United States Patent [19]

Gorlov

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[45] **Date of Patent: Jul. 26, 1988**

[54] **TERRORIST VEHICLE ARRESTING SYSTEM**

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[73] Assignee: **Flexible Barricades Inc.**, Watertown, Mass.

[21] Appl. No.: **63,150**

[22] Filed: **Jun. 16, 1987**

[51] **Int. Cl.**[4] **E01F 13/00**

[52] **U.S. Cl.** **404/6**; 49/9; 49/34

[58] **Field of Search** ..... 404/6, 9, 10; 256/1, 256/13.1; 49/9, 34, 49, 141; 244/110 R, 110 C; 52/174

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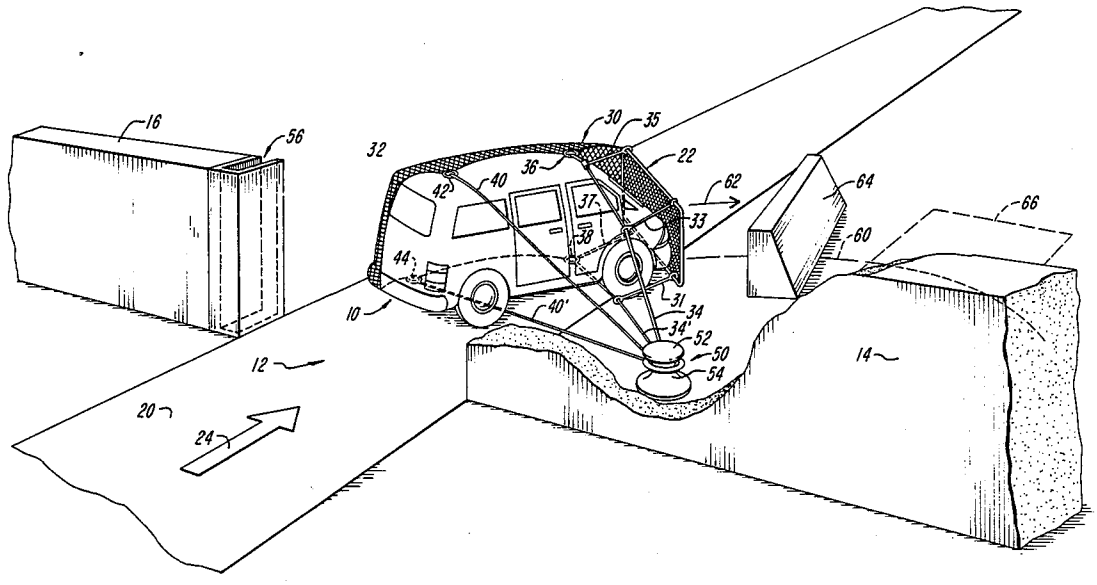
Primary Examiner—Stephen J. Novosad
Assistant Examiner—John F. Letchford
Attorney, Agent, or Firm—Robert K. Tendler

[57] **ABSTRACT**

A terrorist vehicle arresting system includes a crash barrier positioned at a side of a driveway instead of across the driveway; a gate across the entranceway which is dislodged by a vehicle coming through the closed gate; a net pulled out by the dislodged gate which captures the vehicle; a capstan to pivot a captured vehicle into the barrier; and cables from the net looped around the capstan, such that the netted vehicle is swung into the barrier where it comes to rest blocking the driveway. The impact-force is therefore redirected from the direction of the driveway, and the kinetic energy is dissipated upon impact with the offset, rigid barrier, thereby permitting the gate structure to be made light, aesthetically attractive, and quickly closed since the gate does not have to bear any substantial load. In a preferred embodiment, the crash barrier is positioned in such a location with repect to the driveway that the stopped vehicle lying in the driveway blocks further vehicles from continuing down the driveway.

11 Claims, 7 Drawing Sheets



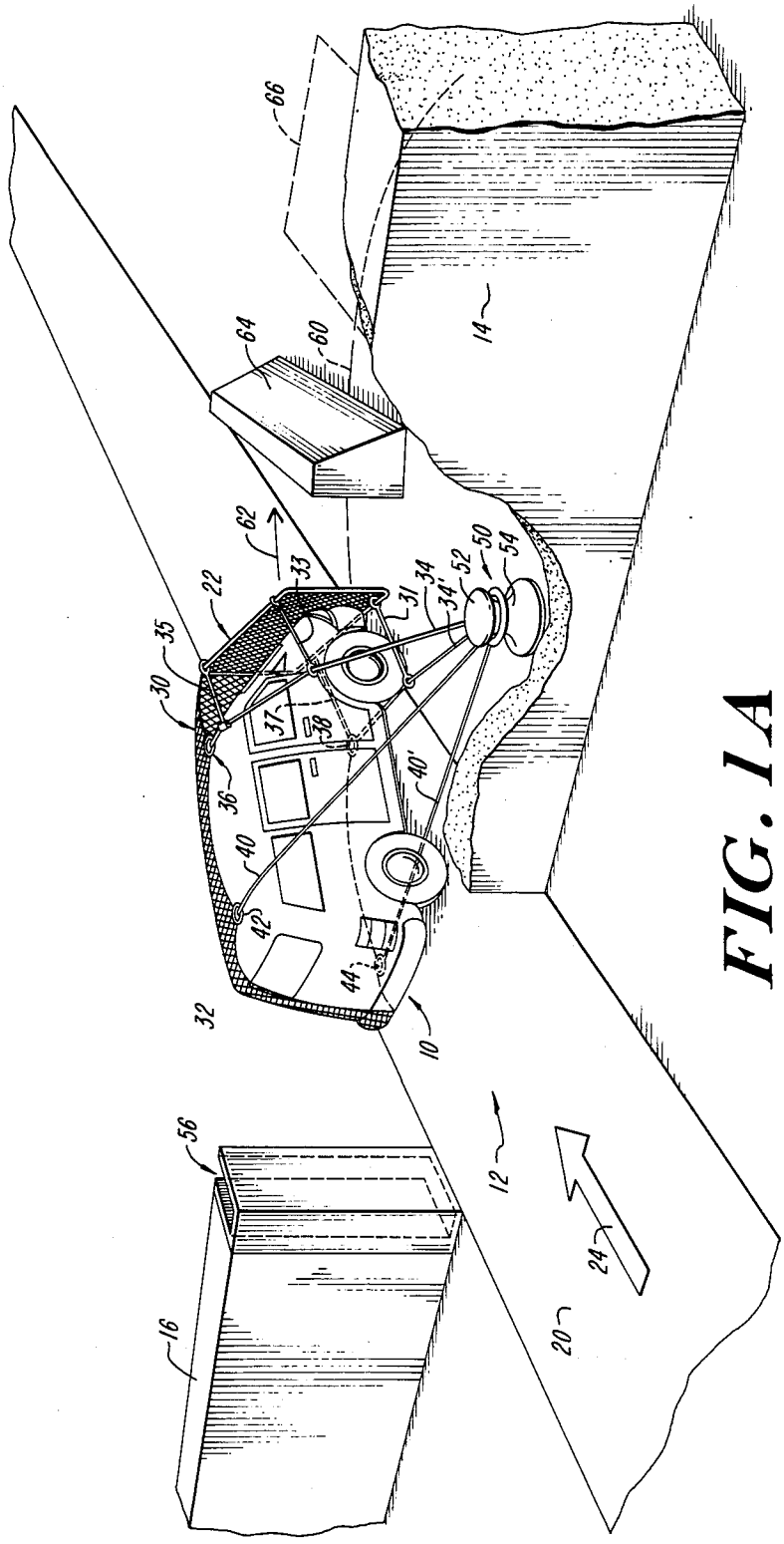

66
64
60
14
62
33
22
35
30
36
37
38
40'
40
42
44
32
10
12
56
16
20
24
50
52
54
34
34'
31

FIG. 1A

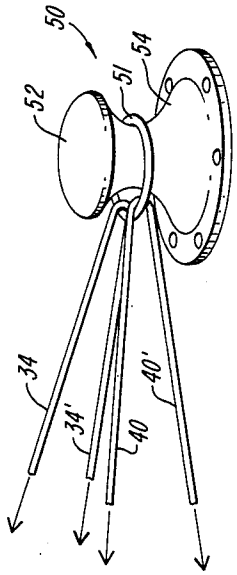

50
54
51
52
34
34'
40
40'

FIG. 1B

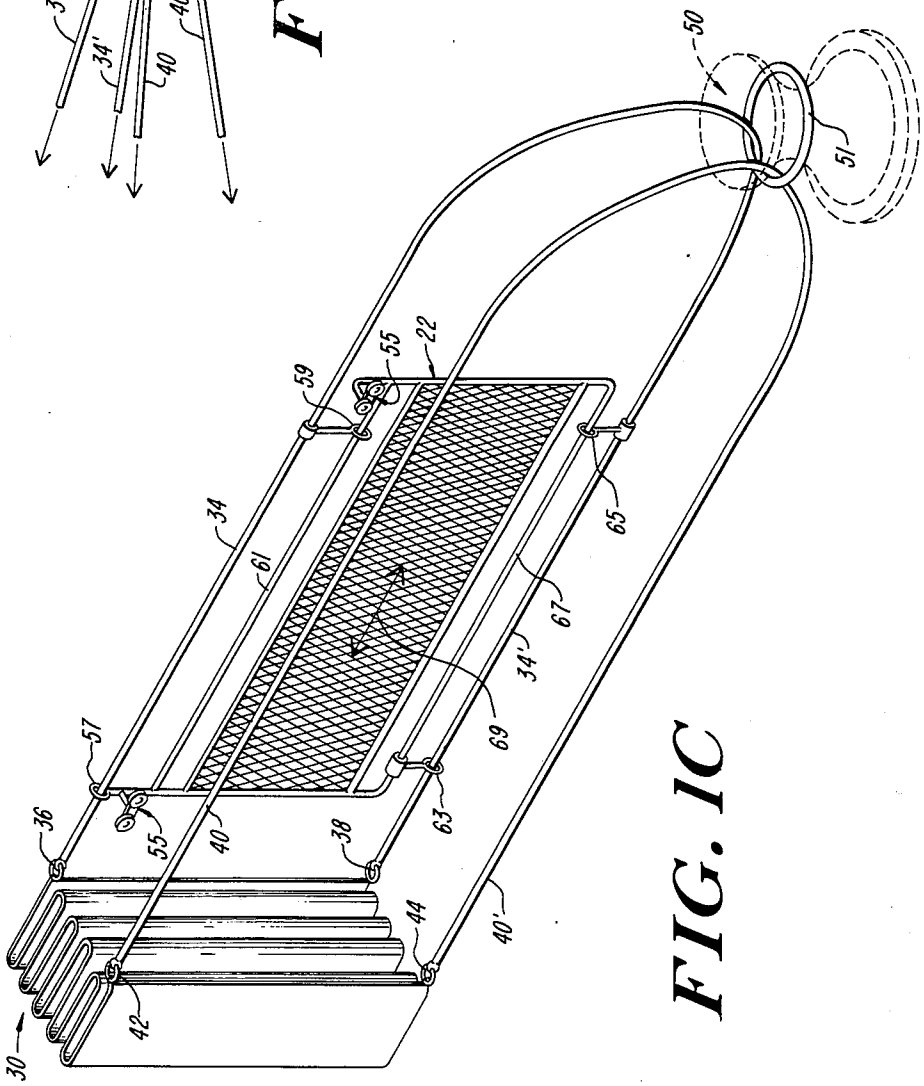

50
51
55
22
59
34
61
65
67
34'
69
57
55
36
40
38
63
44
40'
42
30

FIG. 1C

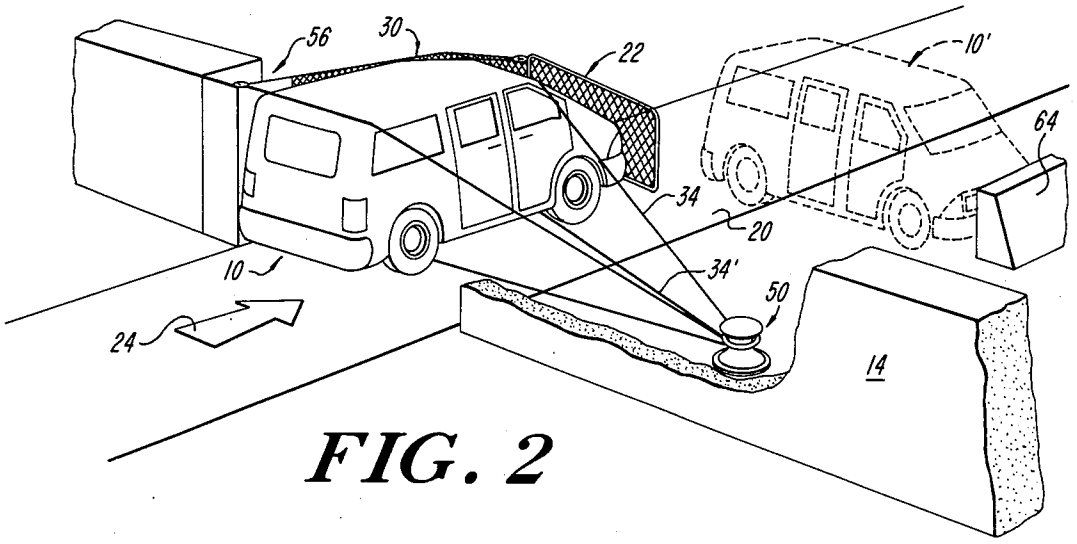

56
30
22
10'
64
34
20
34'
50
10
24
14

FIG. 2

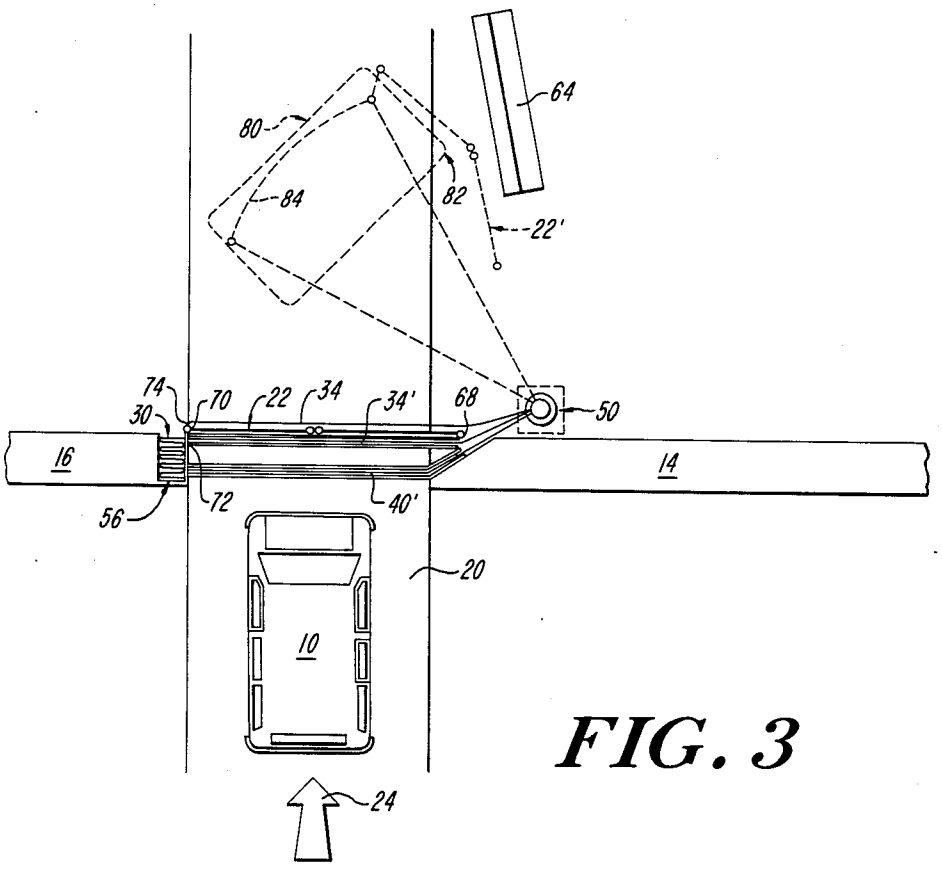

64
80
84
82
22'
74
30
70
22
34
34'
68
50
16
14
72
40'
56
20
10
24

FIG. 3

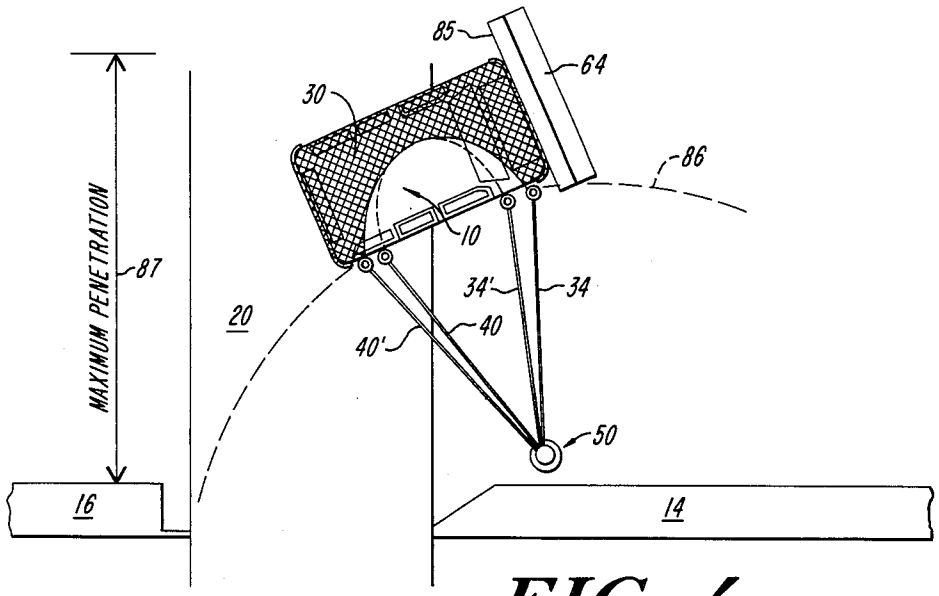

85
64
30
86
10
34'
34
40'
40
20
50
MAXIMUM PENETRATION
87
16
14

FIG. 4

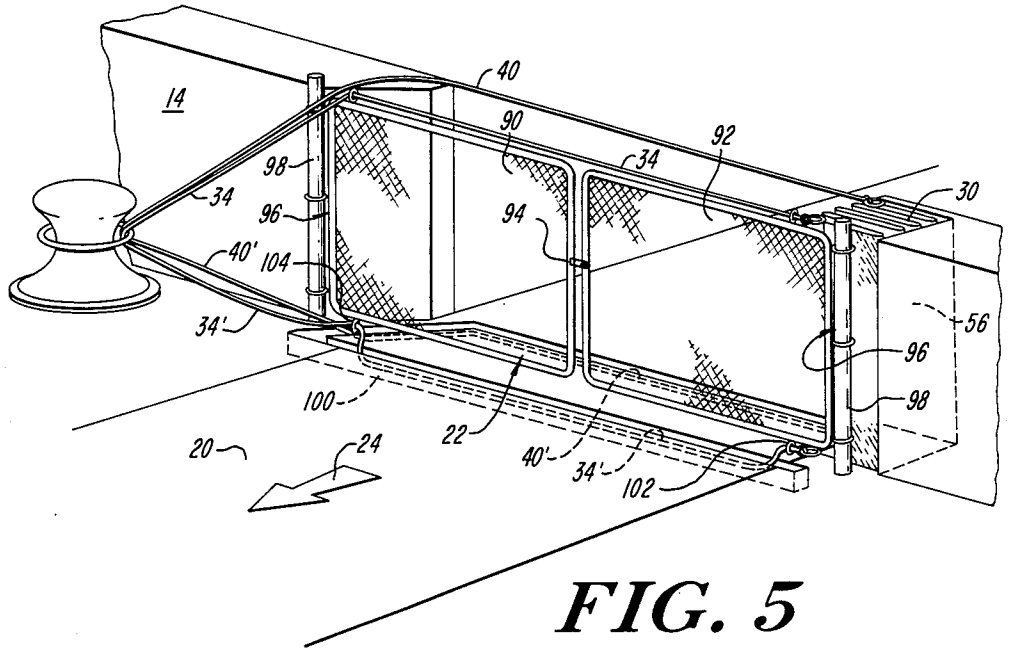
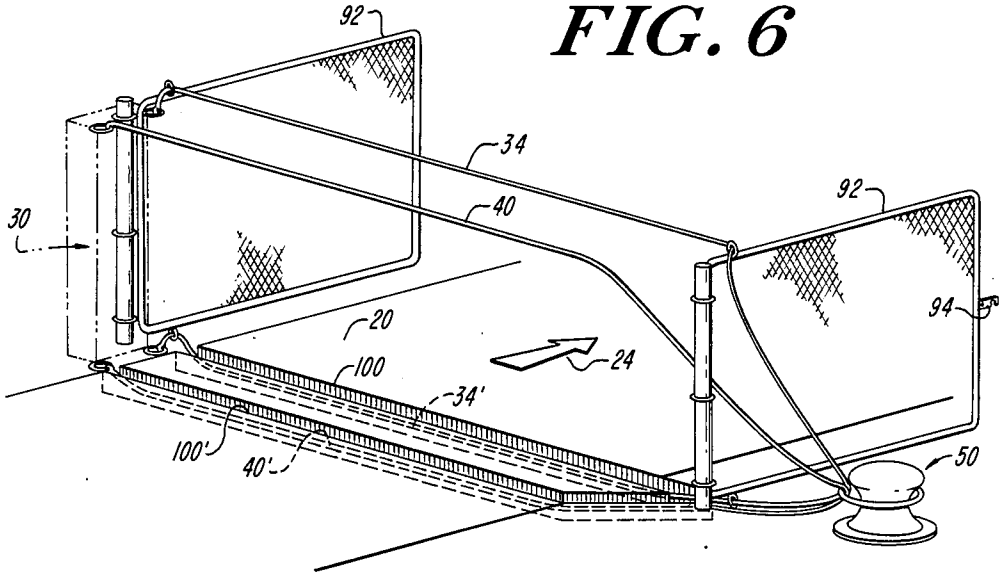

14
40
90
92
34
30
98
34
96
94
40'
104
56
34'
96
98
100
22
20
24
40'
34'
102

FIG. 5

FIG. 6



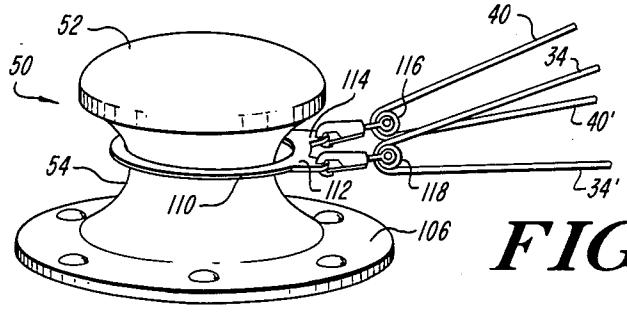


FIG. 7

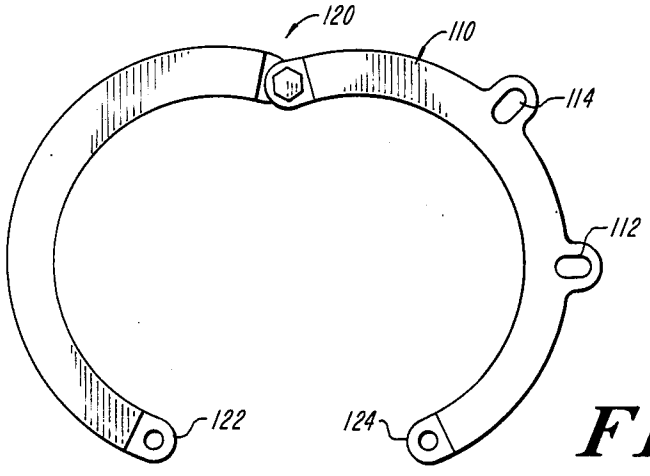
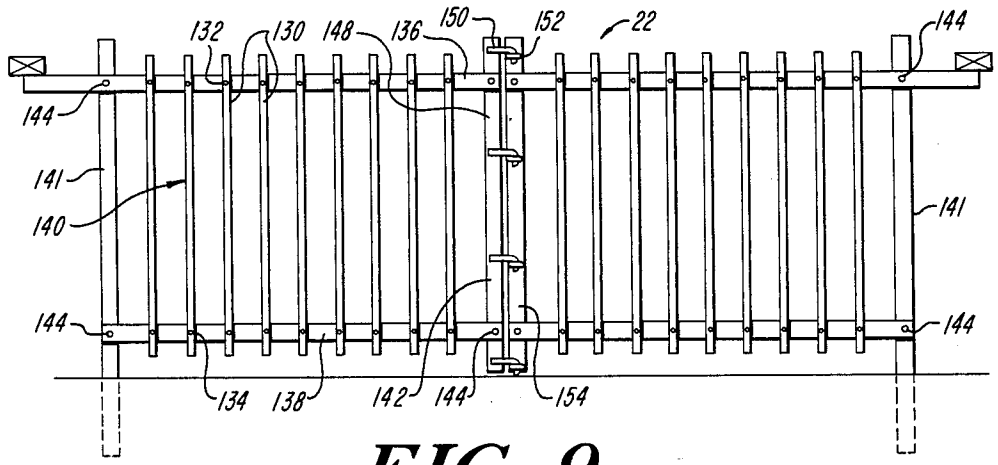


FIG. 8


132
130
148
136
150
152
22
144
144
141
140
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144
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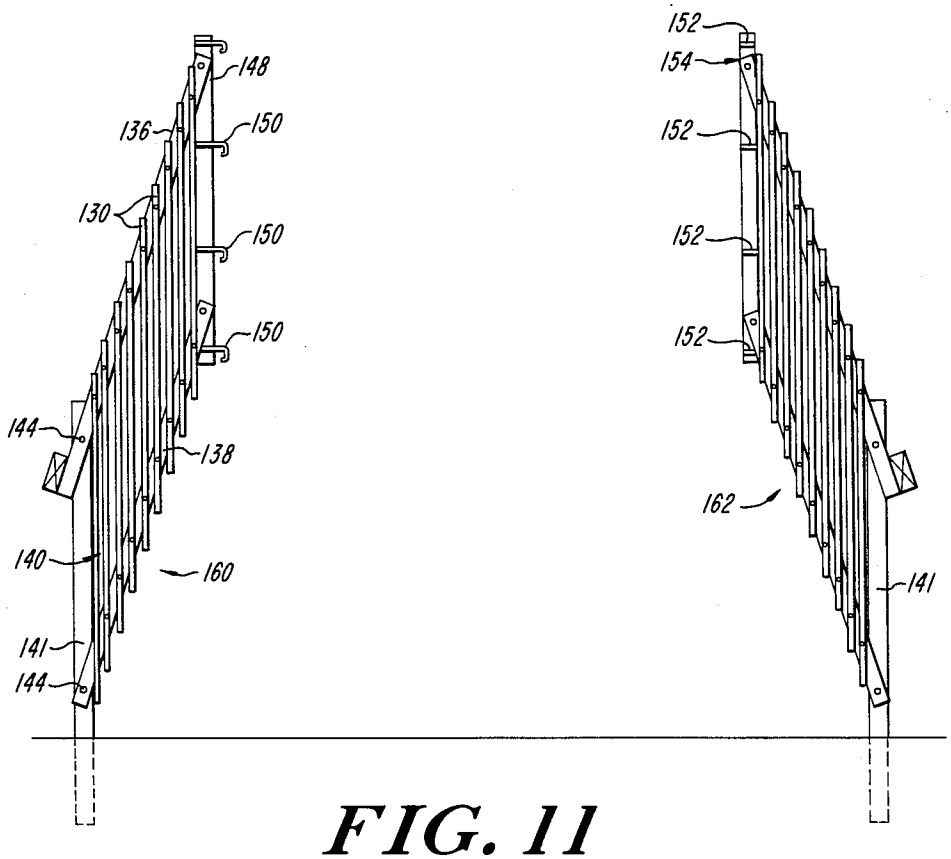
138
142
144
154

FIG. 9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136
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144
138
140
160
141
144
152
154
152
152
152
162
141

FIG. 11

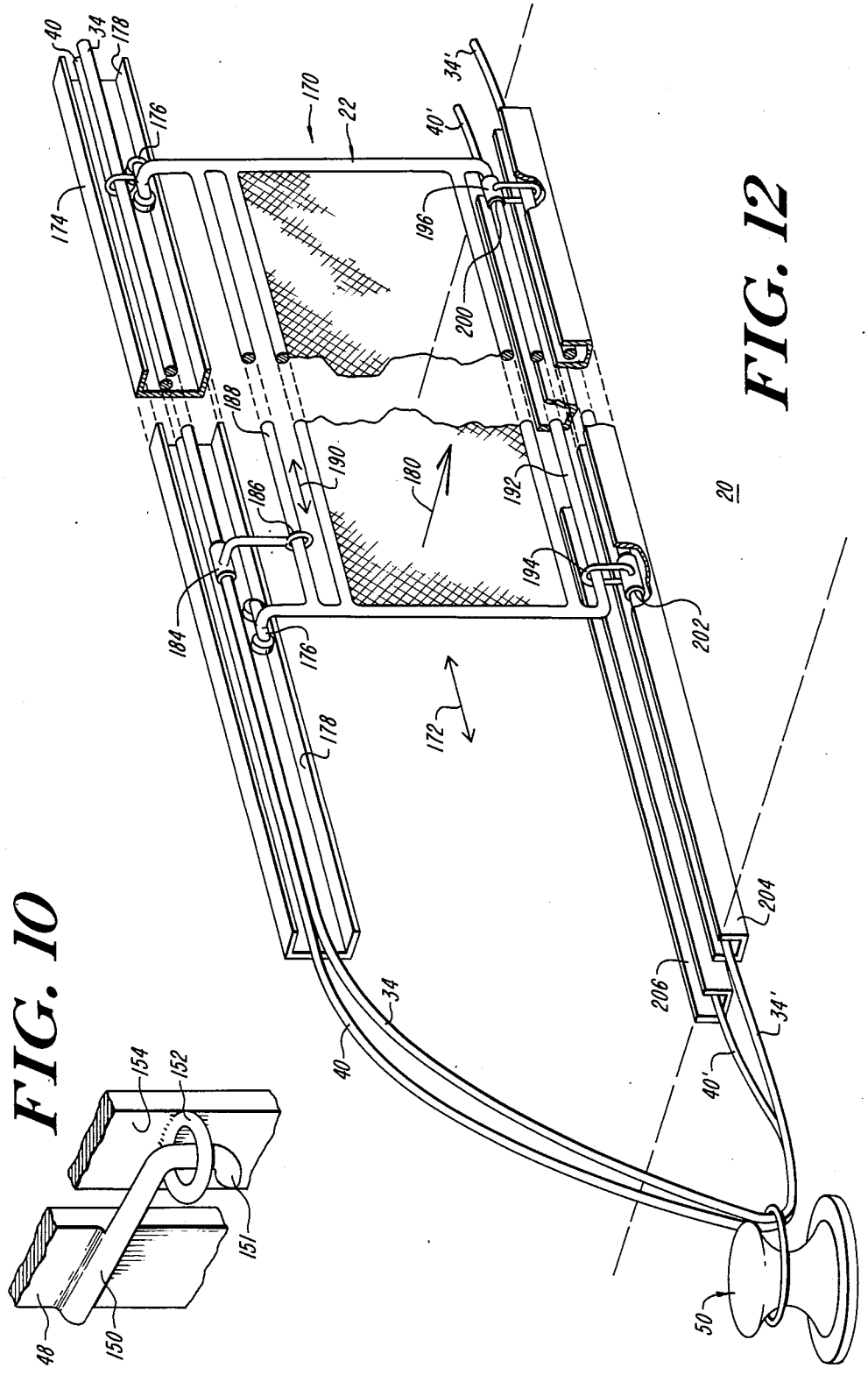
40
34
178
176
174
170
22
34'
40'
196
200
188
190
186
180
192
184
194
202
172
178
176
20
204
206
34
34'
40
40'
50

FIG. 12

154
152
151
48
150

FIG. 10

TERRORIST VEHICLE ARRESTING SYSTEM

FIELD OF INVENTION

This invention relates to a method and apparatus for thwarting terrorist attempts at unauthorized gate penetration, and more particularly to a system for arresting vehicles which is capable of withstanding high impacts while, at the same time, preventing penetration.

BACKGROUND

In the past there have been various vehicle barriers placed directly across roadways to prevent vehicle penetration. One of the difficulties associated with such barriers is that the barrier must be removeably placeable across a roadway. Thus the barrier must be massive enough to arrest a vehicle, yet light enough to be removed for regular vehicular traffic. In order to provide the above functions light weight barriers have been substituted for massive barriers but these light weight barriers have required expensive and somewhat unreliable cable brakes or shock absorbing systems so that the light weight barrier will not break on impact. Such a system is illustrated in U.S. Pat. No. 4,576,507, in which a barrier is released to come down over a gate to attempt to stop a high-speed vehicle. In this case, the barrier is prevented from breaking by virtue of expensive and unwieldy hydraulic or spring-loaded shock absorbers.

By way of further background, in the past, various flexible railroad crossing gates and highway guard fences such as illustrated in U.S. Pat. Nos. 1,848,516; 1,848,517; and 3,292,909 have also utilized various types of shock-absorbing mechanisms which include brakes on drums or other hydraulic and spring-loaded systems. These are likewise complicated and expensive. Note that yieldable barriers have been used for traffic and include U.S. Pat. Nos. 2,295,205 and 1,828,296 which also involve cable and drum-type braking systems. Flexible impact-barriers are illustrated, for example, by U.S. Pat. No. 4,645,375 and a device for arresting airplanes which includes a net that has a shock-absorbing device including a braking system is illustrated in U.S. Pat. No. 3,013,750. Finally, U.S. Pat. No. 1,748,563 illustrates a flexible obstruction-device extending across an open driveway to prevent access by gradually bringing an automobile to a stop at a right-of-way, street, or other crossing. Means are provided for retarding the paying out of the cables connected to the obstructing device which includes a braking mechanism consisting of frictional plates arranged to retard the paying out of the cable.

SUMMARY OF THE INVENTION

In contradistinction to all of the above methods of arresting a vehicle traveling along a given direction, in the Subject System, a vehicle is deflected from its direction of travel through the utilization of a net which captures the vehicle from the front and side and swings it along an arc tangent to the center line of the driveway, thereby redirecting the vehicle such that the kinetic energy is dispersed, not by any retarding mechanism or the resilient qualities of the retarding device, but by the utilization of a pivot in the form of a capstan which is offset from the driveway, and finally by an impact embankment.

The redirection of the inertial force of the oncoming vehicle dissipates the kinetic energy and swings the vehicle into a position where it is made to crash against the embankment, preferably of relatively soft material reinforced by railroad ties held together by cables. The enbankment by which the vehicle is stopped is offset from the driveway, thereby not precluding entrance for authorized vehicles. However, the barrier is preferably positioned so as to stop the vehicle such that the stopped vehicle becomes immeidately itself a barrier to other follow-along vehicles attempting to pass through the originally violated gate structure.

In a preferred embodiment, the gate, whether it be raised, lowered, slid, or swung into position is carried away by the impact of the oncoming vehicle, with the cables being utilized to connect the net to the capstan also being anchored to the gate as well as to the net. In one embodiment, the net is connected to the gate via the cables going around the capstan, with the net being attached to the gate and cables with a four-point coupling system. In a preferred embodiment the net is stored at one side of the driveway in a box or pillar post container.

The purpose of the gate is to make use of the force of the vehicle to cause the stored net to be pulled out along the side of the vehicle as it progresses because the gate is connected to the leading edge of the net by cables or other means.

During normal operation, the netting utilized to capture the vehicle is stored in the above-mentioned side pillar post and the cables utilized to connect the corners of the net together around the capstan are either in ground-level channels for the lower cable portions or are carried over the top of the gate for the upper cable portions so that regular vehicle traffic can be maintained through the gate when opened. The cables are connected to eyelets in the corners of the net and also to the gate via four coupling cables or equivalent clamping devices.

Upon the encroachment of an unauthorized vehicle, the gate is closed rapidly, with the rapid closure of the gate being made possible by its light-weight construction since the gate itself is meant to be detachable upon impact and only provides for a barrier against human traffic as opposed to vehicular traffic.

Because the cables are coupled to the break-away gate, with the carrying away of the gate upon impact, the encroaching vehicle carries with it the forward end of the net which entraps the front end of the truck, bulldozer, or other vehicle at its front, and this pulls the rest of the net which encapsulates the side of the vehicle away from the capstan. This causes the vehicle to be netted and carried or swung in a circular direction around the capstan where it is made to crash, or at least stopped against a barrier which is to one side of the driveway. In one embodiment, the barrier against which the vehicle is made to stop is positioned such that the vehicle is stopped so that its remains impede or block further traffic through the driveway. The preferable material for the barrier is a soft material, such that debris is not spewn over the entire area.

In contradistinction of the above-mentioned patents, no crash barriers are placed across the roadway. Moreover, no braking or shock-absorbing equipment is necessary, with the kinetic energy of the vehicle being dissipated by virtue of its swing through an arc and into a bank or rigid barrier. This makes possible the utilization of a knotless, braided-nylon netting such as manufactured by Bridport Gundrey Ltd. of Bridport, Sussex

England. It will be appreciated that the breaking force of nylon ropes used in such a net is between ten and fifty tons, which braking force is in effect augmented by virtue of the capstan/cable/net system described above.

The subject kinetic energy redirection system can be utilized with a number of break-away gates including two swingable gates each swung from an opposite pillar post, a sliding gate, or a single swingable gate. Additionally, any other type of gating structure which is carried away by the vehicle may be utilized. For instance, one type gate is in the form of a collapsible parallelogram, which when in its "down" or "closed" position has interlocking hook and eye latches which are effective in maintaining the gate together until such time as the vehicle is trapped by the aforementioned net/cable/-capstan system.

In another embodiment, a specialized sliding gate is used which is supported by trolleys on an upper channel that also houses the upper cables. The gate structure is such that the cables do not move relative to each other with the sliding of the gate. Upon impact, the sliding gate and its associated cables come out of the channels and are carried away with the front of the impacting vehicle.

In one embodiment, the upper and lower corners of the net are connected by a single cable which loops around the capstan. Thus, each cable constitutes a single loop connecting an upper and lower corner of the net. Alternatively any two corners of the net can be connected together by the single loop. The location of the cables above and below the gate permits regular traffic flow because the traffic merely runs over the lower cable portions, whereas the top cable portions are sufficiently high such that normal vehicular traffic is accommodated.

In a preferred embodiment, the break-away gate is slightly ahead of the cables which lie at the surface of the driveway such that upon impact, one portion of the leading lower cable is behind the wheels of any oncoming vehicle at impact. This ensures the entrapment of the vehicle in the net and the swinging of the vehicle to one side by virtue of the capstan/cable/net combination. The cables may also be fixed in attachment to the the capstan so as to cause a change between the upper and lower lengths of these cables during curvilinear travel of the vehicle as some or all of the cables wrap around the capstan.

In one embodiment, the capstan is provided with an exceptionally wide top portion to prevent the cables from slipping off the top. Alternatively, the capstan may be provided with a ring or collar. The collar may include eyelets or idlers through which the cables pass. The collar rotates around the capstan during an impact, with forces between upper and lower cable being adjustable through the idlers or through slippage of the cables either around the capstan or through the eyelets or the collar itself.

In summary, a terrorist vehicle arresting system includes a crash barrier to one side of a driveway instead of across the driveway; a gate quickly closed across the entrance way which is dislodged by a vehicle coming through the closed gate; a net pulled out from a side storage bin by the dislodged gate which captures the vehicle; a capstan which serves as a pivot for the captured vehicle; and cables from the net looped around the capstan, such that the netted vehicle is swung into the barrier where it comes to rest blocking the driveway. Thus, the Subject System does not require the energy absorbing barrier to be positioned across the driveway and provides for the arrest of the intruding vehicle without cumbersome and expensive shock-absorbing systems and prevents the spewing forth of debris over a wide area. In one embodiment top and bottom corners of the net are coupled together by the cables which go around the capstan. Alternatively, any pairs of corners of the net may be coupled together by a cable which goes around the capstan. Note that the corners of the net are joined together by a border cord or cable which goes through the net along its periphery. The net/capstan/barrier system thereby redirects the initial reaction force by changing the direction of the motion of the vehicle so that the vehicle is fully arrested by the stationary elasto-rigid structure without the use of shock absorbers for the cables or cable brakes. The kinetic energy is thus dissipated upon impact with the offset, rigid barrier, thereby permitting the gate structure to be made simple and light, aesthetically attractive, and quickly moved into a closed position since the gate does not have to bear any substantial load. Unique, in one embodiment, is the use of a capstan collar and/or pulleys or idlers for the instantaneous adjustability of the net's upper and lower cable lengths. Also, the cables leading to the capstan may be attached to the collar carried by the capstan so that the cables will not slip off the capstan. In one embodiment, the net is stored at one side of the driveway gate and is drawn along side the vehicle from a storage-bin by the impacted gate when the front of an oncoming vehicle comes into contact with the gate which is carried away due to the impact of the vehicle with the gate structure. In another embodiment, the gate's grill work or net gives way allowing the frame of the gate to trap the vehicle when the vehicle impacts the gate, such that the wheels of the vehicle have already passed over this frame. In a preferred embodiment, the crash barrier is made soft and is positioned in such a location with respect to the driveway that the stopped vehicle lying in the driveway blocks further vehicles from continuing down the driveway. In a still further embodiment, either the gate is of a collapsed parallelogram type, or of a sliding type in which the sliding gate and cables come out of respective upper and lower tracks upon vehicle impact.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the subject invention will be better understood in connection with the Detailed Description taken in conjunction with drawings of which:

FIG. 1A is a diagrammatic illustration of the entrapment of a vehicle going through a gate by virtue of a side-catching net and an offset rigid barrier along with an offset capstan which serves as a captured vehicle pivot;

FIG. 1B is a diagram of the capstan for use in the FIG. 1A system, illustrating a ring or collar through which the cables of FIG. 1A pass;

FIG. 1C is a diagrammatic representation of a sliding gate embodiment showing the attachment of the cables to the net, and a four-point attachment of the cables in the leading cable loop to the break-away gate.

FIG. 2 is a diagrammatic illustration of initial impact of a vehicle with a gate which pulls the net out of a net container;

FIG. 3 is a diagrammatic top view of a vehicle approaching a gate with the net to one side, also showing

the position of the vehicle after the break away of the gate showing the pull out of the net;

FIG. 4 is a diagrammatic top view of the swinging of the vehicle away from the roadway and into an offset barrier;

FIG. 5 is a diagrammatic illustration of a dual gate structure along with a capstan, illustrating the joinder of the cables to the net as well as to portions of the gate;

FIG. 6 is a diagrammatic illustration of the gate of FIG. 5 illustrating the opening of the gate to permit normal vehicle traffic between the upper and lower cables;

FIG. 7 is a diagrammatic illustration of a capstan including a yoke or collar having eyelets and pulleys, with the various cables going around the separate pulleys and the yoke functioning to swing around the capstan body;

FIG. 8 is a top view of the yoke or collar of FIG. 7, showing eyelets which may be used with or without pulleys;

FIG. 9 is a diagrammatic illustration of one embodiment of a light-weight, break-away gate, illustrating a light-weight gate structure which may be easily and quickly raised and lowered, with interlocking eyelets and rigid hook structures;

FIG. 10 is a diagrammatic illustration of one portion of the rigid hook and eye structure for use with the gate of FIG. 9;

FIG. 11 is a diagrammatic illustration of the gate of FIG. 9 raised in its parallelogram form; and,

FIG. 12 is a diagram of a slideable gate which comes out of its track upon impact by a vehicle.

DETAILED DESCRIPTION

Referring now to FIG. 1A, a vehicle **10** is shown to have passed through a gateway generally indicated by reference character **12**. Adjacent walls **14** and **16** surround the gateway opening and a driveway **20** is shown passing through the gateway. As illustrated, vehicle **10** has broken through the gateway and carries with it a dislodgeable gate **22** which is normally positioned across the gateway. Here the direction of travel of the vehicle is illustrated by arrow **24**. As can be seen, gate **22** carries with it a net generally indicated by reference character **30** to surround a side **32** of vehicle **10**, with the net having a leading cable with proportions **34, 34'** forming a loop joining a forward or leading upper corner **36** of the net **30** with a forward lower corner **38** of the net. Cable portions **34** and **34'** are shown schematically to be joined to four corners of the gate via cables **31, 33, 35** and **37**. The trailing portion of the net is secured by a cable having proportions **40, 40'** that form a loop which joins a trailing or aft upper corner **42** of the net with a trailing or aft lower corner **44** of the net. It will be appreciated that the cables are looped around a capstan generally indicated by reference character **50**, which has a top portion **52** and a smooth, thimble-shaped interior barrel or surface **54** about which the cables are adapted to either slip or move with the rotation of the barrel of the capstan should the barrel be rotationally mounted to a base. For either the forward loop or the trailing loop cables, rotation of the capstan will be in the same direction to tighten the net about the vehicle. In general this means that the cable portion lengths will self-adjust to pull the top of the net over the vehicle. Slippage or self-adjustment between the top and bottom cable portions is important to balance the forces between the bottom and the top of the net. This automatically adjusts looseness between the top and bottom of the net. This is most readily accomplished by the idlers of the FIG. 7 embodiment. Note, in FIG. 1B cable portions **34, 34'** and **40, 41'** are coupled to capstan **50** via a ring or collar **51**, with the slippage of these cables through the ring providing for the above cable length adjustment. The collar itself provides for pivoting about a vertical axis of the capstan.

Referring now to FIG. 1C, net **30** may be housed in folded form as illustrated, in which the leading eyelets **36** and **38** are joined by cable **34, 34'** which forms a loop through ring **51** of capstan **50**. It will be appreciated that sliding gate **22** includes trolleys **55** which roll along an upper channel (not shown in this figure) with the gate frame being attached to cable **34** via an eyelet **57** carried by trolley **55** and via an eyelet **59** carried by cable **34** which goes around a transverse bar **61** of the frame of gate **22**. This in essence connects eyelet **36** of net **30** with the top portion of the break-away gate.

With respect to eyelet **38**, this is connected via cable portion **34'** to an eyelet **63** carried by a bottom portion of the frame of gate **22** and by an eyelet **65** which is carried on cable portion **34'** and surrounds a transverse lower bar **67** of gate **22**. This eyelet and trolley construction permits the sliding of gate **22** in the direction of double-ended arrow **69** without the removal of net **30** from its stored position as illustrated.

Upon impact with a vehicle, however, the break-away gate pulls out of its respective tracks as illustrated in FIG. **12** to be described hereinafter, and pulls forward eyelets **36** and **38** which carry the leading edge of net **30** about the vehicle which is impacting the gate. The trailing edge of the net has afore-mentioned eyelets **42** and **44** coupled to cable portions **40** and **40'** which again run in a loop through ring **51** on capstan **50**. In this diagram it can be seen that the forward or leading edge of the net is coupled in a four-point connection system to the break-away gate via cable **34, 34'**, thereby establishing the four-point linkage system described in connection with FIG. 1A.

It will be noted that the net is generally rectangular in configuration, having upper and lower corners joined by cable portions **34, 34'**; or cable portions **40, 40'** respectively. This rectangular configuration constitutes a preferred embodiment, with other net configurations being within the scope of this invention.

In operation, and referring back to FIG. 1A, the vehicle **10** impacts gate **22** which causes net **30** to surround the vehicle as shown, with the net being pulled out of a storage container generally indicated at **56** by virtue of its being attached via cables to the gate carried away by an impacting vehicle. By virtue of the capstan and the netting, which can be a knotless net such as mentioned hereinbefore, the vehicle is swung in a circle illustrated by dotted line **60**, such that the momentum of the vehicle initially along the center line of the driveway is now moved off axis as illustrated by arrow **62**, such that the vehicle comes to rest against a barrier **64** which is to one side of the roadway, thereby dissipating the kinetic energy associated with the vehicle. Note the barrier face is preferably perpendicular to circle **60** for maximum effect. In one embodiment, barrier **64** is located adjacent the roadway so that the vehicle is stopped across the roadway, thereby preventing any further traffic through the gateway. Alternatively, the vehicle may be swung a whole 180 degrees around to wall **14** where it is allowed to smash up against the wall

or some other barrier in a zone generally indicated by dotted line **66** which forms a debris disposal zone.

Note in one embodiment in which Kevlar cables are used, each portion of a cable loop is capable of withstanding 110,000 pounds of force. This translates into a total tensile strength of 440,000 pounds.

As can be seen, the operation of the system is such that upon impact, the gate becomes dislodged carrying the light-weight net which is stored to one side or the other of the gateway such that the net both captures the vehicle and swings it away from the driveway by virtue of the cables going around capstan **50**. This changes the momentum by changing its direction, whereby all the force is dissipated upon impact with the barrier. It will be appreciated that the reason for the utilization of a net and capstan is to effectuate a momentum direction change which alleviates the problem of having hydraulic cylinders for net cables, or complicated braking mechanisms for the cables. It will be appreciated that barrier **64** can be a mound of earth surrounded by a cofferdam along with reinforcing railroad ties and cables such that the impact is softened, thereby to minimize the amount of debris thrown off.

Referring now to FIG. **2**, vehicle **10** is illustrated as having impinged upon gate **22**, with gate **22** having been carried away from wall **14**. Thence the vehicle proceeds to be pivoted about capstan **50** into barrier **64** which is to one side of driveway **20**. In this case it can be seen that the upper cable portion **34**, is lifted above the top of the vehicle **10** and pulls out the top of net **30** so as to encompass the top portion of vehicle **10**. Simultaneously the lower cable portion **34'** having been held in a channel in the driveway and at least its forward end having been run over by vehicle **10** pulls out the bottom of net **30** from container **56**.

With the barrier just to one side of the driveway, the final position of vehicle **10** as illustrated in dotted outline **10'** is such that it blocks driveway **20** and prevents any further vehicular traffic.

How this is accomplished is illustrated in FIG. **3** in which the lower cable portions **34'**, **40'** are shown in channels in driveway **20**. Here net **30** is held in container **56** in wall **16**, with capstan **50** being on an opposite side of the driveway adjacent wall **14**. As can be seen, lower cable portion **34'** is anchored to gate **22** at points **68** and **70**, whereas this cable is fixed to the lower leading corner of net **30** at point **72** adjacent point **70**. The other end of this cable is joined to the upper leading corner of the net at point **74**. As the vehicle **10** proceeds to crash through gate **22**, and as illustrated at dotted line **80**, break-away gate **22** is bent around at least a right front portion of the vehicle here illustrated at **82**. At this juncture, net **30** has been pulled out of its container **56** as illustrated by dotted line **84** so that it begins to surround the front portion and the left side of the vehicle, when vehicle **10** is in position **80**.

Referring now to FIG. **4** net **30** surrounds the vehicle as the vehicle impacts barrier **64**, with the barrier in this case having a face **85** tangent to a circular path **86** along which the vehicle is swung. Here barrier **64** is close enough to the driveway that the vehicle comes to rest blocking the roadway. In this illustration cable portions **34**, **34'** and **40**, **40'** are connected to the respective top and bottom corners of the net as illustrated. Note, the maximum penetration is shown by arrow **87** and can be limited by moving the capstan closer to the roadway and shortening the respective cables.

Referring now to FIG. **5**, in one embodiment gate **22** may be a double-gate, light-weight, swingable structure having swingable gate portions **90** and **92** locked together by a latch **94**, with the gate being hinged to walls **14** and **16** at breakable joints **96** mounted to upstanding pillars **98**. Here it can be seen that net **30** is carried to one side of the gateway in container **56**, with the bottom cable having its lower portion **34'** within a channel **100** within driveway **20** where it is anchored at point **102** to gate **22** and also to the leading bottom corner of net **30**. This cable may also be attached to the left hand side of the gate at a point **104** such that when the gate is dislodged, cable portion **34'** pulls the bottom of net **30** out of its container. Here it can be seen that the upper leading cable portion **34** is carried above gate **22**, whereas the aft upper portion **40** is also carried above the walls **14** and **16** as indicated.

Referring to FIG. **6**, with gates **92** open, a vehicle may proceed through the gate structure, with cable portions **34** and **40** being above any vehicle which is moving down the driveway, whereas cable portions **34'** and **40'** are located in channels **100** and **100'** respectively which are embedded in driveway **20**. In this illustration, net **30** is shown in a folded position to the left of the driveway.

It will be appreciated that gate portions **92** need not be of a very heavy nature so that they can be closed quickly and locked via latch **94**, assuming enough advanced warning for an approaching vehicle. It is the purpose of the subject net-catching structure and momentum change capstan that any gate structure may be made so light that it can be closed extremely rapidly as opposed to the heavy gate structures which were thought to be necessary. The heavy gate structures were necessitated, it was thought, because of the mass of vehicles involved which would seek to penetrate the gate structure.

Referring now to FIG. **7** the capstan **50** may as usual include a thimble like shape with the aforementioned top **52** and a smooth inner surface **54** about which the aforementioned cables may pass. The capstan in this Figure is shown to have a base portion **106** and includes in this embodiment ring **51** as a collar generally illustrated by reference character **110** which surrounds surface **54** and contains two eyelets **112** and **114** to which pulleys **116** and **118** are attached. Through these pulleys pass cables **34**, **34'** and **40**, **40'**, with the pulleys serving to provide for movement of the cables back and forth around the pulleys to adjust changes in the length of the upper and lower cable portions between the top and bottom of the net, whereas collar **110** serves the purpose of retaining the cables about the capstan since collar **110** cannot slip off past capstan head **52**.

Referring to FIG. **8** collar **110** may be of a jointed configuration as illustrated by bolt and pivot point **120**, with the collar being clamped at its ends **122** and **124** with suitable bolting means around the capstan. Here eyelets **112** and **114** may be of such rigid structure and of such smoothness that the cables may pass through eyelets **112** and **114** without the aid of pulleys **116** and **118** of FIG. **7**.

It will be appreciated that the purpose of collar **110** is to prevent cables from slipping out over the top of capstan during a high impact collision, with the collar being sufficiently strong to prevent the cables from breaking away from the capstan.

Referring now to FIG. **9** in one embodiment, the gate structure **22** may take on a flexible parallelogram con-

figuration with vertically rising members **130** hingedly attached at points **132** and **134** to respective interconnect members **136** and **138**. The outer portion of gate **140** is hingedly attached to an upright stancion **141** at points **144** and to an inner upstanding member **148**, again at points **144**.

Here the two sides of the gate are joined together by a hook **150** engaging an eyelet **152** with the hook being secured to upstanding member **148** and with the corresponding eyelet being rigidly attached to upstanding member **154** of the opposing gate structure, such that when the gates are lowered, the hook and eyes are engaged thereby to prevent the opening of the gate. They are also of sufficient numbers so as to prevent an impacting vehicle from bursting the gate structure and thereby avoiding the net. The hook and eye structure is illustrated in FIG. **10** in which hook **150** is illustrated as having an inwardly turned end **151** within eyelet **152**, portions of the upstanding members **148** and **154** being as illustrated.

Referring now to FIG. **11**, gate portions **160** and **162** are shown in their uplifted position, in which the gates with their upstanding members **130** and their now angled interconnect members **136** and **138** occupying the position shown to permit passage of vehicular traffic through the gateway. It will be noted that members **136** and **138** are pivoted at points **144** on their respective stancions **141**, with hooks **150** downwardly projecting as illustrated so as to be able to communicate with corresponding eyelets **152** in gate **162**.

Referring now to FIG. **12**, for sliding gates, the cables are contained in upper and lower channels and do not move relative to each other during the sliding of the gates. Here gate **22** may be of a sliding structure such as illustrated at **170**, in which the sliding gate is translatable as indicated by double ended arrow **172**, with the gate being supported from the top via channel **174** on which roller assemblies **176** roll on a flange **178** thereof. The gate is which that upon impact from the direction of arrow **180**, the gate carries in the direction of arrow **180** such that the rollers and the cables come out of channel **174** which is opened rearwardly. This carries the upper cable portions **34** and **40** in the direction of arrow **182**, it being understood that cable portion **40** is coupled to the gate structure **170** via a fixed link **184** which has at its other end an eyelet **186** which surrounds a round bar **188** on gate structure **170**, such that the gate may move in the direction of double ended arrow **172**, with bar **188** moving in the direction of double ended arrow **190** without moving cable portion **34** or **40**.

This is likewise the case for the bottom of gate **170** which has a bar **192**, with links **194** and **196** surrounding cable **34'** and bar **192** simultaneously. Link **196** is joined to bar **192** at point **200**, whereas link **194** is joined to cable **34'** at point **202**. It will be appreciated that cable portions **34'** and **40'** are carried in channels **204** and **206** which are within driveway **20**.

Upon impact of a vehicle in the direction of arrow **180**, the cables jump out of their respective channels along with gate **170** so as to carry the appropriate cables and the net with the gate.

This provides for a slideable gate assembly, in which the gate may be slid backwards and forwards without moving the respective cables but, which carries the cables with it when the gate is forced rearwardly by virtue of impact with a vehicle, thereby to pull the net previously described out of its container.

Having above indicated a preferred embodiment of the present invention, it will occur to those skilled in the art that modifications and alternatives can be practiced within the spirit of the invention. It is accordingly intended to define the scope of the invention only as indicated in the following claims.

I claim:

1. Apparatus for arresting vehicles progressing down a driveway through a gateway across said driveway, comprising:

at least two cables;

a net adapted to entrap a vehicle passing through said gateway from one side thereof, said net having corners, with predetermined pairs of corners joined together with one of said cables;

a capstan offset to one side of said driveway, the cables joining predetermined corners of the net being connected to the capstan;

means for deploying said net around a vehicle as said vehicle enters said gateway, with said capstan and said cables swinging said vehicle in a substantially circular path away from its original direction along said driveway; and,

barrier means positioned to one side of said driveway in said substantially circular path, whereby the netted vehicle is caused to crash against said barrier means.

2. The apparatus of claim **1** wherein said net deployment means includes net storage means and a break-away gate means originally disposed across said gateway, said gate means having at least a portion thereof attached a portion of the cables attached to said net, such that upon impact of a vehicle with said break-away gate means, said net is carried around said vehicle, having been pulled out of said net storage means by virtue of the movement of said break-away gate means.

3. The apparatus of claim **2** wherein said storage means includes container means to one side of said driveway for containing said net in a collapsed condition, whereby said net is pulled out of said container means upon impact of said vehicle with said break-away gate means.

4. The apparatus of claim **2** wherein said barrier means includes a reinforced mound of earth.

5. The apparatus of claim **2** wherein said gate means includes a slideable gate.

6. The apparatus of claim **2** wherein said gate means includes a swingable gate.

7. The apparatus of claim **2** wherein said gate means includes two swingable portions joined at the center thereof.

8. The apparatus of claim **2** wherein said gate means includes moveable parallelograms of light-weight structure.

9. The apparatus of claim **1** wherein said capstan includes collar means and means for joining said cables to said collar means, whereby said cables do not slip off of said capstan upon impact of said vehicle.

10. The apparatus of claim **1** wherein said barrier means is positioned such that an impacting vehicle, upon impact, blocks said driveway.

11. The apparatus of claim **1** wherein said cables are fixed to said capstan to cause a change in length of said cables during vehicular travel as said cables wrap around said capstan.

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