An apparatus for cleaning and transporting one or more pairs of concrete barrier strip forms and a method of cleaning and transporting forms and forming barrier strips whereby one or more pairs of forms are peeled from the set concrete by a crane on a vehicle, lifted by the crane and then placed on a pair of structural members on the vehicle which have mounted between them a dolly which moves on tracks along the members. A stationary standpipe having a number of nozzles and a rotatable stand pipe having a number of brushes attached to it are mounted on the dolly. Both stand pipes extend vertically into the space between the forms. To clean the forms, the brushes are rotated and at the same time move along the forms with the brushes successively cleaning the interior surfaces of the forms. Oil is sprayed from the nozzles in the stationary standpipe, preferably after the dolly has moved the length of the forms and is returning. The forms can be transported at the same time they are being cleaned.

5 Claims, 5 Drawing Figures
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BRIEF DESCRIPTION OF THE PRIOR ART AND SUMMARY OF THE INVENTION

The invention relates to a method and apparatus for cleaning and transporting forms for concrete median barriers and other similar formed structures.

Barrier strips are widely used on the interstate highway system, and on highways where high speed lanes must be separated by some type of barrier to prevent head-on-collisions and where barrier protection is required on the sides of highways. In general, the barriers are approximately three feet high and two to three feet wide, and are made of solid concrete.

To date, concrete barriers have been constructed by the use of a series of reusable metal forms, usually ten feet long. The forms are fixed in place either manually or by the use of a crane, while gauge rods—which fix the internal dimensions of the forms—are inserted at the top and bottom. They are then connected together to form a continuous structure; concrete is placed therein and allowed to harden. After the concrete has hardened sufficiently to allow removal of the forms, they are stripped from the now hardened concrete structure and set aside to be cleaned and oiled. Cleaning is usually accomplished manually by use of scrapers and brooms, and oiling is likewise a manual operation utilizing a hand or power spray. The forms are then moved either individually or in mass to the head of the line where they are unloaded and strung out preparatory to being reset. Thus, construction of concrete barriers involves five distinct stages: setting each individual form into place; stripping the form after the concrete is hardened; cleaning the internal surfaces of the form; oiling these internal surfaces; and moving the form to the area of new construction.

The novel apparatus of this invention was conceived and designed to combine the five phases of barrier construction into one integrated mobile operation. This goal has been achieved by combining a series of known mechanical devices and mounting them on a four-wheeled rubber-tired carrier termed a “gang form mover.” The carrier is simply a unit upon which the other components of the device are mounted and which has the capability of moving forward and backward similar to a truck. A crane is mounted on one side of the carrier, and attached to the crane is a rectangular stripping device termed a yoke. When coupled to the forms, the yoke is capable of spreading or contracting and holding the gang forms intact in either position.

The function of the crane is to lift and position the forms either on the construction grade or upon the cleaning, oiling and gauging rack mounted on the carrier. This rack consists of two parallel I-beams separated by roughly the same width as the forms and somewhat longer than the particular forms to be processed. These beams are mounted rigidly to the frame of the carrier and are connected by a housing tray which allows room for a brush-oil dolly and which captures and contains the excess form oil mentioned below. The housing tray preferably has gauge pins set on the top surface where it crosses the I-beams which match an elongated set of holes in the bottom of the form body and which insure that the forms are gauged properly when they are set upon the rack. The brush-oil dolly is preferably a wheeled platform running on rails fastened to the parallel I-beams and driven by a suitable motor

along the forms. A circular broom rides this dolly and is rotated, preferably by another motor mounted on the dolly. The broom is the exact shape of the internal cross section of the median barrier, only slightly larger to allow for the brushing action. Mounted on the dolly, ahead of the broom is an oil standpipe having sufficient nozzles to produce a spray which covers the entire cross sectional area of the median barrier form. This standpipe preferably receives its oil from a pump mounted elsewhere on the carrier through a hose reel mounted at the end of the parallel I-beams. The brush-oil dolly is capable of running the entire length of the forms being processed. Power to operate the broom motor and the dolly travel motor can be fed through reels mounted alongside the spray oil reel.

As the concrete sets up in the gang forms to be moved, the gauge rods are removed and the gang form sections are uncoupled from the sections ahead. The carrier then moves alongside, the crane lowers the yoke and the yoke is coupled to the gang forms. The crane applies a slight upward pressure and the yoke mechanism is expanded first at the top in order to effect the peeling action necessary for proper stripping and then at the bottom to clear the form of the fresh concrete. The gang forms are then lifted to the carrier rack and the yoke mechanism is contracted to allow the gang forms to engage the gauge pins on the carrier rack. As soon as the gang forms are seated on the carrier rack, the rotary broom activated to start the cleaning process at the same time the carrier travels along the road to the head of the line. As the broom reaches the far end of the forms, it is reversed and simultaneously the oil spray valve is opened to spray the freshly cleaned forms on the return trip. If for any reason the forms are not clean, this process is repeated. By the time the cleaning and oiling process has been completed, the carrier has traveled to the head of the construction line and stopped parallel to the grade upon which the forms are to be placed. Before the forms are lifted from the gauge pins, gauge rods are inserted and made fast and the crane then lifts the forms to the grade and positions them for coupling at the head of the line.

Use of the “gang form mover” has demonstrated that the same size crew of men and less equipment will build at least twice as much barrier strip in 8 hours as a crew using conventional methods. At the same time, the linear footage of forms required is less than half; when using the “gang form mover” each form is either in use or is being immediately prepared for use, and thus a fewer number of forms is required.

Many other objects and purposes of the invention will become clear from the following detailed description of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side view of the novel gang form mover of this invention.

FIG. 2 shows a cut away view of the mover of FIG. 1 along the lines 2—2.

FIG. 3 shows a cut away view along the lines 2—2 illustrating the positions of the yoke assembly and crane in picking up and positioning one or more pairs of forms.

FIG. 4 shows a top view of the broom.

FIG. 5 shows a detailed view of the connection between the yoke assembly and crane.
DETAILED DESCRIPTION OF THE DRAWINGS

Reference is now made to FIGS. 1, 2 and 3 which show the novel gang form mover of this invention. This machine, which is a self-propelled vehicle, includes a frame generally indicated as 20 onto which a number of elements have been mounted. A suitable number of wheels, including wheels 22 and 24, and a suitable motor (not shown) are provided for moving the vehicle along the ground like a truck.

Also mounted on frame 20 are two separated structural members 26 and 28, which in this embodiment are I-beams. Flat platform members 30 and 32 are disposed atop members 26 and 28 respectively and each of members 30 and 32 has a plurality of upwardly extending dowels or pins, such as pins 34 and 36 in FIG. 2, which each engage a matching hole in the bottom of the pair or pairs of forms which sit atop members 26 and 28. In FIGS. 1 to 3, two pairs of conventional Y shaped concrete median forms 40 and 42 are depicted in place for cleaning on members 26 and 28.

A conventional crane 44 is also mounted on frame 20 for picking one or more dirty used pairs of forms, such as forms 40, 41, 42 and 43, off the ground and onto members 26 and 28 for cleaning and for returning the cleaned forms to the ground at a new location. While in FIG. 1, two pairs of forms are picked up and transported together, it will be apparent that more or less pairs can be cleaned together. The forms are attached to crane 44 by a yoke assembly indicated at 46. Assembly 46 includes a bar 48 which is pivotally connected to member 50 of crane 44 by connection 51 shown in FIG. 5. Connection 45 includes an eye bolt 51 with a bearing swivel and clevis 53 which also connects to rectangular yokes at the pair or pairs of forms. As shown in FIG. 2, each such rectangular yoke includes four vertical arms 52 and 54 which are supported from horizontal arm 56 by a plurality of rollers each of which has its axis extending along the direction in which members 26 and 28 extend. Horizontal arm 56 is in turn rigidly connected to bar 48. Further two lateral bars including bar 58 shown in FIG. 1, extend between the two yokes, connecting at each end to a vertical arm and connecting two pairs of forms.

To remove one or more pairs of forms such as forms 40 and 42 from a set portion of a concrete barrier strip, the gauge rods connecting the pair or pairs of forms together are removed and the pair or pairs are uncoupled from the adjoining pair or pairs of forms. Next yoke assembly 46 is first extended by crane 44 to the position shown in FIG. 3 so that the vertical arms 52 and 54 can be bolted to the forms at connecting points 60 and 62. When more than one pair of forms are to be moved the lateral bars are also bolted to the forms with bar 58 being connected to the forms 40 with bolt and wing-nut 64. Forms 40 and 42 are now securely connected to yoke assembly 46.

To properly strip the forms from the concrete, it is desirable to peel the forms away from the concrete. This is accomplished in the embodiment shown in the drawings by first exerting a slight upward pressure with the crane and then separating the vertical arms 52 and 54 at both ends of the forms at the same time. Arms 52 are connected to bar 48 by a conventional hydraulic cylinder 66 and arms 54 are similarly connected by cylinder 68. As hydraulic pressure is applied to cylinders 66 and 68, the force thus produced moves arms 52 and 54 away from each other horizontally along horizontal arm 56. Rollers 70, 72, 74 and 76 which are rotatably mounted on bar 52 guide the movement of bar 52 and similarly rollers 78, 80, 82 and 84 guide arm 54 as it moves in the opposite direction along bar 56. As bar 52 moves away from form 40, that form pivots about connection 60 and guide block 115 which is set so that form 40 peels away from the set concrete from the top to the bottom. Form 42 similarly pivots about connection 62 and guide block 116 and is likewise peeled away from the set concrete.

After forms 40 and 42 have been stripped from the concrete they are lifted by crane 44 positioned on I-beam members 26 and 28 with the holes in the bottom of forms 40 and 44 matching the pins extending upward from platforms 30 and 32. The forms are preferably returned to their normal positions at this time. Frame 20 is now driven to transport the forms to their new location which is usually the front of a string of form pairs.

At the same time that the forms are being transported they are also cleaned and oiled. Cleaning is accomplished by a rotary broom 86 which has a number of individual brushes extending about its axis of rotation which is a vertically mounted standpipe 88. Each of these brushes, as can be seen in FIG. 2, is shaped to correspond to the interior surfaces of forms 40 and 42. Broom 86 is mounted on a dolly 90 which has a plurality of wheels, including wheels 92 and 94 driven by a motor 96 for propelling dolly 90 and broom 86 along the lengths of the forms on members 26 and 28 in tracks 98 and 106 which extend below and in the same direction as the forms on members 26 and 28. A further motor 102 is also mounted on dolly 90 and, as shown in FIG. 2, motor 102 rotates broom 86 as it moves along the forms.

Standpipe 114 is mounted on dolly 90 in front of broom 86 and has a plurality of apertures or nozzles disposed along its length for spraying oil onto the exterior surfaces of the forms. An oil pan 110 which includes platform members 30 and 32 is mounted beneath dolly 90 for catching excess oil which runs off the interior surface of the forms. The oil is conveyed to standpipe 114 by a suitable hose 112 which may be stored on a reel (not shown) mounted at the end of member 26 and 28. Similar reels may also store the electrical or hydraulic cables needed to supply power to motors 96 and 102. An oil pump and source (not shown) can be located at any suitable place on frame 20. A screen 113 shields the driver of the vehicle from the oil spray as shown in FIG. 1.

Preferably after the forms have been properly positioned on members 26 and 28 and while the forms are being transported to the new location, broom 86 is rotated and moved the length of the forms to clean the interior surfaces thereof before oil is added. On the return trip, oil is strained from standpipe 114. Usually by the time that this cleaning and oiling operation is complete the vehicle has reached the new location for the forms which can then be lifted off members 26 and 28 and placed at the proper position on the ground. Yoke assembly 46 is uncoupled from the cleaned and oiled forms which are now or before uncoupling connected to each other with gauge rods and to the adjoining pair of forms.

Many changes and modifications can of course be made in the above embodiment of the invention. Ac-
cordingly, the scope of the invention is intended to be limited only by the scope of the appended claims.
What is claimed is:
1. A vehicle for cleaning and transporting forms for highway barrier strips comprising:
a frame,
a plurality of ground engaging wheels mounted on said frame,
means for propelling said frame along the ground on said wheels,
means mounted on said frame for removing one or more pairs of forms bounding set material forming part of a barrier strip and placing said pair or pairs of forms on said frame, and
means mounted on said frame for cleaning the interior surfaces of said forms while on said frame.
2. A vehicle as in claim 1 wherein said cleaning means includes means for moving along said forms and brushing the interior surfaces thereof.

3. A vehicle as in claim 2 wherein said cleaning means further includes means for spraying oil onto said interior surfaces.
4. A vehicle as in claim 1 wherein said causing means includes means for peeling said forms from said material.
5. A vehicle for cleaning and transporting forms for highway barrier strips comprising:
a frame,
means mounted on said frame for moving said frame along the earth's surface,
means mounted on said frame for removing one or more pairs of forms bounding set material forming part of a barrier strip and placing said pair or pairs of forms on said frame, and
means mounted on said frame for cleaning the interior surfaces of said forms while on said frame.