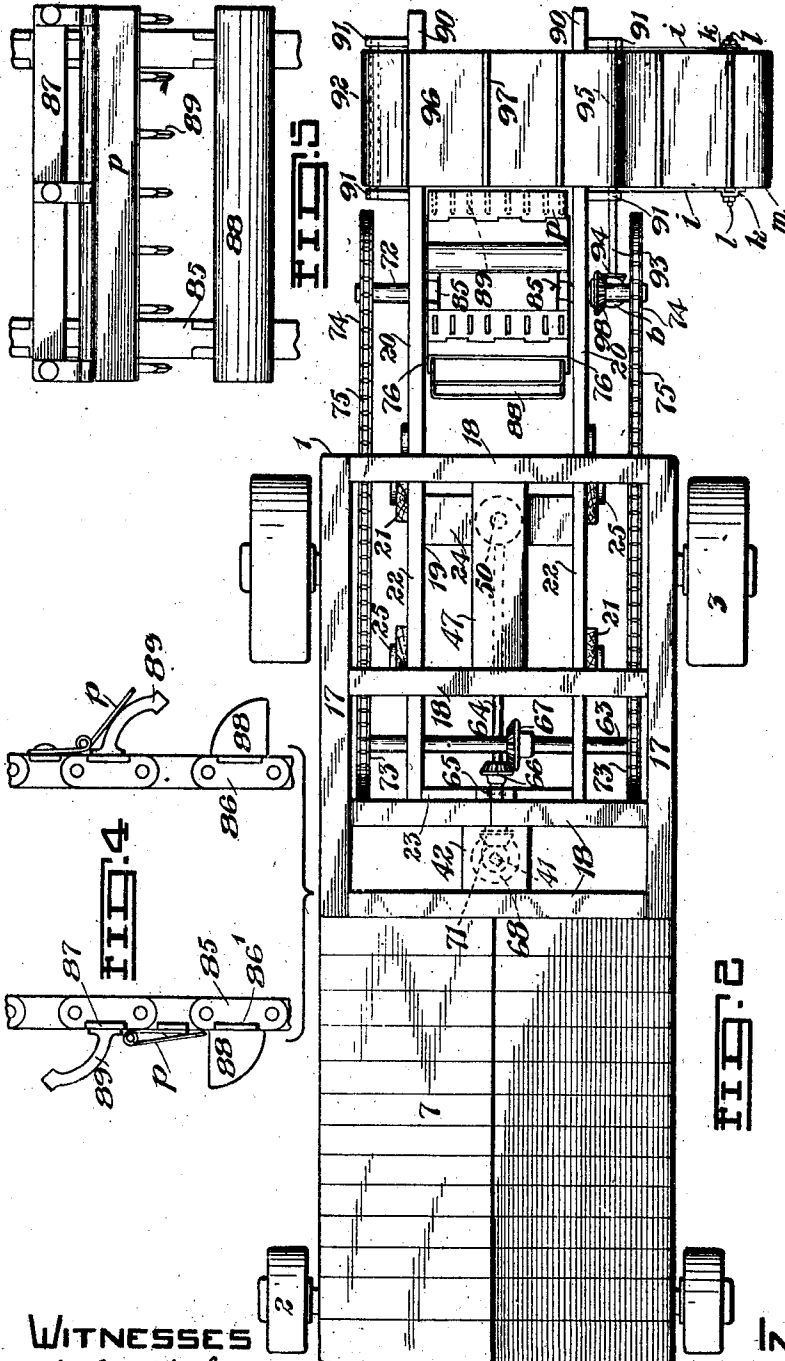
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4 SHEETS—SHEET 2.



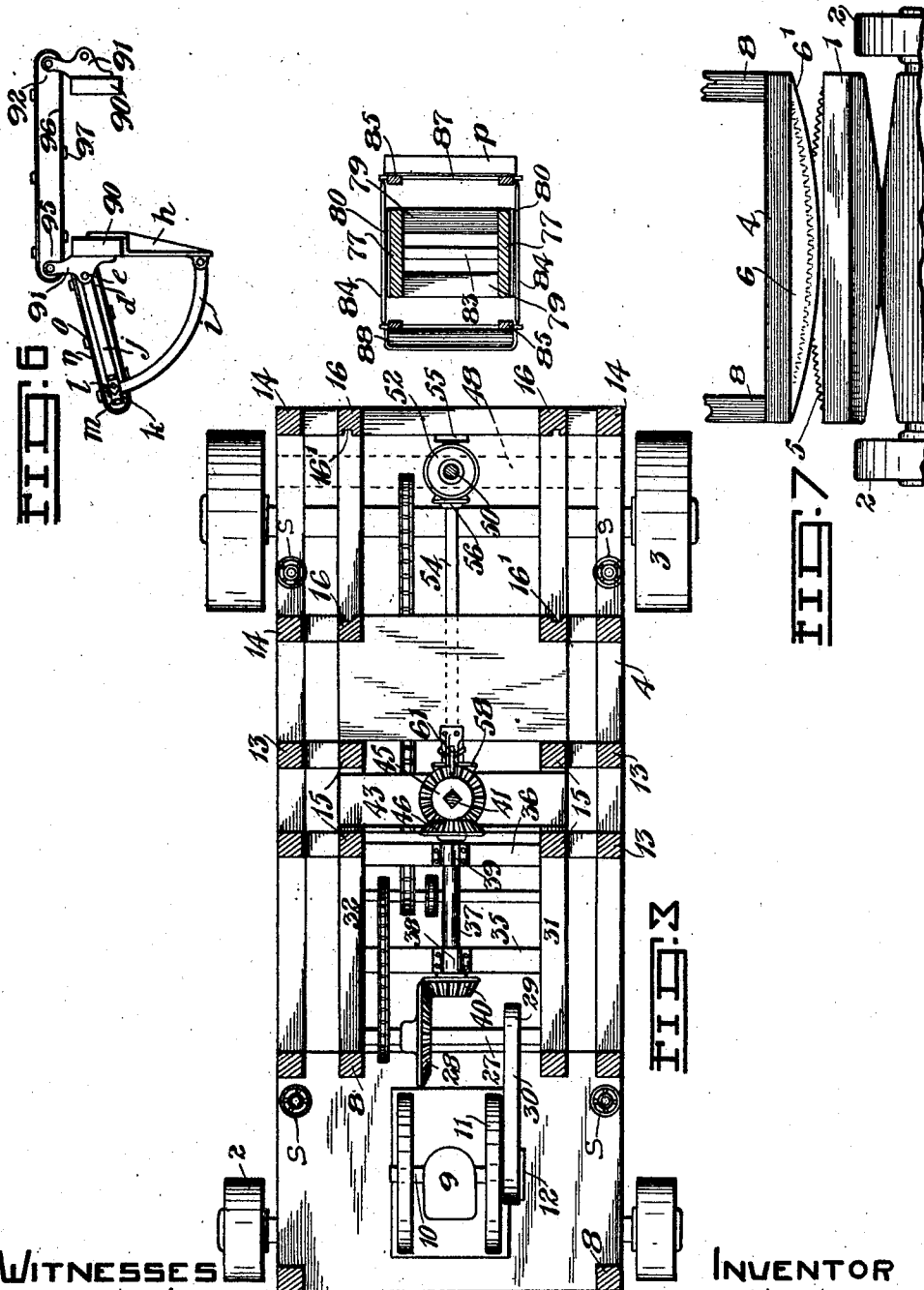
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4 SHEETS—SHEET 3.



WITNESSES

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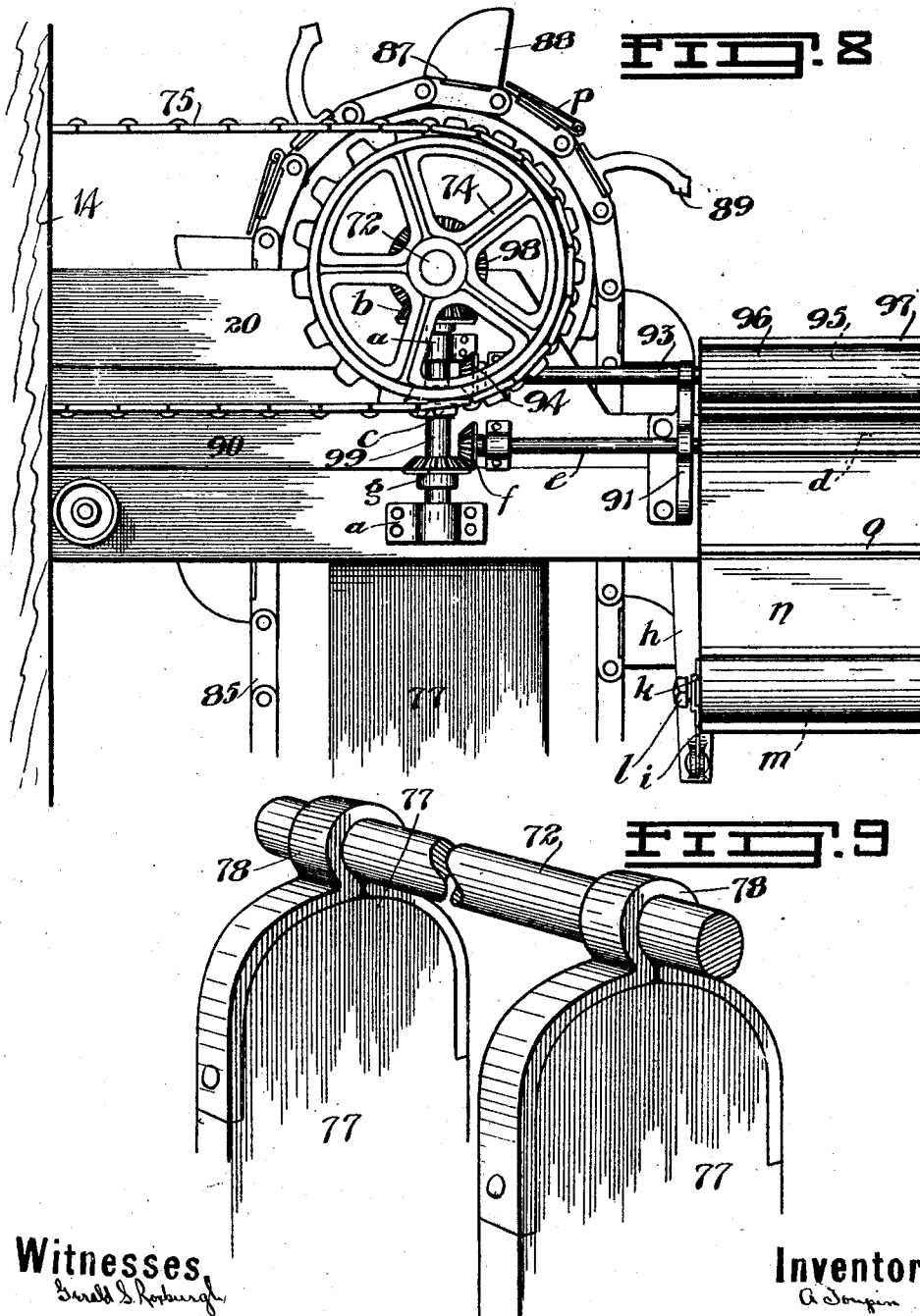
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4 SHEETS—SHEET 4.



Witnesses

David S. Robinson
John M. Topley

Inventor

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His Atty

UNITED STATES PATENT OFFICE.

ALPHONSE TOUPIN, OF ST. AGATHE, MANITOBA, CANADA.

EXCAVATOR.

940,752.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed June 15, 1908. Serial No. 438,633.

To all whom it may concern:

Be it known that I, ALPHONSE TOUPIN, of the village of St. Agathe, in the Province of Manitoba, Canada, merchant, have invented certain new and useful Improvements in Excavators, of which the following is a specification.

My invention relates to machines for excavating, ditching, etc., of the class in which an endless chain of buckets and forks, supported upon and suspended from a suitable and vertically movable framework and driven by an engine mounted upon a movable platform, is employed for excavating, elevating, and discharging the material.

The present machine is particularly well adapted for excavating sewers and for leveling ground by cutting away the face of banks or hills.

The excavator may be generally described as consisting of a base frame mounted upon suitable carriage wheels so that it may run on temporary tracks which are held on the ground at the point where the excavation or cut is to be made. Carried upon the base frame is a rockable platform upon which is mounted any form of motive power such as a gasolene engine, and forward on the platform is built a framework having beams forming vertical tracks or guideways. A horizontal framework extends beyond the forward end of the platform and is vertically movable operating on the tracks or guideways already mentioned, the upward and downward motion being controlled by a clutch. From this latter framework is suspended the frame for the endless chain of buckets and forks, the lower end of the frame falling outside the base frame and adapted for a swinging adjustment if required. Forward again of the endless chain is arranged a set of carriers which receives the material elevated by the buckets and discharges or delivers it to wherever it is required to be unloaded.

For a full and better comprehension of my invention reference must be made to the accompanying drawing, in which—

Figure 1 is a side elevation of my machine complete. Fig. 2 is a plan view of the excavator, as in Fig. 1. Fig. 3 is a horizontal sectional view in the plane denoted by the line X X', Fig. 1, and looking downwardly toward the platform. Fig. 4 is an enlarged detailed side elevation of a portion of the

endless-chain showing the buckets, the forks, and the deflector plates. Fig. 5 is an enlarged detailed front view of a portion of the chains showing the buckets, the forks, and the deflector plates. Fig. 6 is an enlarged detailed elevation of the endless carriers showing the manner in which the one is rendered adjustable. Fig. 7 is a front elevation of the base frame and the platform. Fig. 8 is an enlarged detailed side elevation of the extending portion of the frame, showing the endless chains; the buckets and forks; and the endless belts. Fig. 9 is an enlarged detailed perspective view of the upper end of the beams showing the manner in which they are supported from the cross shaft.

In the drawings like characters of reference indicate corresponding parts in each figure.

1 is a rectangular base frame supported forwardly and rearwardly on wheels 2 and 3, the wheels being shown of sufficient width to carry the weight of the excavator without sinking into the ground. If it be so desired other flanged wheels could be used when temporary rails are laid on the ground.

4 is a rectangular platform super-imposed above the base frame and it is so attached to the frame that it may rock if required. In order to allow of this I have distributed several similar transverse racks 5 along the base frame and have secured on the under base of the platform oppositely curved racks 6 which rest on the lower racks, the upper racks having side flanges 6' in order to prevent longitudinal displacement of the platform.

7 is a canopy or housing erected on the rear end of the platform being supported by uprights 8 and serves the purpose of protecting the motor engine 9 from rain, snow or hail. The engine may be of any suitable form, that shown being a gasolene engine, of which 10 is the main shaft, 11 the fly wheel, and 12 the drive pulley.

13, 14, 15 and 16 are upright beams suitably fastened at their base to the platform 4 at its forward end, such beams being interconnected by upper horizontal longitudinal and cross beams 17 and 18, respectively. The inner set of beams 16 have longitudinal grooves 16' cut therein forming a guideway or track for sets of rollers later explained. There are two of these latter beams at either

side of the platform 4 and those at one side are directly opposite those at the other as shown. The beams 13 and 14 are simply for the purpose of strengthening the structure.

5 Operating in the tracks or grooves supplied in the beams 16 is a carriage 19 which is formed from two horizontally extending beams 20 which extend both forwardly and to the rear of the beams 16 and are located directly to the inside of the vertical beams. 10 The beams 20 have secured to them by means of cross strips 21 an upper and a lower short beam 22. The beams 21 are spaced apart a distance such that their one face out-cleaves the inner face of the beams 16, in this way aiding in keeping the carriage perfectly alined. Between the beams 20 are transverse beams 23 and 24, and directly to the outside of the beams 21 are rollers or wheels 25 which operate in the grooves and allow of easy movement of the carriage.

26 are bearing brackets secured firmly to the upright beams 8, directly opposite each other, and they receive a counter shaft 27 on which is mounted a bevel gear 28.

29 is a pulley on the shaft 27, directly in alinement with the pulley 12, and it is interconnected with this pulley by a belt 30, in the usual way.

31 and 32 are horizontal beams passing between the vertical beams 8 and 15, and 33, 34, are standards passing between the beams 31 and the platform 4.

35 and 36 are suitable cross members secured to the opposing sets of beams 33 and 34.

37 is a shaft mounted in suitable bearings 38 and 39 carried on the cross members 35 and 36.

40 is a bevel pinion on a shaft 37 meshing with the bevel gear 28.

41 is a vertical squared shaft having its ends circular in cross section and bearing at the top in a plate 42 supported by the beams 18. The lower end passes into and through a cross beam 43 which is supported by the platform 4, as shown, there being two small blocks 44 inserted between the platform and the beam, at either end, to raise the level of the beam, for a reason which will afterward appear.

45 is a bevel pinion firmly secured to the shaft 41, and 46 is a bevel wheel at the opposite end of the shaft 37 to the pinion 40. This latter pinion meshes with the pinion 45.

47 is a plate passing between the beams 18 directly above the carriage 19.

48 is a beam supported from the platform 4 from which it is raised by means of inserted blocks 49.

50 is a vertical screw shaft having its lower end carried in a suitable bearing formed in the beam 48, and its upper end resting in a cup 51 fastened on the under face of the plate 47. The spacing beam 24

is provided with a stationary nut through which passes the shaft 50 and on account of this the turning of the shaft forces the carriage 19 up or down as desired, according to the rotation.

52 is a bevel pinion on the lower end of the screw shaft 50 and beneath the cross beam 48.

53 is a bracket secured to the under face of the platform, and 54 is a shaft having its one end bearing within the bracket and the other end within a suitable bearing 55 carried by the forward cross member of the platform 4.

56 is a bevel pinion secured on the shaft 54 and positioned so that it will mesh with the bevel pinion 52.

57 is a bevel wheel at the lower end of the shaft 41 immediately beneath the cross beam 43.

58 and 59 are bevel pinions fastened together by a sleeve 60 which operates on a feather carried by the shaft 54.

61 is a forked lever suitably pivoted on the platform 4 and with the forked end interconnected with a collar 62 extending from the sleeve 60 and surrounding the shaft 54. The inter-connection between the lever and the collar is such that the movement of the lever controls the position of the bevel pinion by sliding them backwardly and forwardly on the shaft.

The bevel wheel 57 is designed to engage with either of the bevel pinions 58 and 59, and according to the one with which it is engaged so the direction of rotation of the shaft 54. In this way I have both a forward and reverse motion.

63 is a transverse shaft mounted in suitable journals carried by the beams 20.

64 is a counter shaft mounted in a bearing 65 carried by the spacing beam 23, and 66 is a bevel pinion at the one end of the shaft designed to mesh with a bevel wheel 67 secured on the cross shaft 63.

68 is a bevel wheel on the shaft 41, the wheel being free to slide up or down on the shaft, but compelled to rotate therewith.

69 is a shoulder formed on the bevel wheel 68, and 70 is a bracket secured to the under edge of the spacing beam 23 and passing outwardly and around the shoulder 69, thereby compelling the bevel wheel to always move with the carriage.

71 is a bevel pinion at the opposite end of the counter shaft 64 to the pinion 66 and it is constructed so that it will be continuously kept in engagement with the bevel wheel 68.

72 is a cross shaft supported within suitable bearings formed in the forwardly extending ends of the beams 20, the shaft extending considerably beyond the outer face of the beams.

73 are gear wheels at the opposite ends of the shaft 63, and 74 are similar gear wheels

at the opposite ends of the shaft 72, such gear wheels being oppositely disposed and inter-connected by gear chains 75.

Centered on the cross shaft 72 and directly to the inner face of the beams 20 are two similar gear wheels 76. Suspended from the shaft 72 and directly to the inner side of the gear wheels are two similar beams 77 which pass normally downwardly toward the ground or track over which the machine is operating. The beams are connected to the shaft by straps 78 which are bolted to the beams and pass over and around the shaft. In this way the beams are free to be swung forwardly or backwardly on the shaft and without binding or preventing rotation. The beams 77 are held a proper distance apart by means of interposed cross braces 79. At the lower end of each of the beams 77 I have provided an adjustable plate 80, such plates being slotted and held to the beams by means of bolts or pins 81 on which are placed nuts 82 which may be loosened or tightened for adjusting purposes.

83 is a cross shaft carried in suitable bearings provided in the plates 80, the shaft being parallel with the upper shaft 72 and in the normal position directly beneath it.

84 are two circular disks secured to and centered on the shaft 83, being placed on the shaft directly against the outer face of the plates 80, and consequently directly in alignment with the gear wheels 74.

85 are endless gear chains operating on the disks 84 and the gear wheels 76. Each chain is composed of a series of similar inter-connected links 86 of the form shown in perspective detail in Fig. 4 of the drawings.

It will be noticed that each link has on its upper face and centrally a cross channel 86' cut therein. The chains are interconnected by a series of cross plates 87 which are of a length somewhat greater than the distance between the gear wheels or disks, that is the plates extend slightly beyond the chains at either side. The plates are in any suitable manner fastened securely to the individual links of the chains, such as by bolts or rivets.

Connected to the plates at regular intervals and adapted to operate with them are scoops or buckets 88, having an open front and a closed curved back and bottom. Connected to others of the plates at regular intervals and disposed in each case between each successive pair of buckets are curved rakes or cutting bars 89. On each plate there are several cutting arms and their purpose is to pierce and break the earth to be excavated when the chains are revolved in the direction noted by the arrow in Fig. 1. The earth which is in this way loosened is picked up by the buckets and carried to a suitable point, later explained, where it is transferred to a set of carriers or conveyers. The ad-

vantage in having the ends of the plates 87 extend beyond the chains is so that the chains may be carried on the gear wheels and disks.

Referring to the drawings it will be seen that the teeth of the gear wheels pass between the adjoining ends of the plates, or in other words the ends of the plates rest in the opening between the teeth. The plates simply rest on the face of the disk wheels as it is unnecessary to have any further driving means other than the gear wheels. It is particularly to be noticed that the links are not provided with the ordinary recess to receive the teeth.

90 are a set of beams secured to the forward end of the beams 20 and extending therebeyond an equal distance.

91 are brackets secured to the outer face of the beams toward their ends there being a set of brackets on each beam.

92 is a roller suitably mounted in bearings carried by one pair of the brackets 91, and 93 is a shaft mounted in bearings formed in the other set of brackets 91. The shaft extends at one side beyond the brackets and is provided with a bevel pinion 94. On the shaft is a roller 95 corresponding to the roller 92.

96 is an endless belt passing around the rollers and 97 are cross strips or slats fastened on the belt at suitable intervals.

98 is a bevel gear on the shaft 72 placed at the outside face of one of the beams 20.

99 is a vertical shaft supported by suitable brackets *a* which are fastened to the outer face of the adjoining beams, and *b* is a bevel pinion at the upper end of the latter shaft and meshing with the bevel wheel 98.

c is a bevel pinion on the shaft 99 meshing with the bevel pinion 94 in such a manner that the rotation of the shaft 99 rotates the shaft 93 and consequently operates the belt.

d is a roller supported on a shaft *e* mounted in suitable bearings formed in one set of the brackets 91. The shaft extends beyond the brackets at one side and is provided at its end with a bevel gear *f*.

g is a bevel wheel on a shaft 99 being positioned so that it meshes with the bevel gear *f*.

h are hangers secured to one of the beams 90 and extending beneath it. To the lower end of the hangers are connected curved arms *i*, the arms forming in reality a segment of an arc, whose center is the center of the shaft *e*. The arms are placed apart a distance practically equal to the length of the roller *d*.

j are bars centered at their one end on the shaft *e* and having their other ends adjus- justably connected to the arms *i* by means of straps *k* which pass out from the bars *j* and around the arms.

l are adjusting screws passing through the straps and adapted to screw against the

arm *i*, in this manner holding the bars *j* at any desired inclination.

m is a roller suitably journaled in bearings formed at the outer ends of the bars *j*, and *n* is an endless belt inter-connecting the roller *m* with the roller *d*.

o are cross cleats or bars disposed on the belt *n*.

p are deflector plates swung from the chains 85 between the scoops and the hooked bars. They may be designed in the form of a hinge with a short wing, the short wing being bolted or otherwise fastened in each case to the cross plate 87, intervening between the plate carrying one of the hooks, and that carrying one of the scoops. The advantage gained by using these deflector plates is that of directing the earth carried up and thrown down by the scoops onto the endless belt 96. It is to be noticed that the deflector plates on the side of the endless chains toward the platform are hanging vertically, and that they lie flat against the chains until they pass over the gear wheels 76 and commence to descend. The deflector plates after passing over successively swing into a position such that they rest on the upper side of the adjoining set of hooked arms. Consequently the material thrown down by the scoop directly above is received by the plates and directed to the belt 96 where it is immediately transferred to the belt *n* and discharged.

If it is desired to have the excavator propel itself in so far as moving from point to point is concerned, any suitable system of gearing and drive chains can be used, such interconnecting the counter shaft 27 with the carriage wheels 3.

In order that the platform 4 may be rocked in respect to the base frame on the racks *f* I have provided a set of vertically extending rods *g* which are loosely connected to the base frame and pass up through an elongated opening provided in the platform. Where the rods pass through the platform I have placed a plate *r* and upon each rod, which it will be understood is already threaded, is provided a hand wheel *s*. Consequently the platform 4 can be placed at the desired incline by screwing down the hand wheels at one side of the frame and releasing those at the opposite side of the frame. Various other well known means may be employed which would serve the same purpose as the hand wheels and rods and I wish it to be understood that such may be applied, if it be found desirable, without departing from the spirit of my invention.

In using my machine for excavating sewers, cellars, or such like, it will be operated as follows;—Assuming the engine started, it will be seen that with the interconnection as shown in Fig. 1, the scoops will be rotated in the direction shown by the adjoin-

ing arrow. The hooked arms will break the surface soil and the scoops will collect it and later deposit it on the endless belt which is turned in a direction which will carry material thrown thereon to the second belt. It in turn, on account of the interconnections with the shaft 72 will deposit the earth received over the free end. As the earth is excavated and leveled the carriage 19 is lowered in position and this is controlled by the lever 61.

With the lever in the position shown in Fig. 1 the carriage will descend and with it in the reversed position the carriage will ascend. Consequently the depth to which one can excavate with my machine will depend entirely upon the distance to which the carriage can be lowered, as will readily be seen.

Where it is required to cut away the face of a bank or hill the lower end of the beams 77 would be swung outwardly and the hooked arms would break down the face of the bank while the scoops would carry away the material loosened.

Considerable advantage is gained by having the platform rockable on the base frame as it allows the excavator to be used with equal facility on slanting or sloping ground, as the upper platform can be set to always remain in the horizontal position. Consequently the scoops and hooked arms will always be in a position to work to the best advantage.

Particular attention is directed to the manner in which the carriage is rendered adjustable vertically while still retaining a drive connection for the shaft 63. The square shaft 41 and the bevel wheel 68 slidable on the shaft and rotatable therewith allow of this combined vertical adjustment and drive.

What I claim as my invention is:

1. In an excavator the combination with the supporting frame and the motor, of a vertically adjustable, horizontally extending frame carried by the former framework, and a series of buckets on a set of endless chains carried by the latter framework, as and for the purpose specified.

2. In an excavator the combination with a vertically disposed framework, and motor, of a horizontally disposed vertically adjustable frame; a set of beams pivotally supported from the frame; and excavating means carried by a set of endless chains mounted on said beams, as and for the purpose specified.

3. In an excavator, the combination with a vertically extending portable framework, and a motor power, of a horizontally extending vertically adjustable frame carried by the framework; a cross shaft having ends overhanging the frame, and by which it is carried by its overhanging end a set of oppo-

sitely downwardly extending beams pivotally swung on the shaft; a cross shaft mounted in bearings at the lower end of the beams; a set of endless gear chains suitably mounted upon the said shafts; and buckets and forks arranged at intervals and secured alternately to the chains, as and for the purpose specified.

4. In an excavator the combination with a portable vertically extending framework and a motive power, of a horizontally extending vertically adjustable frame carried by and extending forwardly of the framework; means interconnecting the motor, with the frame whereby it may be adjusted; a cross shaft carried by the overhanging end of the frame; an opposing set of beams pivotally interconnected to the cross shaft; a shaft mounted in adjustable bearings secured to the ends of the beams; a set of gear wheels keyed on the upper shaft; a set of disk wheels secured to the lower shaft; a set of endless chains interconnected by spacing bars, such chains passing over the gear wheels and around the disk wheels; and alternately arranged buckets and forks secured to the spacing bars, as and for the purpose specified.

5. In an excavator the combination with a portable supporting platform; a forwardly disposed framework having an opposing set of vertical guideways formed thereon, and a motor, of a horizontally disposed frame operating in the guideways, such frame extending forwardly of the framework; and means interconnecting the motor with the frame whereby it may be operated in the guideways, as and for the purpose specified.

6. In an excavator the combination with a portable supporting platform; a forwardly disposed framework having an opposing set of vertically directed guideways therein and a motor, of a horizontally disposed frame carried by sets of wheels operating in the guideways, such frame extending beyond the framework; a vertically extending screw shaft carried by the framework, such shaft operating within a receiving nut carried by the frame; and means interconnecting the motor with the shaft whereby it may be rotated, as and for the purpose specified.

7. In an excavator the combination with the supporting platform; a forward framework; and a motor, of a horizontally disposed frame carried by the framework, such frame extending forwardly of a framework and supporting a series of buckets and forks on an endless chain; means interconnected with the motive power whereby the frame may be vertically adjusted; and means whereby the endless chains may be rotated in any of such adjusted positions, as and for the purpose specified.

8. In an excavator the combination with the supporting platform; a forwardly dis-

posed framework; and a motor, of a horizontally disposed frame carried by the framework and extending forwardly of the framework; a series of buckets and forks on an endless chain carried by the frame; an upright screw shaft interconnected with the frame whereby it may be adjusted vertically in respect to the framework; a vertically extending square shaft secured to the framework to the rear of the frame; means interconnecting such shaft with the motor whereby it may be rotated; and means interconnecting the endless chains with the shaft whereby they may be rotated in any of the adjusted positions of the frame, as and for the purpose specified.

9. In an excavator the combination with the platform; the framework; and the motive power carried by the platform, of a vertically adjustable frame carried by the framework and extending forwardly thereof; a cross shaft mounted in suitable bearings carried by the frame; an opposing set of beams pivotally interconnected with the said shaft; a cross shaft mounted in suitable bearings carried by the lower end of the beams; a series of buckets and forks on an endless set of chains carried by the shafts; a cross shaft mounted in suitable bearings formed at the rear of the frame; drive chains interconnecting such latter shaft with the forward shaft on the frame; a vertically disposed square shaft secured to the framework to the rear of the frame; means interconnecting the shaft with the motive power whereby it may be rotated; a bevel wheel slidably mounted on the shaft and rotatable therewith; an arm extending from the frame and interconnected with the bevel wheel whereby the bevel wheel moves with the frame; and means interconnecting the bevel wheel with the rear shaft carried by the frame whereby it may be rotated, as and for the purpose specified.

10. In an excavator, the combination with a forward framework and the motor, of a vertically adjustable frame carrying the excavating means; operating means for said excavating means and means carried by the framework and interconnected with the said operating means whereby the excavating means may be rotated, as and for the purpose specified.

11. In an excavator, the combination with a vertically adjustable frame, a second frame suspended from said first named frame, said second frame having a series of buckets and forks mounted on an endless set of chains carried thereby, of an endless belt mounted upon suitable rollers carried by the first frame and adapted to receive the material deposited by the buckets and forks, as and for the purpose specified.

12. In an excavator, the combination with a vertically adjustable frame having a series

of buckets and forks on an endless set of chains carried by the frame, of an endless belt mounted on suitable bearings carried by the frame; a second endless belt continuous with the latter belt, such belt being carried by an upper roller mounted in suitable bearings carried by the frame; and a lower roller mounted in adjusting bearings carried by a downwardly extending bracket, both of such belts being actuated when the endless chains are operated and being adapted to receive the material deposited by the buckets and forks, as and for the purpose specified.

15 13. In an excavator, the combination with an endless set of chains having buckets and forks secured thereto at intervals and spaced alternately, of means carried by the chains adapted to direct the material deposited by

the buckets over the extending end of the forks, as and for the purpose specified. 20

14. In an excavator, the combination with an endless set of chains having buckets and forks secured thereto, the buckets being arranged alternately with the forks; and an endless belt adapted to receive the material deposited by the buckets, of self actuating means carried by the chains between the buckets and forks and adapted to direct the material deposited by the buckets to the belts, as and for the purpose specified. 25 30

Signed at Winnipeg, in the Province of Manitoba, this 26th day of March 1908.

ALPHONSE TOUPIN.

Witnesses:

GILBERT THOMSON,
GERALD S. ROXBURGH.