

March 28, 1939.

J. E. F. CAMBÉSSÉDÈS

2,151,894

APPARATUS FOR SORTING HOUSEHOLD RUBBISH

Filed Nov. 21, 1935

8 Sheets-Sheet 1

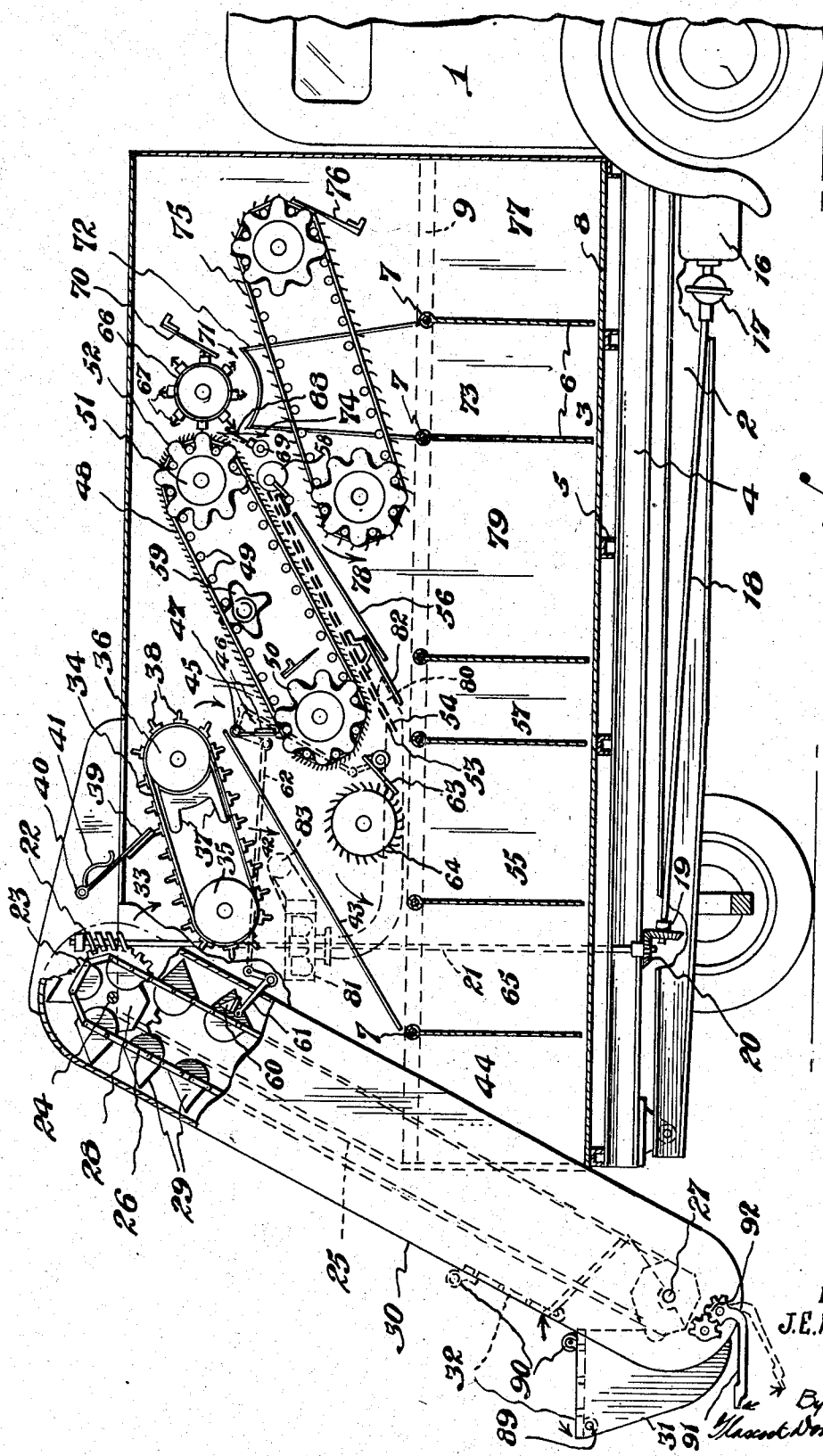


Fig. 1.

INVENTOR.
J. E. F. Cambessedes

By
H. A. Downing & Sons
Attys.

March 28, 1939.

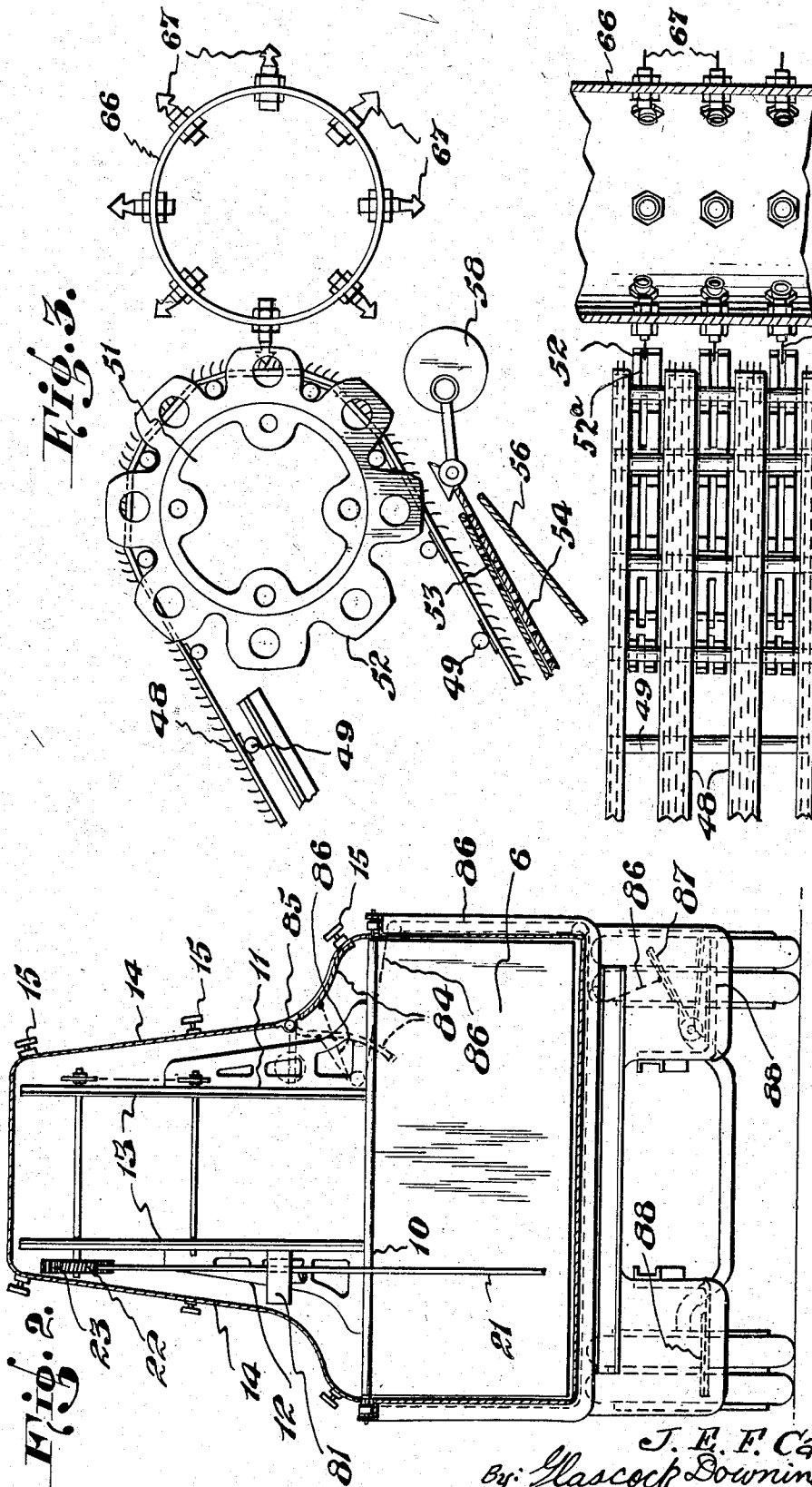
J. E. F. CAMBÉSSÉDES

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8 Sheets-Sheet 2



INVENTOR,

J. E. F. Cambessedes
By: Glascock Downing & Seabold
Attys.

March 28, 1939.

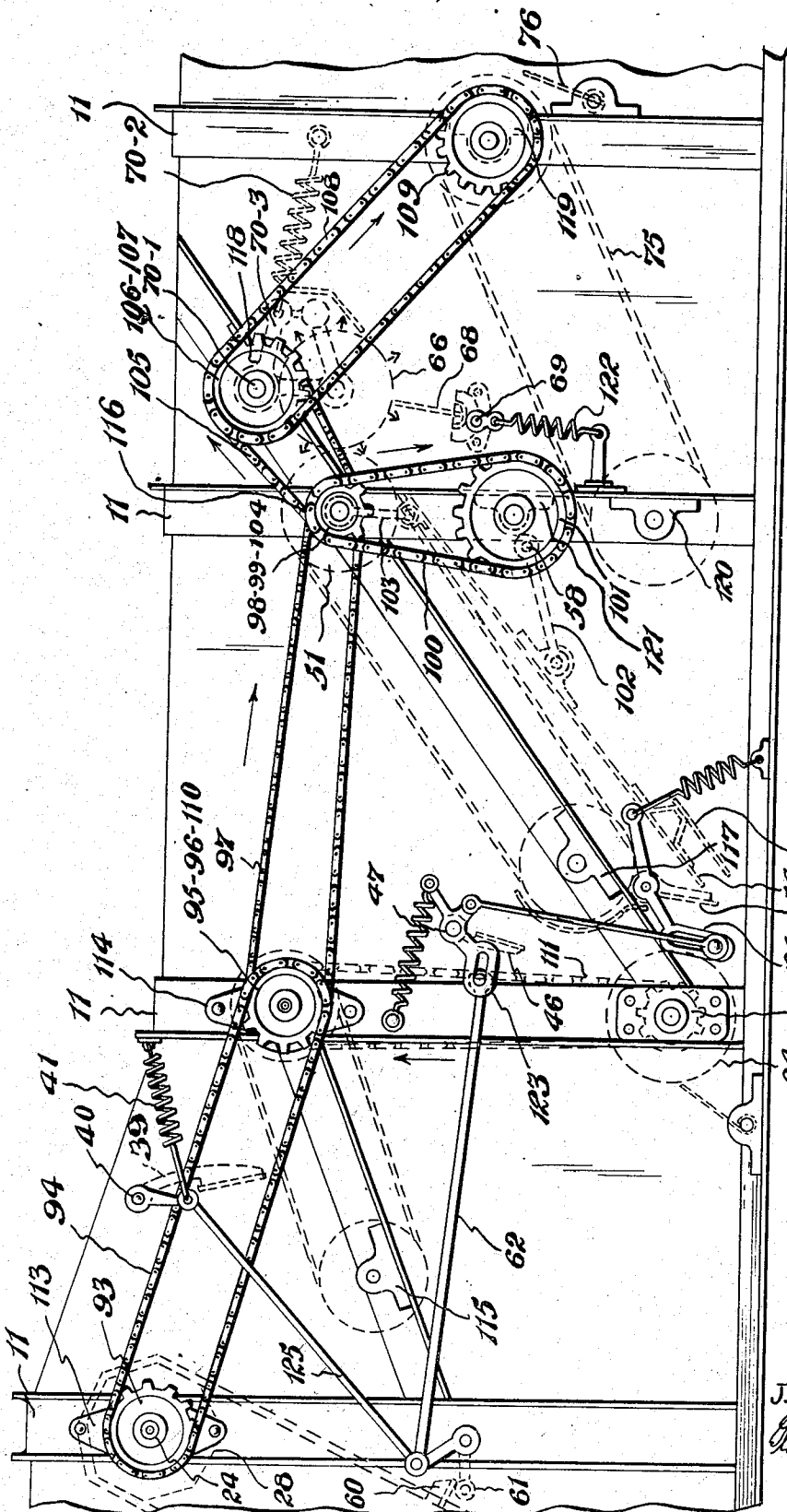
J. E. F. CAMBÉSSÈDES

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8 Sheets-Sheet 3



INVENTOR:
J.E.F. Cambessedes

Hascoet Downing & Seabold
ATTORNEYS.

March 28, 1939.

J. E. F. CAMBÉSSÉDÈS

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8 Sheets-Sheet 4

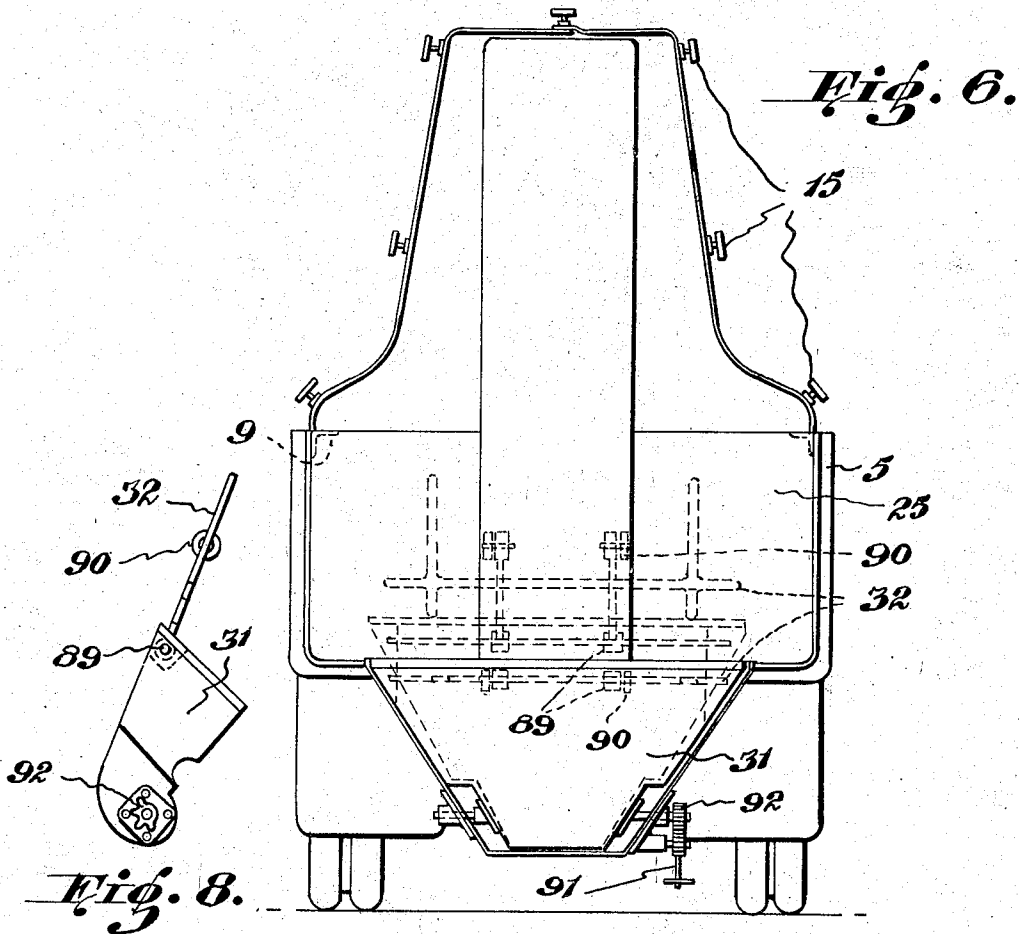
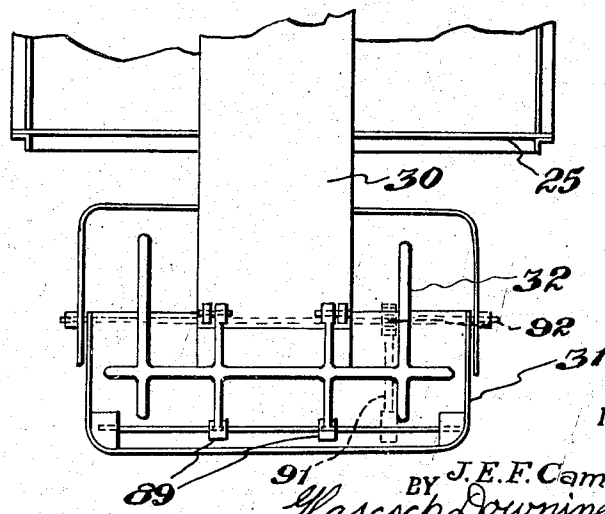


Fig. 7.



INVENTOR,

BY J. E. F. Cambessedes
Glascopp Downing & Leibold
ATTORNEYS.

March 28, 1939.

J. E. F. CAMBÉSSÉDÈS

2,151,894

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8 Sheets-Sheet 5

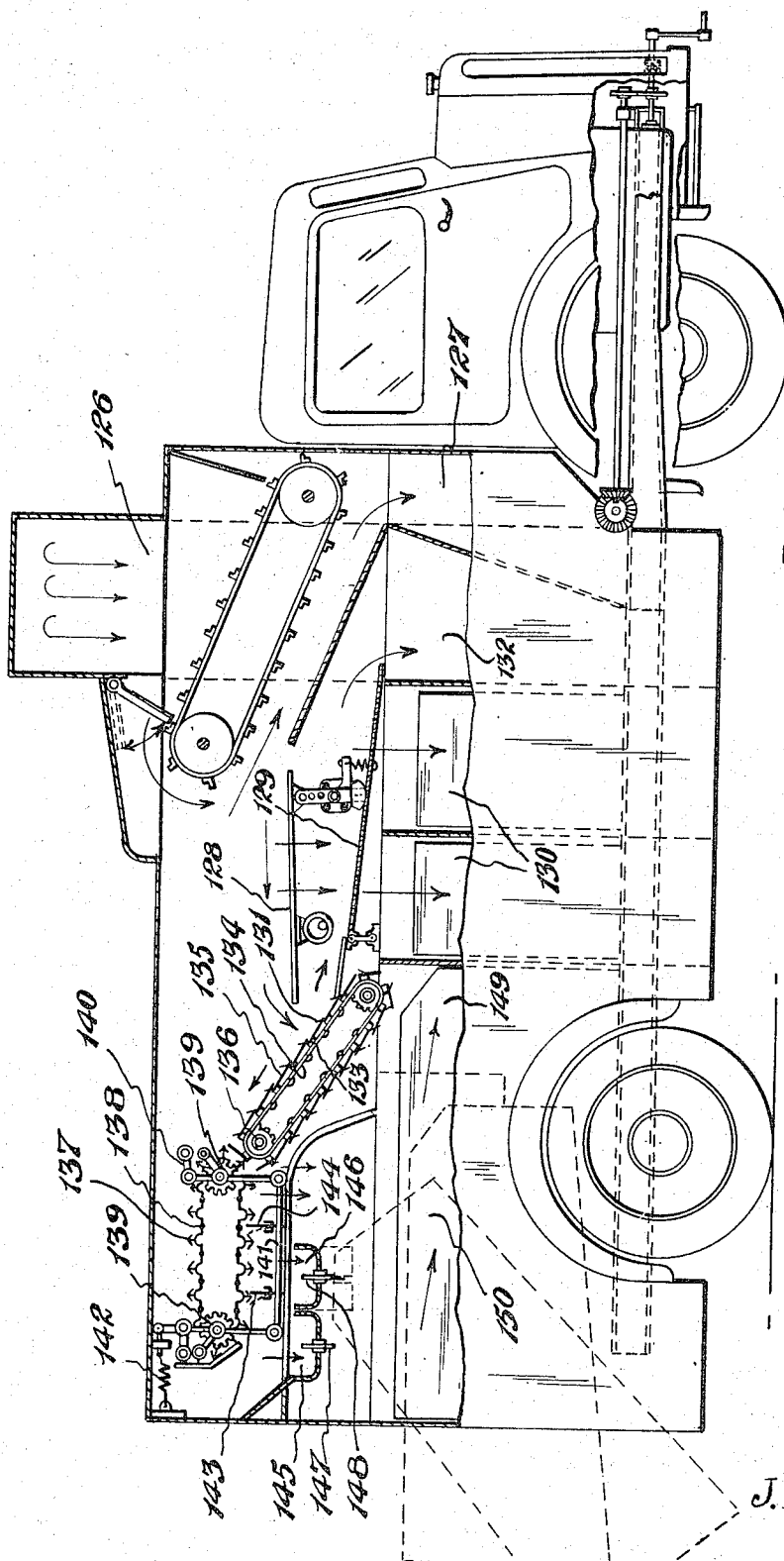


Fig. 9.

INVENTOR.
J. E. F. Cambessedes

ATTORNEYS:
Glascopp Downing & Seibold

March 28, 1939.

J. E. F. CAMBÉSSÉDÈS

2,151,894

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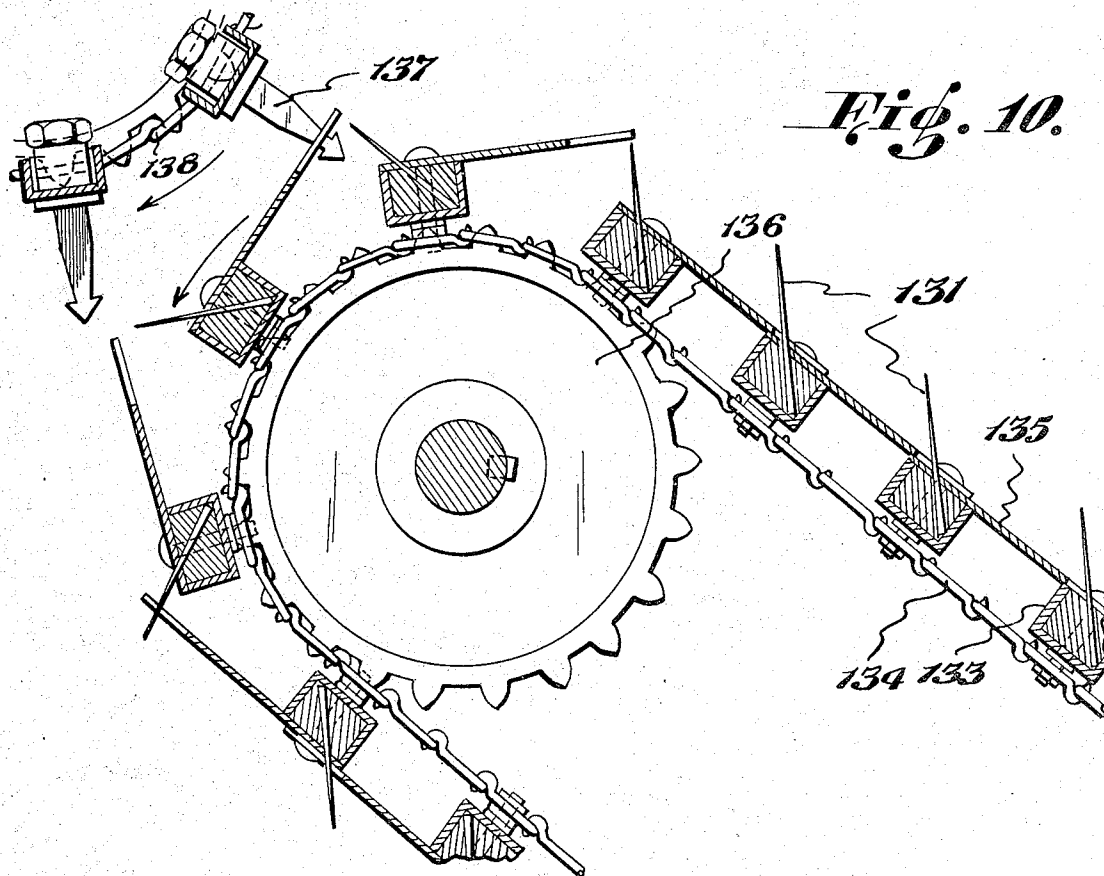


Fig. 10.

Fig. 11.

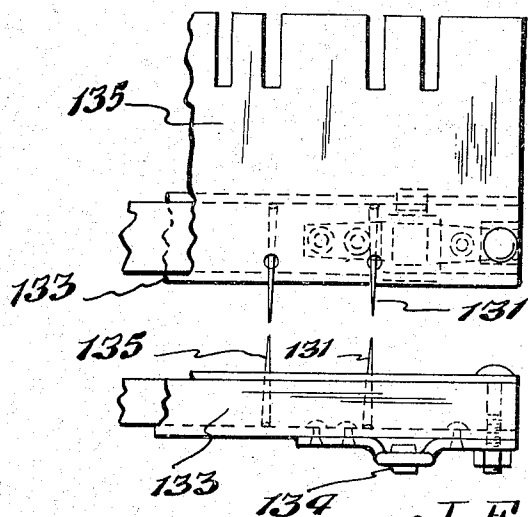


Fig. 11^a

INVENTOR,
J. E. F. Cambessedes
BY
Glascopp Downing & Seebold
ATTORNEYS.

March 28, 1939.

J. E. F. CAMBÉSSÉDÈS

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Fig. 12.

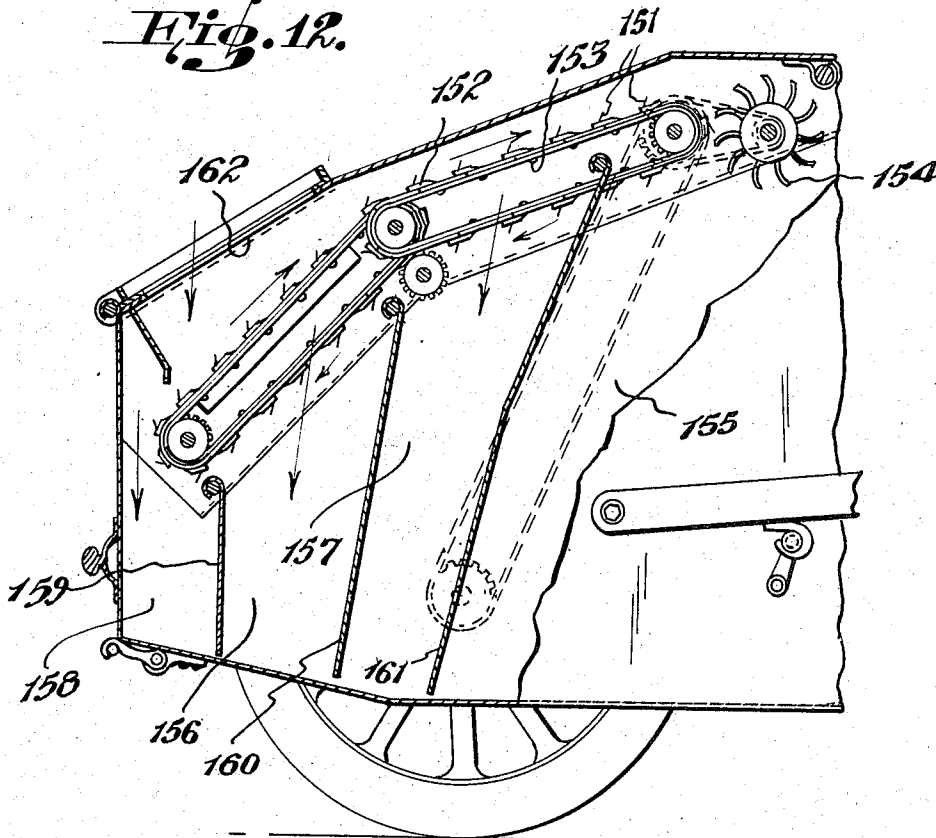


Fig. 13.

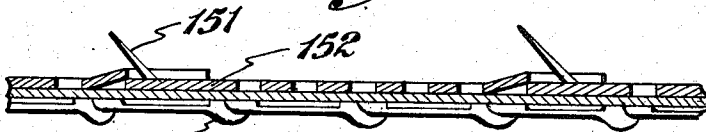
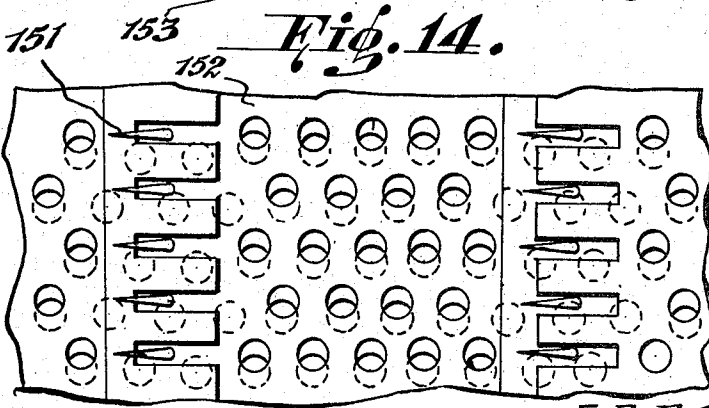


Fig. 14.



INVENTOR,

J. E. F. Cambessedes

BY

Glascok Downing & Seabold
ATTORNEYS.

March 28, 1939.

J. E. F. CAMBÉSSÉDÈS

2,151,894

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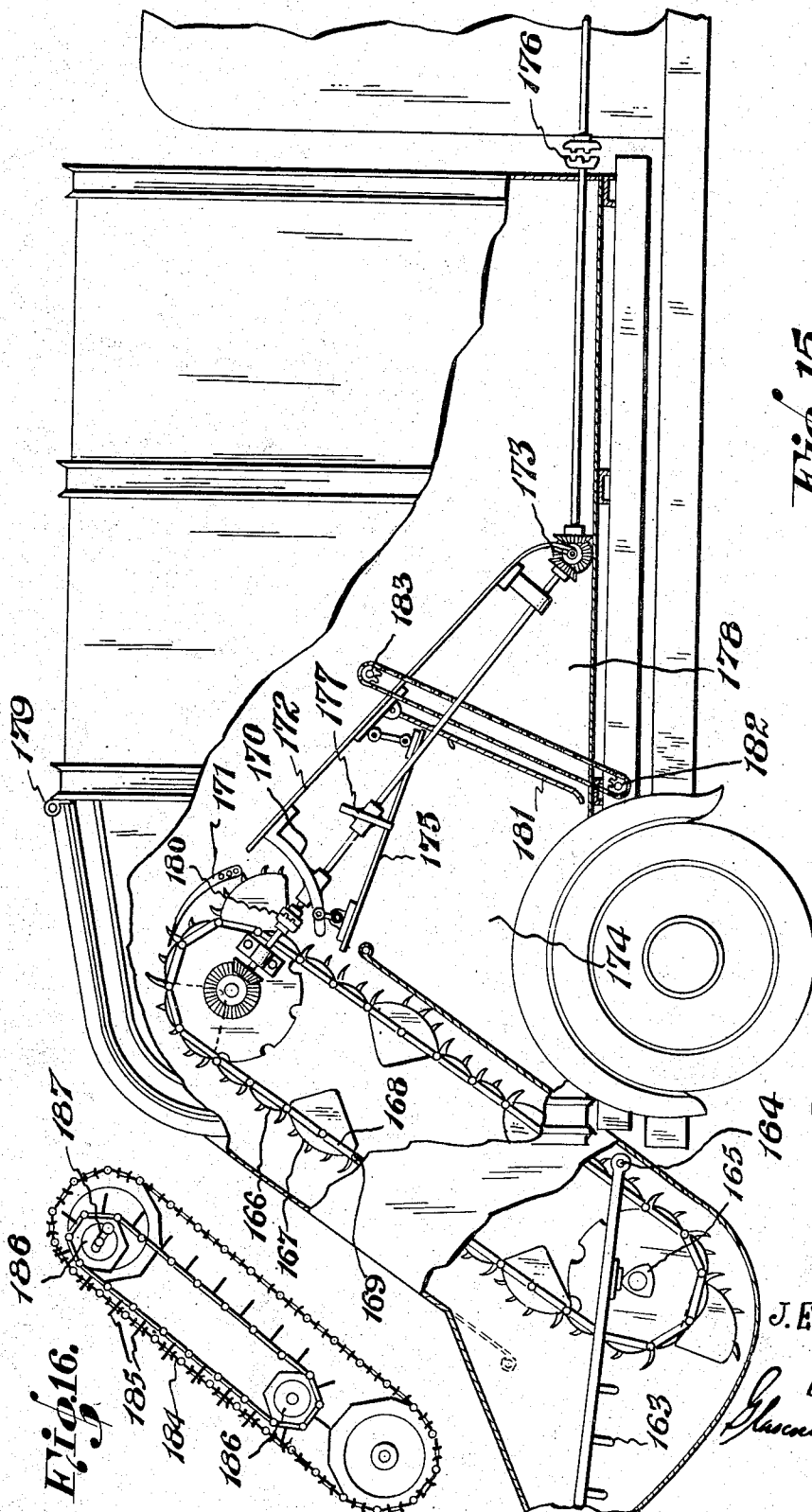


Fig. 15.

Fig. 16.

J. E. F. Cambessedes
INVENTOR.

By: *Glenn & Downing*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,151,894

APPARATUS FOR SORTING HOUSEHOLD RUBBISH

Jean Etienne Félix Cambéssédès, Paris, France

Application November 21, 1935, Serial No. 50,980
In France November 21, 1934

9 Claims. (Cl. 209—12)

This invention relates to improvements in apparatus for sorting household rubbish and has for its object to provide a motor driven lorry removably supporting various types of sorting devices whereby that part of the refuse which is suitable for the production of fertilizer, fuel and like materials may be recovered and utilized for these purposes.

In the accompanying drawings in which several approved embodiments of the invention are illustrated:

Figure 1 is a diagrammatic longitudinal sectional view partly broken away, of a sorting apparatus constructed in accordance with the invention.

Figure 2 is a diagrammatic transverse sectional view taken vertically in the plane of the shaft 21, Fig. 1.

Figure 3 is a fragmentary longitudinal sectional view through the apparatus on an enlarged scale illustrating one of the sorting devices.

Figure 4 is a plan view partly in section of the device shown in Figure 3.

Figure 5 is a fragmentary side elevation of a part of the apparatus illustrating the driving gear in detail.

Figure 6 is a rear elevation of a sorting apparatus provided with a charging funnel, of somewhat modified construction.

Figure 7 is a plan view of the arrangement shown in Fig. 6.

Figure 8 is a detail view of the charging funnel removed.

Figure 9 is a view similar to Figure 1 showing a modified construction of the entire sorting apparatus.

Figure 10 is an elongated detail sectional view of one of the sorting devices disclosed in Fig. 9.

Figure 11 is a fragmentary plan view of the arrangement shown in Fig. 10.

Figure 11a is a detail edge view of the arrangement shown in Fig. 11.

Figure 12 is a diagrammatic elevation partly broken away of a further modification of the invention.

Figures 13 and 14 are sectional and plan views of the sorting chain shown in Figure 12.

Figure 15 is a fragmentary diagrammatic view of a further modification of the sorting apparatus, and,

Figure 16 is a detail of a further modification of the chain.

1 designates a lorry, upon the chassis 2 of which is mounted a box 3 supported by longitudinal beams 4 and channel cross members 5. The box

is provided with partitions 6 movable about pivots 7 and slidable doors (not shown) in the bottom 8. Upon ledges 9 provided as usual upon the top edges of the box are slidably mounted transverse supporting members 10 which carry upright members 11 of the frame of the sorting apparatus. The frame comprises in addition angle pieces 12 and aluminium plates or linings 13. Between the aluminium lining of the casing are mounted the various members of the sorting apparatus, whilst the various members of the driving gear, such as driving chains and toothed gears which transmit the motion are mounted between the aluminium plates 13 and outer covering plates 14, which latter are held in place by screws 15. The driving gear is therefore located in a space protected from dust which might be contained in the rubbish. The drive is connected with the gear box 16 and is transmitted by members 17, 18, 19, 20, 21 the screw 22 and the worm wheel 23 to a shaft 24, said shaft serving as the fulcrum for a large rear door 25 and for driving an elevator chain 26. The elevator chain rests upon pinions 28 on the two shafts 24 and 27 and is provided with buckets 29.

At the bottom of a passage 30 is arranged a movable charging funnel 31, provided at the inlet with bars 32 which prevent articles of an excessive size from entering the apparatus. About four or five buckets are provided one behind the other upon the chain, the remainder of the chain being free from buckets. By this arrangement, rubbish is supplied to the sorting apparatus from the upper portion 33 of the passage 30 at intervals. The rubbish drops upon an endless band 34 which latter passes over a guide roller 35 and a magnet-roller 36 of known type. The magnet roller 36 may, in order to reduce its weight, be fitted with aluminium wire, instead of copper as usual. 37 designates extensions of the magnet which extend under the band; while 38 indicate plates provided with fingers which are magnetised by the extensions 37. The fingers of these plates may pass through the wall of the passage and between the buckets to remove obstructions from them. The endless band is preferably provided upon its ledges with brass chains. A bar 39 pivotally mounted at 40 in the casing continuously equalises the thickness of the rubbish layer, under the action of a spring 41. A chain mounted outside the inner casing transmits rotation of the shaft 24 to the shaft of the magnet and likewise to all the other shafts of the apparatus.

The matter deposited at 33 gradually advances, smoothed by the bar 39, the fingers 38, attract-

ing the larger pieces of iron. The intense magnetic action ceases as the band passes the end of the lower extension 37 and the iron then drops in the direction of the arrow 42. An inclined plate 43 which serves also as a cross member stiffening the casing, then guides the iron pieces into a receptacle 44. The remaining mass of rubbish in which ashes predominate, drops in the direction of the arrow 45 into an angular recess formed by a bar 46 pivoted at 47 and upon endless bands 48 carrying short points. These bands are connected transversely by tubes 49 and form a continuously moving conveyer passing around a guide roller 50 and a head roller 51. The latter roller is provided between the bands 48, with aluminium discs 52 formed with teeth with which engage the cross tubes 49. The discs 52 serve for moving the carded conveyer band, and the points of the said carded band are so high that they discharge the papers, rags, or fine parings of vegetables which were picked up while bearing against the bar 46, out of being caught by the teeth fitted on 50, but shorter than those of 51. The same applies to the other picking members of the mechanism, while all very flat objects capable of being picked up by the very short cards 48 rise upon the conveyor band, ashes pass through the bands 48 and drop upon a perforated sheet 53 which is mounted in contact with another perforated sheet 54, and then slide down into a compartment 55. Very fine ashes pass through both the sheets and drop upon an imperforate fixed sheet 56 and then slide along that sheet into compartment 57. In order to avoid any obstruction, the sheet 54 is associated with an eccentric shaft 58 which continuously agitates the sheet. At the exterior of the casing, the shaft 58 receives its movement together with the other parts of the bands 48, by means of chain wheels. Should obstacles, for instance, stones, become lodged in the free space of the conveyor bands 48, a roller 59 provided with strong teeth removes them instantly. This roller is driven by the cross tubes 49.

At the moment when a fresh series of buckets 29 arrives near the passage 33, a striker 60 of the chain 26 striking against a lever 61 associated with a rod 62, rapidly opens the door 46. Objects such as pieces of broken porcelain, glass, stones, large cinders, bottles, apples, potatoes, carrots, pieces of bread and other objects which the carded bands fail to pick up, then fall upon another pivoted bar 63. A roller 64 provided with long points arranged at large distances apart, grips the apples, carrots and like soft objects and discharges them into a compartment 65 whilst leaving broken glass. The plate 33 oscillates in a manner similar to the plate 46 and almost at the same time, broken porcelain and stones drop into the compartment 55 into which large cinders which pass through the endless bands are delivered. The roller 51 detaches by means of its teeth 52 paper, rags and fine parings of vegetables. Opposite the roller 51 there is another roller 66 provided with double hooks 67 arranged at suitable distances apart and located opposite slots 52a milled on to the tips of teeth 52, so as to engage the matter carried thereby. These double hooks shown in Figs. 3 and 4 carry the matter up to a brush having long bristles 68 pivoted at 69 which retains the paper and allows rags which have been detached by the comb 70 to pass. They thus drop in the direction of the arrow 71 into a passage 72 in the form of an arch in which moves another carded band 75 which conveys the rags into a compartment 73.

The roller 66 and the comb 70 are mounted upon a shaft provided with a return spring 70—2, Fig. 5, so that they can yield backwards in case a large body should pass between 51 and 66.

Parings of vegetables are dropped vertically in the direction of the arrow 74 and are picked up by a band 75 mounted upon two driving rollers and provided with long and fine cards. Due to their mass, the parings are carried by the bands 75 and are detached by a comb 76 whereupon they drop into a compartment 77. On the other hand, the waste papers the surface of which is hard and is not gripped by the hands, drops into the direction of an arrow 78 and are accumulated in a compartment 79. This action is assisted by the suction nozzle 80 of a fan 81 (Fig. 1) mounted upon the shaft 21. The suction nozzle 80 is continuously cleared of paper which might obstruct it, by a grid 82 actuated by the oscillating sheet 54. The discharge end 83 of the fan is utilised for blowing from the iron pieces dropping from the magnet, any papers that might have been carried along, and causes them to drop in the direction of the arrow 74.

The casing is provided with doors 84, Fig. 2, pivoted at 85 and adapted to be opened by means of a cable 86, and a pedal 87 associated with a footboard 88 so that operators stepping upon the footboard can open the doors 84 and use both hands for throwing directly into the compartments any objects which grid 32 has retained.

In order to prevent the operators from attempting to push with their hands or by means of sticks rubbish such as bunches of flowers into the apparatus, the grid 32 is pivoted at 89 and fitted with two rollers 90 which allow the said grid to move upwardly along the drag-line casing, when the charging funnel 31 is closed by means of the gear 91—92. The charging funnel 31 is preferably provided with lateral enlargements as shown in Figs. 6 and 7.

Roller 66 and comb 70 are mounted on a frame 70—3 and motion is given to the said roller 66 by means of two spur gears, not shown in the drawings. One of these spur gears is keyed on to the axle of roller 66, the other being keyed on to the axle 70—1. The return spring 70—2 controls the distance between double hooks 67 and slots 52a.

Motion from axle 24 is given to the other parts of the apparatus by means of pinion 93, Fig. 5, chain 94, and chain wheel 95, the axle of which carrying another chain wheel 96 whereby the chain 97 transmits power to the pinion 98 driving the roller 51. Two other pinions or chain wheels 99 and 104 are keyed on to the axle of the said roller 51. The wheel 99, drives the chain wheel 101 by means of the chain 100, and the said chain wheel 101 acts as driving member of the eccentric crank pin 58 which causes the connecting rod 102 to shake the perforated sheet 54, the said sheet 54 being hung on the same axle as roller 51 by the linkage 103.

The second chain wheel 104 drives the endless carded band 75 by means of the chain 105, a set of two sister wheels 106—107, a chain 108 and a chain wheel 109.

Another chain wheel 110 gives motion to the roller 64 by use of the chain 111 driving the chain wheel 112. Bearings numbered from 113 to 131 bear the shafts of the chain wheels hitherto mentioned.

The soft bristles brush 68 is returned by the spring 122 should a bulky body press against the said brush pivoted at 69.

By means of the two slotted levers 123 and 124 75

the gate 63 is opened later than 46 when, due to the linkage 61, 62 and 125, rubbish is stopped moving by the gate 39 which is pivoted at 40 and opened again by the return spring 41. Convenient return spring and bearings are provided for the oversaid timing mechanisms.

It is understood that the described sorting mechanism could be advantageously disposed in the transverse direction of the lorry instead of longitudinally.

An alternative way of carrying out the invention would be to arrange the whole sorting mechanism stationary instead of mounting same on the body of collecting lorry.

In the form illustrated in Fig. 9 the rubbish is conveyed up to 126 by suitable conveying means and iron pieces are delivered at 127, as described in Fig. 1. The rubbish is there thrown upon a movable grid 128 composed of parallel members allowing the thin or medium size products to pass through and to fall down a perforated sheet 129. Ashes or dust pass through 129 and are collected in the compartments 130.

Medium size products having passed through the grid 128 are collected in 132 together with the objects which have not been picked up by the pointed members 131.

These members 131 are fitted inside U shaped pieces 133 which are regularly spaced upon a chain 134 in such manner that the slotted plates 135 discharge the impaled objects when the plates 135 are tilted as they pass around the chain wheel 136, Fig. 10.

At this time the rags are caught by the hooks 137 fastened on chains 138 mounted on rollers 139 pivoted in the brackets 140.

Brackets 140 are connected by bars 141 and are retained in position by means of springs 142.

Brushes 143 and 144 are intended for discharging papers and rags, respectively in the transverse channels 145 and 146. Transverse chains 147 and 148 then drive papers and rags into compartments 149 and 150, from which they can be easily removed at the rear of the body of the vehicle.

In the modification illustrated in Figs. 12 to 14, there is shown a simplified apron actuated by the wheel of a vehicle. The pointed members 151 are directly fitted on plates as 152, which are themselves secured on the chains 153 by their short edges. A slotted plate follows a plate provided with pointed members, and discharges the products picked up by the members.

These plates are integral with the chain 153 and 154 is a device adapted to crush the soft articles which fall in the casing 155.

Ashes fall at 156, the largest material such as stones and unburnt coal at 157, and the remainder being thrown in the casing 158.

When tilting the cart, doors 159, 160 and 161 are successively released and opened.

A grid 162 retains the bulky products.

Fig. 15 shows an apparatus in which ashes and all hard products are compelled to pass through the two members 163 of the oscillating grid pivoted at 164 and actuated by the cam 165. Soft matter is caught by pointed members secured both on plates as 166 and on to the upper face of buckets 167 which are a part of a chain 168. Buckets 167 are fixed on the chain 168 by only one axle 169 at every other link allowing them to be easily pushed inwardly after tilting, when following the large radius of the member 170. Other devices, not shown direct the buckets downwards in order to collect ashes and stones. Angle pieces of rails are provided to keep the

buckets in such a position that they retain their load up to the tilting point. At the top, a comb 171 is arranged which discharges rags upon the surface 172 pivoted at 173. At the same time hard objects are discharged from the buckets in the casing 174 upon the perforated sheet 175. The dog-clutch 176, when connected with the engine drive gives motion to the chain by suitable and known means.

The cam 177 passing through a slot in the perforated sheet 175, shakes the latter vigorously. Stones are deposited at 178, and ashes at 174.

In order to discharge the products, the body is tilted and the rear door turns around the axle 179 which causes the drive to be disconnected at 180. Material contained in the casing 174 is then removed. The door 181 is then opened and allows the stones to be thrown out. The roller axle 182 is then actuated by means of a handle giving motion to a cable which passes around a fixed pulley 183. The surface 172 is thus lowered and soft material thrown out.

Chains of various type fitted with pointed members can be employed combined with or without buckets.

Fig. 16 shows a chain combined with a continuous conveyor band 184 which drives the members 185 of another chain moving on two rollers 186, which rollers 186 are pivoted on the crankshaft 187.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including an endless band having pointed members thereon for carrying waste paper, rags, vegetable parings and like material, means for directing larger material deposited on said band into one of said receptacles, and a second band having pointed members for receiving material falling from the first mentioned band.

2. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including an endless band having pointed members thereon for carrying waste paper, rags, vegetable parings and like material, means for directing larger material deposited on said band into one of said receptacles, a second band having pointed members for receiving material falling from the first mentioned band, and pneumatic means for removing paper scraps.

3. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means
5 arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing
10 passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including an endless band having pointed
15 members thereon for carrying waste paper, rags, vegetable parings and like material, means for directing larger material deposited on said band into one of said receptacles, a second band having pointed members for receiving material falling from the first mentioned band, and means
20 interposed between said bands for receiving and sorting ashes, stones and like material.

4. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means
25 arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing
30 passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including an endless band having pointed
35 members thereon, oscillating bars receiving material from said band and adapted to discharge sorted material into said receptacles.

5. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means
40 arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing
45 passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including a plurality of endless bands arranged side by side below said conveyor, the several bands being spaced from and provided with
50 pointed members adapted to carry along therewith the smaller sizes of material, and a series of rotating teeth adapted to move through the planes of the spaces between said bands to disengage material carried by said pointed members.

6. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means
60 arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing
65 passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including a band provided with pointed
70 members adapted to carry along material of relatively small size, means for retaining material

of larger size accumulating on said band, means for periodically actuating the retaining means to permit the accumulated material to fall by gravity, and additional sorting means for sorting said large sized material.

7. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means
75 arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing
80 passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including a plurality of endless bands arranged side by side below said conveyor, the several bands being spaced apart and provided with pointed members adapted to carry along therewith smaller sizes of material, and a series of rotating teeth adapted to move through the planes of the spaces between said bands to disengage material carried by said pointed members, a pivoted brush coacting with said teeth for removing paper material therefrom, and a comb-like member coacting with said teeth and angularly displaced with respect to said brush for removing rag material from said teeth.

8. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means
85 arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing
90 passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including an endless conveyor band, rotatable supports for said band, plates fixed at certain of their edges to points spaced along said band, the plates carried by the portions of the band intermediate the supporting means being disposed in overlapping relation and adapted, during the movement of the band about said supporting means to be tilted outwardly, pointed members carried by said band and adapted to carry material deposited thereon, said plates having slots therein receiving said pointed members and adapted, when said plates move outwardly, to strip material from said pointed members.

9. In an apparatus for sorting household rubbish, a plurality of receptacles for receiving sorted materials, a moving endless conveyor to which rubbish to be sorted is supplied, sorting means
95 arranged to receive material falling by gravity from said conveyor and adapted to direct the sorted materials into certain of said receptacles, magnetic means associated with said conveyor for attracting metallic objects and preventing
100 passage thereof to the sorting means, and means for directing said metallic objects into another of said receptacles when said object moves out of the field of said magnetic means, said sorting means including an endless conveyor band, rotatable supports for said band, plates fixed at certain of their edges to points spaced along said band, the plates carried by the portions of the band intermediate the supporting means be-

ing disposed in overlapping relation and adapted, during the movement of the band about said supporting means to be tilted outwardly, pointed members carried by said band and adapted to
5 carry material deposited thereon, said plates having slots therein receiving said pointed mem-

bers and adapted, when said plates move outwardly, to strip material from said pointed members, and an additional endless band and teeth carried by said band cooperating with the plates of the first mentioned band.

JEAN ETIENNE FÉLIX CAMBÉSSÈDES.