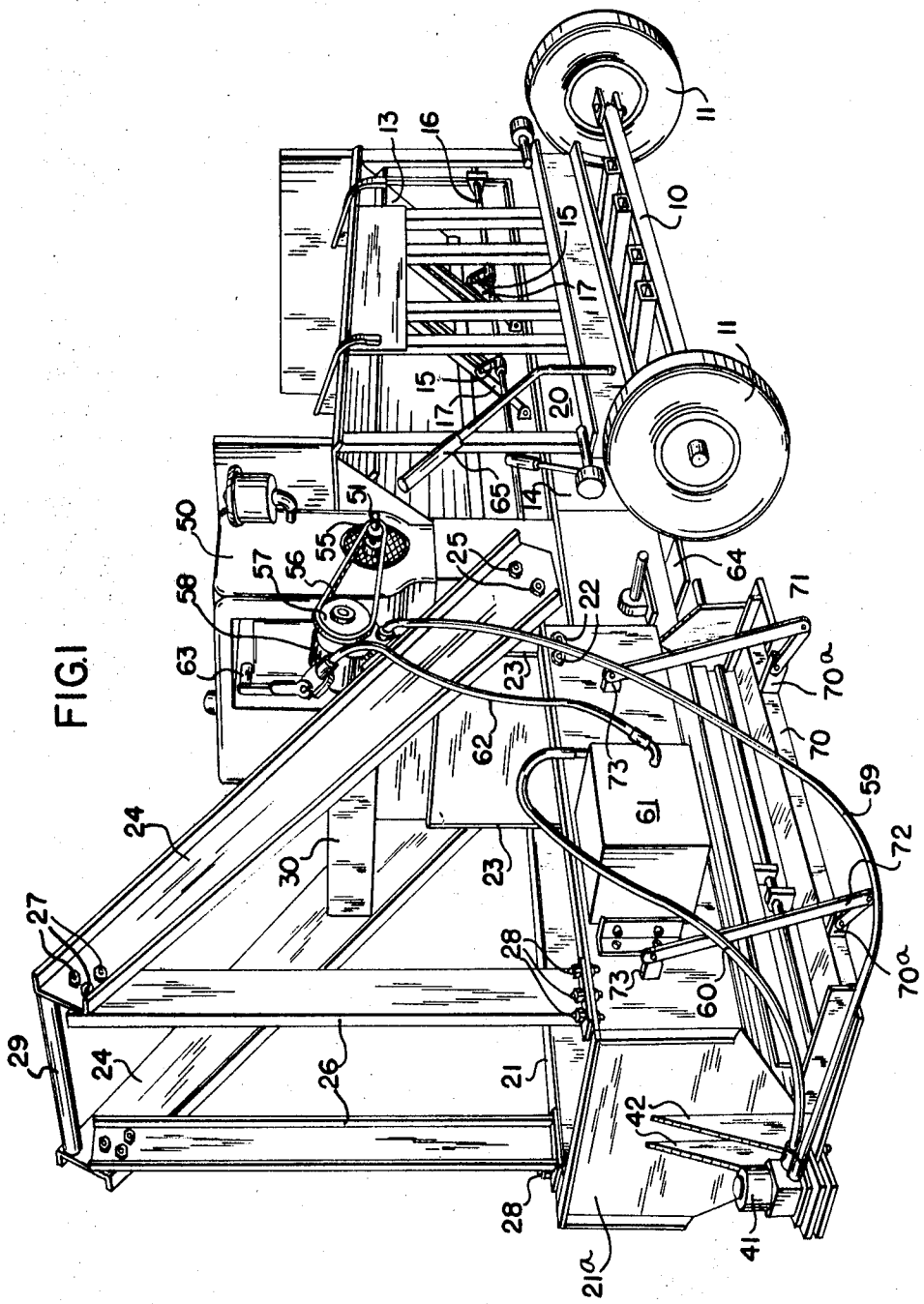
Sept. 21, 1971 E. H. ENSINGER 3,606,964

GRAVEL SPREADER

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FIG. 1



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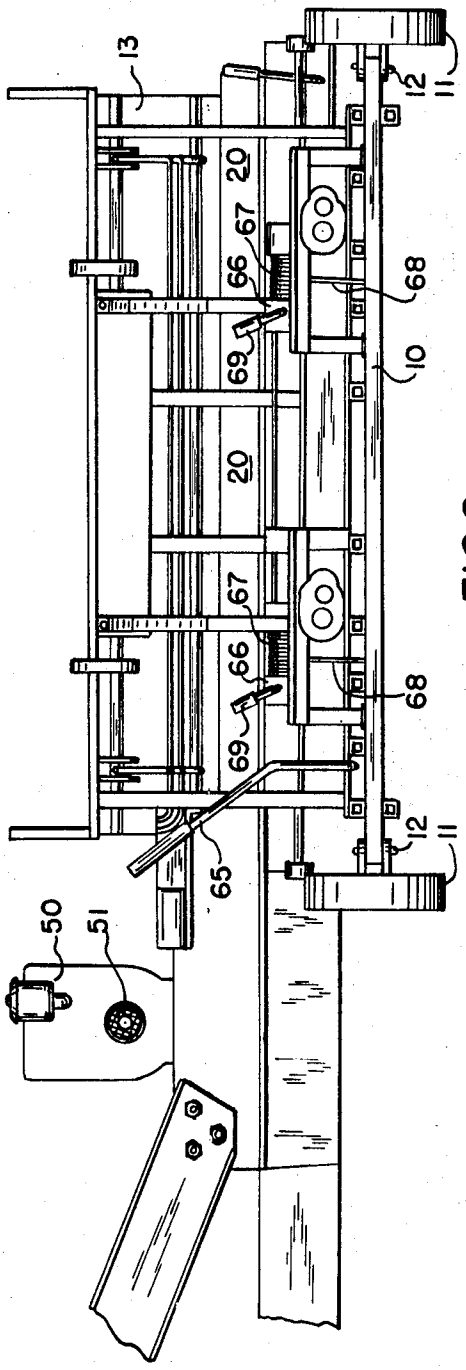


FIG.2

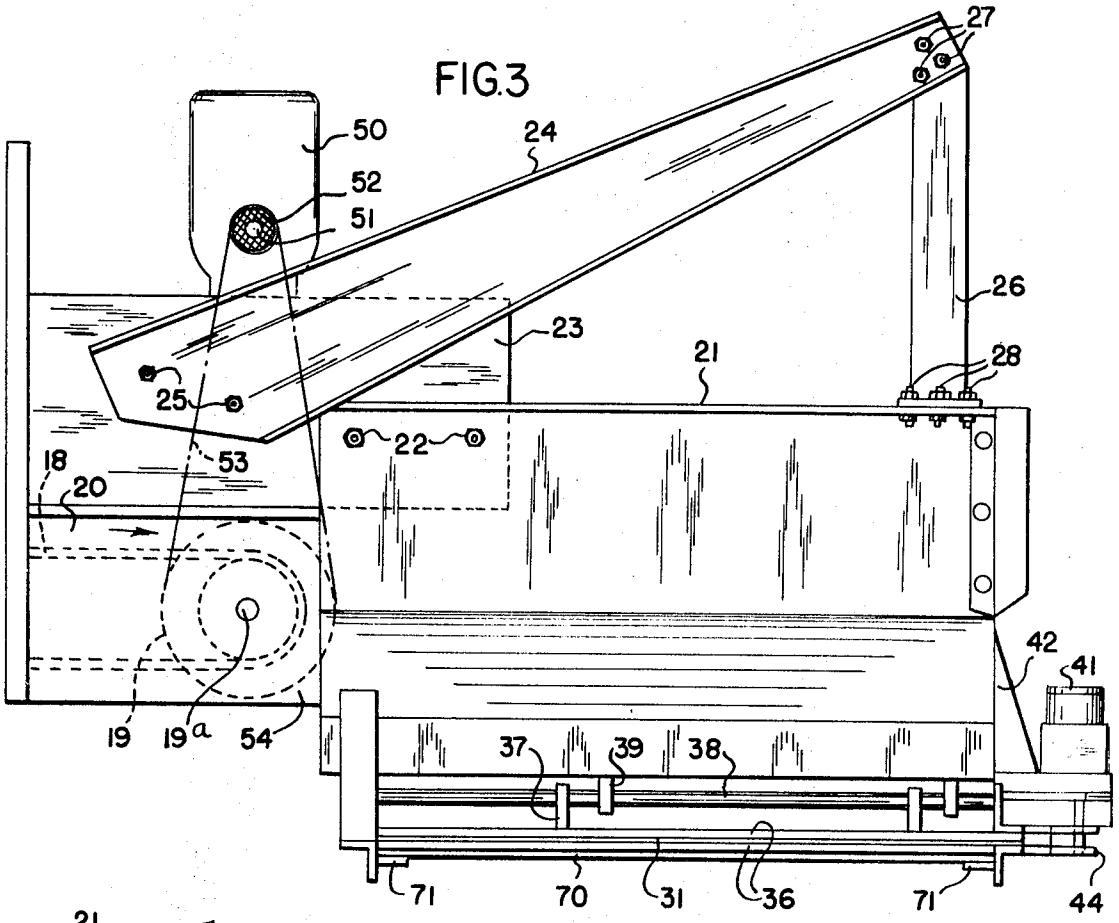
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FIG.3



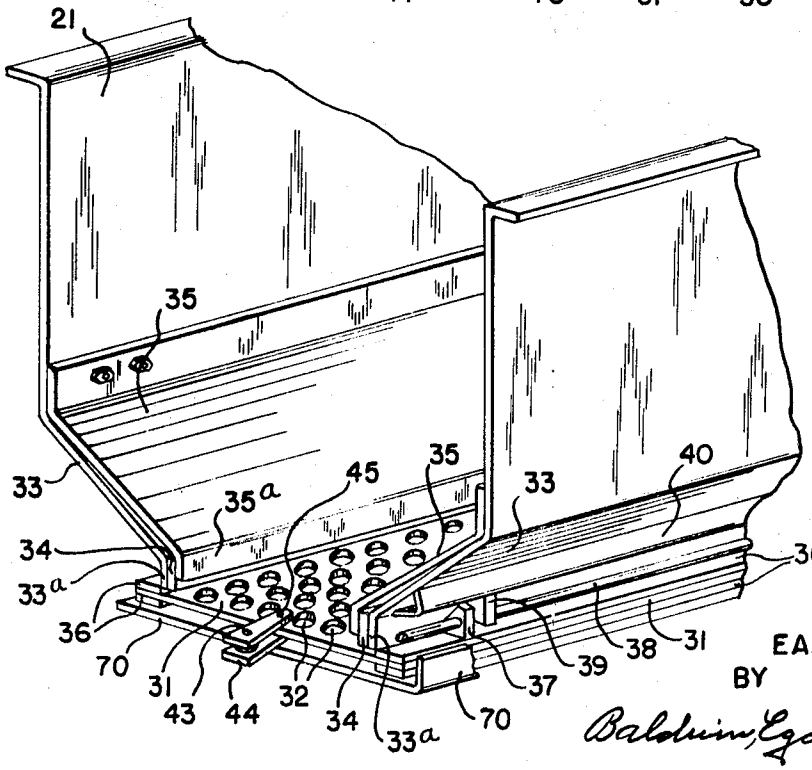


FIG. 4

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United States Patent Office 3,606,964 Patented Sept. 21, 1971

3,606,964

GRAVEL SPREADER

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Filed Aug. 28, 1969, Ser. No. 853,789
Int. Cl. B65g 65/70
U.S. Cl. 222—161 6 Claims

ABSTRACT OF THE DISCLOSURE

A hopper and conveyor unit adapted to receive gravel or the like from a hauling truck has an endless conveyor extending crosswise of the roadway and effective to deliver gravel from the hopper to a box extending crosswise over the shoulder of the roadway, this box having a perforated bottom with means for reciprocating the perforated bottom whereby the gravel is evenly shaken out upon the shoulder, together with a control gate for varying the number of perforations in the bottom free to discharge gravel.

There is a need today for an apparatus which will travel down a roadway, following a tank which spreads tar or bituminous material upon a shoulder laterally outside of the roadway so as to progressively and substantially uninterruptedly, evenly deposit fine gravel, commonly known as chips, on the freshly coated shoulder. This invention provides such an apparatus which is readily attached to a towing dump truck and which provides a very simplified arrangement for evenly spreading the gravel chips at any rate desired within the capacity of the machine.

In the drawings,

FIG. 1 is a perspective view of the entire apparatus intended to be hauled behind a dump truck;

FIG. 2 is a side elevational view of the hopper and conveyor unit;

FIG. 3 is a fragmentary side elevational view taken from the left-hand side of FIG. 1; while

FIG. 4 is a fragmental perspective view, enlarged, of the end of the gravel spreader device most remote from the hopper and conveyor unit with certain parts removed to more clearly understand the invention.

While other devices might be used to feed gravel chips to the improved gravel spreader of this invention, it is preferred to utilize a hopper and conveyor combination which is disclosed and described in my U.S. Pat. No. 2,779,508, granted Jan. 29, 1957, to which further reference may be had for details not mentioned herein. It is believed it is only necessary to understand the basic features of this hopper and conveyor unit as it forms only an indirect part of the present invention.

A wheeled chassis **10** is adapted to travel along a roadway by wheels **11** which may be mounted if desired to be angularly movable about vertical pivots **12** so as to facilitate movement of the unit in one or more directions when it is pushed or pulled. Mounted on the chassis is a hopper **13** which has the usual inclined walls crosswise of the roadway terminating in an elongated discharge slot at the bottom of the hopper in the usual fashion. At least one side of the hopper **13** at the top is low enough to permit a rear-dump truck, when closely engaging the hopper, to discharge its load gradually into the open upper top of the hopper **13**. A sliding gate **14** is movable generally in line with one of the inclined sides of the hopper to control the width of the elongated slot in the bottom of the hopper so as to vary the amount of gravel discharged below the hopper. The position of the gate **14** may be controlled in any desired manner as by cranks **15**, oscillatable by a control rod **16** and connected with the

gate **14** by linkage **17**. In one form of this apparatus, the gate **14** is controlled by hydraulic jacks.

An endless conveyor **18** (FIG. 3) is mounted in position so that its upper run will receive the gravel falling from the hopper **13**. The conveyor belt passes over pulleys at opposite ends of the chassis **10**, one being a drive pulley **19** at the end of the unit nearest the road shoulder and the other being a tail pulley at the opposite end, not shown. Side boards, not shown, are secured to the inner faces of the parallel members **20** which are secured to the chassis **10** in fixed position above the conveyor upper run **18** so as to hold the gravel on the conveyor in the usual fashion.

This invention adds to the above device a novel means for evenly distributing gravel chips on the shoulder of a roadway traversed by the hopper and conveyor unit. For this purpose, a box **21** is rigidly attached to the hopper and conveyor unit, as by bolts **22** secured to members **23** which in turn are rigidly secured to members **20** of the hopper and conveyor unit. Further support of a cantilever nature is provided by a pair of channels **24** bolted to members **23** at **25** at their inner ends, and bolted to vertical posts **26** at their outer ends by bolts **27**. The lower ends of posts **26** are bolted at **28** to the upper edges of the box **21**. This cantilever frame is further braced at **29** and **30** so that the entire weight of the gravel spreader is supported from the chassis **10**. However, it should be understood, that this invention could utilize support wheels at the laterally outermost end of the gravel spreader and still utilize the benefits of this invention.

Referring to FIGS. 1, 3 and 4, the bottom of hopper **21** is formed by a plate **31** having substantially evenly spaced through perforations **32** over substantially its entire surface except for the edges as will be later described. As seen in FIG. 4, the holes **32** are arranged in parallel lines extending longitudinally of the box **21**, or crosswise of the road shoulder. To give greater holding capacity, the lower portions of the side walls of the box **21** slope inwardly and downwardly as indicated at **33**. The lower edges of the walls **33** terminate over the plate **31** so that all of the material falling into the box **21** is fed to the perforated bottom **31**. Preferably, rubber flashing strips **34**, extending the full length of box **21** on each side thereof, are held between vertically downwardly extending flanges **33***a* of the portions **33** and held firmly in position by flanges **35***a* on the flashing covers **35** which are bolted to the side walls of the box **21** and which lie generally parallel to the inclined plates **33**.

It will be understood that the bottom **31** is longer than it is wide. The longer dimension extends crosswise of the shoulder of the roadway to be coated. Means is provided supporting the bottom **31** for endwise reciprocation, that is, in the direction of its longer dimension. The longitudinal edges of the bottom plate **31** are held in a more rigid fashion by having the same sandwiched between reinforcing strips **36** which are either welded or bolted to the bottom plate **31**. Rigidly extending upwardly from each of these side structures **36** are a plurality of hangers **37** along each side having perforations through which pass a fixed guide rod **38** on each side along which the hangers **37** support the bottom plate for endwise reciprocation. The rods **38** in turn are fixed in position by hangers **39** which are secured, as by welding, to the strips **40** secured along the bottom of the side walls of the box **21**.

The endwise reciprocation of the box bottom may be provided in several different manners but the form shown here comprises an hydraulic motor **41** fixed to a shelf **46** which is braced by angle plates **42** welded to the outer end wall **21***a* of the box **21**. This motor has a vertically

extending rotatable shaft to the lower end of which is attached an eccenric **44** (FIG. 3), which eccentric passes through openings **43** in a clevis **44***a* which is pivotally connected by pin **45** with the laterally outermost end of the bottom plate **31**. It results from this construction that rotation of the hydraulic motor shaft causes plate **31** to oscillate endwise, that is, crosswise of the roadway shoulder, with a stroke which is sufficient to maintain an even distribution of the gravel chips on the bottom **31**. Referring to FIG. 3, it will be obvious that gravel chips moving in the direction of the arrow on the upper run of conveyor belt **18** will be discharged with sufficient velocity to fall into the box **21** and onto the bottom **31** thereof, say, at approximately the center zone of the bottom. As the gravel chips pile up on the bottom of the box, they naturally will tend to spread out both laterally and longitudinally and this movement is aided by an oscillation of the bottom plate by eccentric **44** with a stroke of approximately ¾ inch to one inch with a frequency of about 500 to 2000 oscillations per minute. This oscillation is sufficient to provide an even distribution of the gravel chips throughout the entire longitudinal length of the bottom plate **31** where such total length is between four and eight feet. The holes **32** in this case were ½ inch diameter and the gravel was No. 2 chips.

Power is supplied to carry out all the necessary functions of the apparatus hereinbefore described. An internal combustion engine **50** is mounted in a rigid manner on the chassis **10**, as shown, supported by plates **23** and suitable bracing members. The driven shaft **51** of this engine at one side of the machine carries a gear **52** which through a chain belt **53** drives a larger gear **54** which is secured to the end of shaft **19***a* so as to drive the conveyor pulley **19**. At the other side of the machine, shaft **51** drives a spur gear **55** which through chain belt **56** drives a larger gear **57** which in turn drives the hydraulic pump **58** to supply hydraulic fluid for the motor **41**. A flexible hose **59** connects the pump **58** with hydraulic motor **41**. The discharge from this motor is through hose **60** to a sump tank **61** which in turn is connected by hose **62** back to the pump **58**. A control lever **63** is provided to control this flow of hydraulic fluid. Preferably, a step **64** is provided on which an operator may stand as he rides along with the apparatus and a control handle **65** may be reached by the operator standing on step **64** and this enables him to control conveyor **18** through control mechanism not shown here, but which is described in the above mentioned Pat. 2,779,504.

Electric winches are shown at **66** in FIG. 2 for driving cable drums **67** upon which are wound cables **68** which pass through tubular members to the opposite side of the hopper-conveyor unit for the purpose of hooking this unit tightly to a dump truck to which the cables are attached as for instance by means of the hooks **27** described in the above mentioned prior patent. The control lever **69** provides means by which the hopper-conveyor unit may be attached to the hauling truck after it moves into position to dump gravel into the hopper **13**. The electric winches **66** are not shown in FIG. 1 as that would only confuse the drawings.

Means is provided to control the flow of gravel chips through the perforations **32** in the box bottom **31**. This comprises an imperforate plate **70** mounted below the bottom **31** and slidable across the shorter dimension of the bottom by reason of the fact that it rests upon ways **71** which are rigidly secured to the bottom of the box **21**. Control of gate **70** may be supplied in any manner desired. I have here shown a manual control comprising a linkage **72** connected between ears **70***a* on the gate and ears **73** on the box **21**. It will be understood that this might be done hydraulically or electrically if desired.

The operation of this invention should now be clear. The apparatus shown in FIG. 1 is placed on the roadway with the wheels **11** on the road supporting the gravel spreader device in a cantilever fashion over the shoulder at the side of the road. A dump truck loaded with gravel chips is backed up against that side of hopper **13** farthest from the viewer in FIG. 1. The cables **68** described in connection with FIG. 2 are then payed out by the winches **66** until their ends can be secured to the dump truck and the winches **66** are then driven in a direction to tighten up the cables to hold the hopper-conveyor unit tightly against the dump truck. This dump truck is then elevated sufficiently to drop gravel chips into the hopper **13** of the device disclosed here. The operator will close the control gate **70** until he has run the conveyor **18** sufficiently to get a load of gravel chips in the box **21**. It will be understood that a tank vehicle has just previously to this passed along the shoulder to spread a layer of tar or bituminous material. The driver of the dump truck is then signalled to go ahead and the operator of the device of this invention standing on the step **64** will start the conveyor **18** by manipulation of the handle **65** and will start the hydraulic motor **41** by manipulation of lever **63**. Gravel chips will then be carried by conveyor **18** and thrown into the box **21** where they will partly spread themselves on the perforated bottom **31** which will be aided by the oscillating motion of the bottom due to the connection with hydraulic motor **41**. The control gate **70** will have been set to a predetermined position so as to open a sufficient number of holes to give the desired deposit of gravel chips on the road shoulder. These chips will be evenly distributed over the entire width of the shoulder due to the fact that the bottom **31** is perforated from end to end and the same number of rows of holes will open or close by the gate **70** through the entire longitudinal dimension of the bottom **31** so that an even coating of gravel chips is deposited on the shoulder across the entire width thereof, whatever depth of deposit be chosen. When the dump truck is empty, the device is stopped and the cables **68** are disconnected from the dump truck and again connected to another full truck to repeat the operation. The operation and control of this device is very simple and there are few parts to get out of order.

What is claimed is:

1. Apparatus for evenly spreading gravel on the shoulder of a roadway comprising a vehicle adapted to move along the roadway, a hopper on said vehicle in position to receive gravel from a hauling truck, a conveyor on said vehicle extending crosswise of said roadway and effective to deliver gravel from said hopper to said shoulder laterally beyond an edge of said roadway, a box having a longitudinal dimension extending crosswise of said shoulder and connected with said vehicle in position to receive gravel discharged from said conveyor, said box having a bottom with overall through perforations, means for reciprocating the bottom of said box, said perforations being arranged in parallel lines extending crosswise of said shoulder, and an imperforate gravel control gate having mounting means supporting said gate for movement close to said bottom generally at right angles to said parallel lines to various positions in which holes of uniformly distributing capacity are opened through the longitudinal dimension of said box, whereby a uniformly distributed coating of gravel is deposited on the shoulder across the entire width thereof.

2. Apparatus as defined in claim **1**, wherein said box is supported in cantilever fashion from said vehicle.

3. Apparatus as defined in claim **1**, wherein said box is longer crosswise of said shoulder, and said reciprocating means is an oscillator moving said bottom alternately in the direction of said longer dimension sufficiently to maintain even distribution of said gravel on said bottom.

4. Apparatus as defined in claim **3**, wherein said box has side walls parallel to said longer dimension, and means suspended from said side walls supporting said box bottom for endwise oscillation.

5. Apparatus as defined in claim **4**, wherein said oscillator is a motor mounted on said box, and said motor having a vertically extending driven shaft having an eccentric connection with one end of said box bottom.

6. Apparatus as defined in claim 1, wherein said gate mounting means comprises ways mounted on said box and supporting said gate below said bottom for movement across the shorter dimension of said box.

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U.S. Cl. X.R.

222—163, 199, 200, 221; 239—144, 659