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VEHICLE COUPLING

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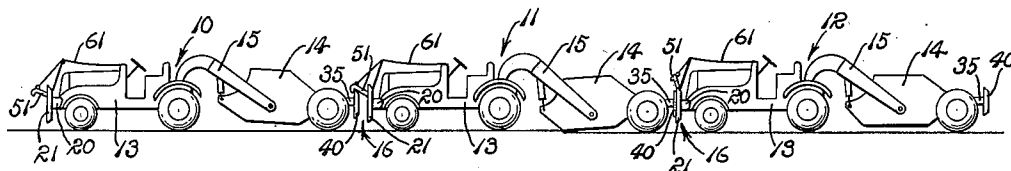


FIG. 1.

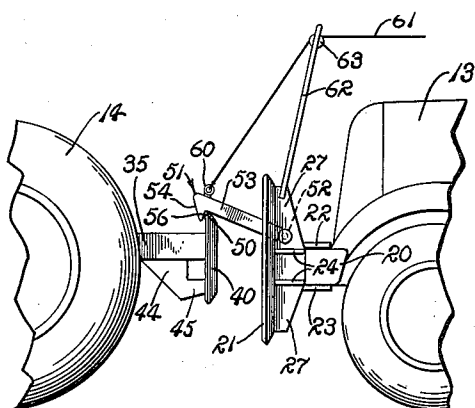


FIG. 2.

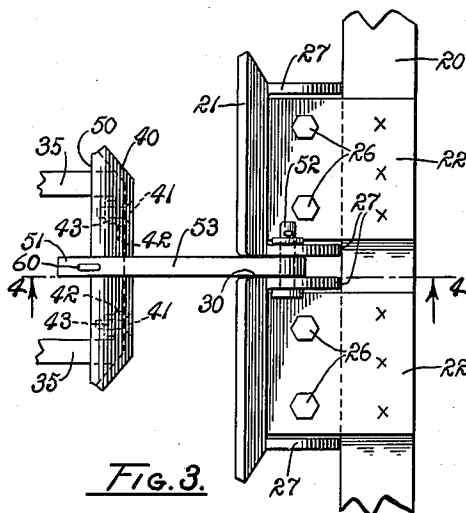


FIG. 3.

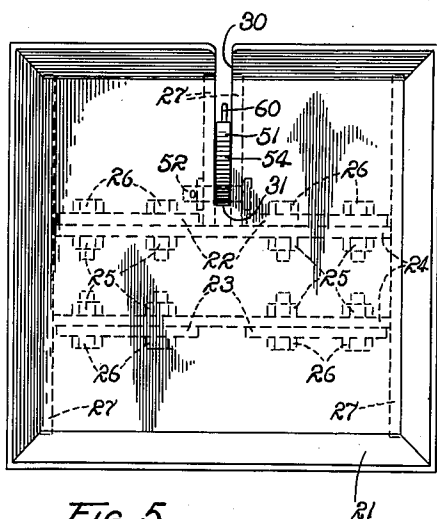


FIG. 4.

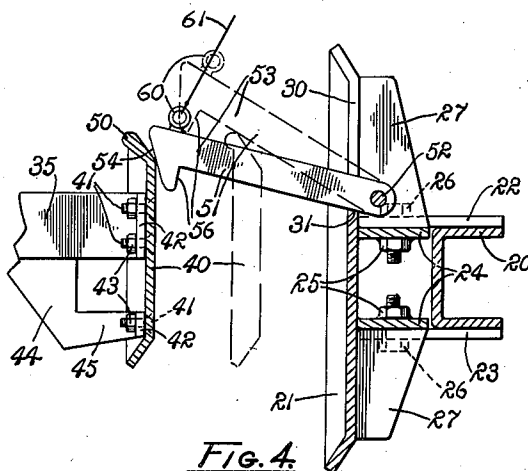


FIG. 5.

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VEHICLE COUPLING

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3 Claims. (Cl. 280—33.13)

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The present invention relates to vehicle couplings and more particularly to a coupling adapted for the releaseable interconnection of leading and following vehicles in traction-bucking relation having particular utility in trains of tractor-scraper units operated in paths of circuitous travel.

In the conveying of earth from a source of excess thereof to a point of deposit, as encountered in land leveling, road grading, and other operations, it is the usual practice to employ a plurality of tractor-scraper units circuitously traveled from the point of excess earth at which they are loaded to the point of deposit of the earth and return. The tractor-trailer units are operated in following relation in their circuitous paths of travel and are not inappropriately referred to as constituting a train.

It is well known that scrapers have excessive power requirements when they are being loaded. Such scrapers of the wheel supported types particularly require comparatively little motivating power during conveyance of a full load of earth supported therein to a point of deposit and even lower power requirements for the empty return travel to the loading point. It is the usual practice to provide tractors in tractor-scraper units with adequate power for simple loading operations, but inasmuch as the power of the tractor represents at economic compromise, inadequate power for speedy loading operations or excessively difficult loading is available.

The present invention results from the discovery that a plurality of tractor-scraper units operated in train relation may be of substantial aid to each other by the provision of couplings for the units adapted to interconnect the units in traction-bucking relation whereby leading and following units may pool their available power as an assistance to one or more of the coupled units subjected to unusually high power requirements.

An object of the present invention is to provide an improved bumper coupling adapted for the releaseable interconnection of vehicles in traction-bucking relation.

Another object is to provide for the convenient interconnection and disconnection of tractor-trailer units operated in train relation for traction and pushing mutual assistance in order to pool the power of several thereof to assist successive individual units in loading or overcoming other increased loads to which the units may be periodically or successively subjected.

Another object is to provide an improved bumper coupling having abutable members for

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pushing purposes and traction means adapted automatically to interconnect the abutable members when they are caused to approach each other.

Another object is to provide, in a device of the character described, for the automatic disconnection of the traction means when the abutable members are caused to approach each other closer than a predetermined distance and to reconnect upon subsequent separation thereof.

A further object is to provide manually operable means whereby such reconnection can be optionally avoided.

Still further objects and advantages will become apparent in the subsequent description in the specification.

In the drawing:

Fig. 1 is a side elevation of a section of a tractor-trailer train consisting of three tractor-trailer units equipped with couplings embodying the principles of the present invention.

Fig. 2 is an enlarged fragmentary side elevation of the rearward end portion of a leading tractor-scraper unit and the forward end portion of a following tractor-scraper unit interconnected by means of the coupling of the present invention.

Fig. 3 is a further enlarged fragmentary plan view of a frame portion of a leading tractor-scraper unit and frame portion of a following tractor-scraper unit showing the coupling of the present invention connected therebetween.

Fig. 4 is a vertical longitudinal section through the coupling as taken on line 4—4 of Fig. 3.

Fig. 5 is a front elevation of the portion of the coupling of the present invention mounted in forwardly disposed positions on the tractor-scraper unit.

Referring in greater detail to the drawing:

In Fig. 1, a tractor-trailer unit transporting earth is indicated generally at 10, a unit loading earth indicated at 11, and a unit approaching to load earth indicated at 12. The units are of a popular form employing rubber tired tractors 13 in towing relation to wheel supported, so-called carry-all scrapers 14. The forward end portions of the scrapers are rested on the rearward end portions of the tractors by means of goose neck draft bars 15. The couplings interconnecting the units 10, 11, and 12 are indicated at 16. Although the utility of the couplings of the present invention is conveniently illustrated by reference to the tractor-trailer units described, it is to be understood that the couplings are not limited to such use but satisfactorily em-

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ployed releaseably to interconnect vehicles or any desired type in traction-bucking relation.

The tractors 13 normally provide forwardly disposed bumpers 20 conveniently employed to mount a portion of the coupling. Shallow frusto-pyramidal concave bumper plates 21 are supported in erect attitudes in forwardly disposed position on the bumpers 20. The bumper plates are conveniently fabricated from sheet steel or the like. Inasmuch as the bumper plates are employed to push or buck leading tractor-trailer units, they must be mounted on their respective bumpers so as to withstand considerable shock and strain. This is conveniently accomplished by welding a pair of substantially parallel bracket plates 22 on the top of each of the bumpers 20 in substantially horizontally extended positions. Similarly, a pair of lower bracket plates 23 are welded on the lower surface of each bumper and forwardly extended in substantial vertical alignment with corresponding bracket plates of the upper pair 22 and in parallel relation thereto.

A pair of substantially parallel mounting plates 24 are weldably mounted on the rearward face of each of the bumper plates 21 and slidably fitted between the bracket plates 22 and 23 of their respective bumper plates. Bores, not shown, are formed vertically through the mounting plates 24 and the bracket plates 22 and 23. As an assembly convenience, screw-threaded nuts 25 are welded to the mounting plates in alignment with the bores between said plates. Bolts 26 are passed through the bracket plates 22 and 23 and tightened into the nuts 25 thus securing the frustum shaped bumper plates 21 securely on the bumpers 20 of their respective tractor-trailer units.

The interconnection of the bumper plates and their respective mounting plates is preferably reinforced by a plurality of substantially parallel, vertically disposed gusset plates 27 weldably connected to the mounting plates and to the bumper plate at opposite sides of the bracket plates 22 and 23.

As clearly evident in Figs. 3 and 5, the frustum shaped bumper plates 21 have slots 30 formed vertically therein from the upper edges thereof downwardly to positions slightly above the upper bracket plates 22. The bottoms of the slots, as will soon become apparent, constitute hook stops indicated for illustrative convenience at 31.

Scrapers of the type shown at 14 generally have rearwardly extended frame portions 35 conveniently employed in mounting the relatively forwardly disposed portions of the coupling on the leading units. It is of course to be understood that scrapers or other vehicles which do not have rearwardly extended frame portions, may be provided with any suitable rearwardly extended members adequate to support the portions of the coupling about to be described which are mounted thereon and to withstand the traction and bucking forces imposed by the full use of the coupling in the cooperative utilization of the power of a plurality of tractor-trailer units or the like operated in train relation.

A rearwardly disposed convex frusto-pyramidal bumper plate 40 of sheet steel or the like is mounted on the rearwardly extended end portions of the frame members 35 in such a position that when the units on which the concave bumper plate 21 and convex bumper plate 40 are mounted are aligned, the convex bumper plate 40 centers on the concave bumper plate 21. For pushing purposes the convex bumper plate

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40 is adapted to nest within the concave bumper plate 21 but in order to accommodate varied elevations in terrain traversed, human error in aligning the units, and the like, the convex bumper plate 40 is preferably substantially smaller than the concave bumper plate 21.

The mounting of the convex bumper plates 40 is conveniently accomplished by means of counter-sunk bolts 41 rearwardly extended there-through, through ears 42 borne by the frame portions 35 and tightened into position by screw threaded nuts 43. When the scraper frames 35 are not at the same elevation as the bumpers 20, it has been found desirable in order to brace the convex bumper plates 40 in positions aligned to nest in the concave bumper plates 21 to mount gusset plates 44 on the frame members having rearwardly extended arm portions 45 to which the convex bumper plates are also connected by means of the counter-sunk bolts 41 and nuts 43.

As shown, the convex bumper plates 40 have substantially horizontal upper edges 50 to which traction hooks 51 effect connection, as shown in Fig. 2. The hooks are individually mounted in the slots 30 of the concave bumper plates for pivotal elevational movement, as by pintles 52 extended through the gusset plates 27 adjacent to the slots and through rearward end portions of the hooks located therebetween. The hooks provide substantially straight shank portions 53 extended forwardly and upwardly from the pivotal mounting of the hooks. The forwardly extended end portions of the hooks 51 are forwardly and upwardly beveled, as at 54, to provide a camming surface adapted to ride over the horizontal upper edges of approached convex bumper plates 40. The beveled portions terminate at their rearward ends in rearwardly disposed shoulders 56. The stop portions 31 are at a height in relation to the pintles 52 that downward pivotal movement of the hooks is limited to positions of the hooks where the beveled portions 54 strike the horizontal upper edges of the concave bumper plates approached.

The extended ends of the hooks 51 provide eyes 60 through which a control cable 61 is secured. Arms 62 are weldably or otherwise secured to the gusset plates 27 in upwardly extended positions and mounts sheaves 63 therein. Cables 61 are connected to the eyes 60, threaded through the sheaves 63, and extended rearwardly to positions of convenient access for operators of the tractors 13.

Operation

The operation of the device is believed to be clearly apparent and is briefly summarized at this point. It is understood that the concave bumper plates 21 are mounted in forwardly disposed positions on the tractors 13 or other vehicles and the convex bumper plates 40 mounted in rearwardly disposed positions on their scrapers 14 or other vehicles by the structures described or any other convenient to the purpose.

For automatic operation of the couplings of the present invention, the hooks are lowered to their lowermost pivotal positions defined by the stops 31 by releasing the cables 61. As a tractor 13 approaches a scraper 14 in leading relation thereto, the beveled portion 54 of the hook 51 strikes the forwardly inclined horizontal upper edge 50 of the frustum shaped convex bumper plate 40 and rides upwardly thereover until the shoulder 56 hooks over said horizontal edge of the convex bumper plate. So associated, the

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scraper is connected in towing relation to the following tractor 13 and the power of the scraper's leading tractor may be employed to aid in towing the following tractor and its respective scraper.

As shown in Fig. 4, if the frustum shaped concave bumper plate 21 is caused more closely to approach the frustum shaped convex bumper plate 40, the shank 53 of the hook 51 rides upwardly over the horizontal upper edge of the bumper plate 40 and pivots upwardly into the slot 30. This automatically disengages the shoulder 56 from the upper edge of the convex bumper plate and the traction interconnection of the plates' respective vehicles is interrupted. When separation of the vehicles or units is desired, the operator of the following vehicle or unit through tension applied to the cable 61 maintains the hook 51 in an upwardly pivoted position where the shoulder 56 will not snag the upper edge of the convex bumper plate 40.

Upon still closer approach of the concave bumper plate 21 to the convex bumper plate 40 they assume a nested association, as demonstrated between the units 11 and 12 in Fig. 1. In such association, a following tractor is able to impart substantial pushing or bucking force through the coupling on the scraper immediately in front of said tractor. If it is expected that the leading unit will subsequently be expected to exert traction force on the following unit, no tension is applied to the cable 61 and the hook 51 is permitted to pivot downwardly as the shank thereof rides over the upper edge of the convex bumper plate 40. When the shoulder 56 is brought to bear against the upper edge of said bumper plate through the increased spacing of the bumper plates, traction interconnection is established.

Fig. 1 illustrates the significant cooperative employment of available power achieved through employment of the traction-bucking couplings of the present invention. The tractor-scraper unit 11 is shown with the scraper 14 thereof in loading position. In such condition it is difficult to pull and fully taxes the power of its tractor frequently even when the loading operation is slowly performed. The tractor-scraper unit 10 is illustrated as having already been loaded and in the process of conveying a load of earth to a point of deposit. Under such condition the unit 10 needs to employ only a fraction of the power available through its tractor 13. It will be noted that the coupling 16 between the units 10 and 11 establishes traction interconnection of said units whereby the surplus of power available to the tractor in the unit 10 is utilized in towing relation to the unit 11 whereby more expeditious loading of the scraper of unit 11 can be achieved. The tractor-trailer unit 12 is illustrated as empty, as is the normal condition in returning to a loading point from a point of earth deposit. In such condition the tractor 13 of the unit 12 effectively also utilizes only a small portion of its available power. It will be noted that the coupling 16 between the units 11 and 12 is in pushing condition so that the tractor of unit 12 can exert a substantial bucking or pushing influence on the trailer of the unit 11. Through the cooperative employment of the available power of the various units, loading under much more difficult conditions can be achieved than has heretofore been considered possible and the loading effected at a much higher speed. As soon as unit 11 is loaded and its scraper is shifted to carrying position, its excess power readily causes its tractor more close-

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ly to approach the unit 10 pivoting the hook 51 therebetween upwardly as demonstrated in Fig. 4. The operator of unit 11 tensions his cable 61, retaining the hook in an upwardly pivoted position and the unit 10 is thus freed to convey its earth to a point of deposit while unit 11 through its connection to unit 12 which now becomes traction in effect assists unit 12 in its loading operation while a successive unit, not shown, assumes the bucking position originally fulfilled by unit 12.

The couplings of the present invention are convenient to employ, inexpensive to produce, durable in operation, and by a relatively small investment permit the operators of a train of tractor-scrappers to pool the power of individual units thereof to overcome excessive loading or other power requirements achieving a more efficient and rapid completion of earth moving operations.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred method and embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a pair of traction vehicle units arranged in following relation, releasable coupling means comprising a pair of substantially complementary concave-convex bumper plates positioned between the units with one thereof mounted on the leading unit in rearwardly disposed position and the other thereof on the following unit in forwardly disposed position, one of the plates having a substantially horizontal upper edge and the other having a slot formed substantially vertically therein, and a hook pivotally mounted on the unit mounting the plate providing the slot and extended through the slot, the hook having an endwardly and downwardly slanted extended end, a downwardly disposed shoulder formation adjacent to the slanted extended end, and a substantially straight shank portion intermediate the shoulder formation and the pivotal mounting of the hook, the pivotal mounting of the hook being lower than the upper horizontal edge of the opposite plate and the bottom of the slot of its respective plate limiting downward pivotal movement of the hook to an inclined position with its extended end at substantially the elevation of the upper edge of said opposite plate.

2. In a train of tractor-scraper units in which each unit consists of a tractor in towing relation to a scraper, the combination of a socket-shaped bumper plate mounted in forwardly disposed position on each tractor and having a slot formed substantially vertically therein, a convex bumper plate mounted in rearwardly disposed position on each scraper adapted loosely to nest within a socket-shaped bumper plate of a following tractor, each convex bumper plate having a substantially horizontal upper edge, and a hook pivotally mounted on each tractor rearwardly of said tractor's respective bumper plate and forwardly extended through the slot thereof, the hooks having rearwardly and downwardly slanted extended ends forwardly adjacent to rearwardly disposed shoulder formations and substantially straight shank portions intermediate the shoulder formations and the respective pivotal mountings of the

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hooks, the pivotal mounting of each hook on each tractor being lower than the upper edge of the convex bumper plate of the respective tractor's scraper, and the bottom of the slots in the socket-shaped bumper plates limiting downward pivotal movement of their respective hooks to forwardly inclined positions with their extended ends at substantially the elevation of the upper edges of the concave bumper plates.

3. In a train of tractor-scraper units in which each unit consists of a tractor in towing relation to a scraper, means for releaseably interconnecting the units for cooperative pushing and pulling co-action comprising a concave frustum-shaped bumper plate mounted in forwardly disposed position on each tractor having a slot formed in a substantially vertical position centrally thereof; a convex frustum-shaped bumper plate mounted in rearwardly disposed position on each scraper adapted loosely to nest within the forwardly disposed bumper plate of a following tractor, each convex bumper plate having a substantially horizontal upper edge; a hook pivotally mounted on each tractor and forwardly extended through the slot of said tractor's respective concave bumper plate and providing a forwardly inclined extended end adapted to cam the hook upwardly

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over the upper edge of a convex bumper plate when moved theretoward in substantial alignment therewith, a shoulder adapted to hook over the upper edge of such a bumper plate, and a shank portion intermediate the shoulder and the pivotal mounting of the hook adapted to ride over the upper edge of such a bumper plate and pivot the hook upwardly into its respective bumper plate for nested association of said plate upon continued movement theretoward; and release means individually connected to the hooks adapted releaseably to retain their respective hooks upwardly for detachment of adjacent units of the train.

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