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MECHANICAL DEVICE

Filed Aug. 6, 1962

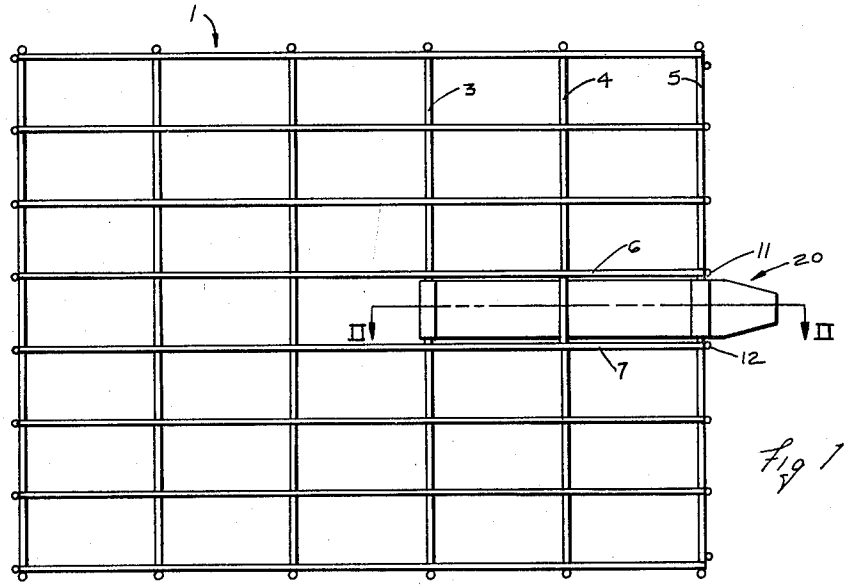


Fig 1

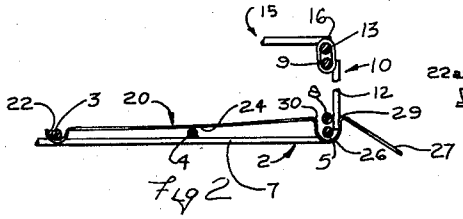


Fig 2

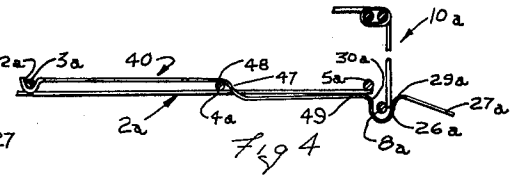


Fig 4

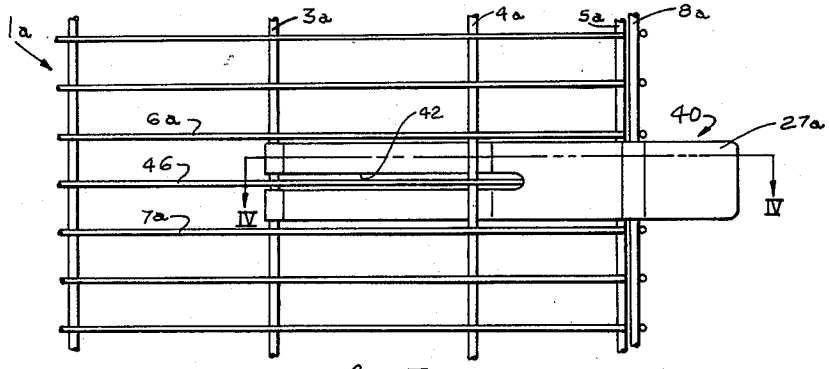


Fig 3

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MECHANICAL DEVICE

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This invention relates to a latch for a mesh-type cage and particularly to a latch for a mesh-type animal cage.

Previous latches of acceptable reliability have usually been relatively expensive to manufacture and install, thus adding significantly to the cost of the cage. In some cases the latch assembly has consisted of several different parts thus adding to the complexity of the cage and the cost of its manufacture. It has been common practice to attach such latches by bolting or welding. The former method may require recurrent maintenance to keep the latch tightly fixed to the cage while in use and the latter method of attachment, should it break down, requires special tools for repair which are not usually available to the user. Such multipart latches often cannot be easily opened and/or positively latched with only one hand which makes operation difficult when the other hand of the user is transferring objects or animals into or out of the cage.

Accordingly, the objects of the invention include:

(1) To provide a latch which is of one-piece construction and which is relatively simple and less expensive to manufacture than existing latches.

(2) To provide a latch which is easily manufactured in different sizes for cages of different mesh sizes wherein each size latch is capable of use with meshes of several different sizes.

(3) To provide a latch which requires no tools, additional parts, excessive effort or special skills to attach it quickly and positively to the cage and which can be easily removed from the cage if desired by reversing a simple installation procedure.

(4) To provide a latch which is easily attached to existing cages as a replacement for a defective latch of a different type.

(5) To provide a latch whereby a cage door can be easily opened or closed and latched positively with one hand and whereby the closing of the cage door will automatically and positively latch same.

(6) To provide a latch which cannot be opened or rendered ineffective by small mammals or lower animal forms.

(7) To provide a latch which is comparatively free of protrusions which might injure an animal either inside the cage or being transferred into or out of said cage or which might harm a person working with said cage and animal.

Other objects of this invention will become apparent to persons familiar with this type of equipment upon reading the following specification and examining the accompanying drawings in which:

FIGURE 1 is an end elevational view of an open mesh cage equipped with a latch embodying the invention.

FIGURE 2 is a section taken along the line II—II of FIGURE 1.

FIGURE 3 is a partial end view of an open mesh cage equipped with a modification of the invention.

FIGURE 4 is a section taken along the line IV—IV of FIGURE 3.

General Description

The objects and purposes of this invention, including those set forth above, have been met by a latch construction consisting of a single strip of resilient material which during manufacturing is permanently bent at appropriate locations along its length. Said latch is installed

on the cage by weaving it through the mesh of said cage and is held fixedly in its location by the force of its resilience bearing on the cage mesh. Said resilient force is also used to positively latch the cage door and must be overcome to open said door.

Detailed Description

Referring now to FIGURE 1, the embodiment of the invention herein selected for primary consideration is attached to an open mesh cage **1**, the mesh of which may be of any suitable construction, here shown as welded. The cage end **2** shown consists of a series of spaced, generally parallel, vertical elongated members hereinafter referred to as wires of which three are shown at **3**, **4** and **5** attached to, in the aforementioned manner, a series of spaced, generally parallel, horizontal wires of which two are shown at **6** and **7**. The cage door **10**, which in this embodiment is also of mesh construction, similarly consists of a series of spaced, substantially parallel, vertical wires of which two are shown at **8** and **9** (FIGURE 2) attached in the aforementioned manner to a series of spaced, substantially parallel, horizontal wires of which two are shown at **11** and **12**. The door **10** is in this embodiment supported so that the common plane through the vertical cage door wires **8** and **9** at least substantially coincides with the common plane through the vertical wires **5** and **13** of the cage ends **2** and **15**, respectively. The cage door **10** is hingedly connected to the cage end **15** by any suitable means here shown as straps, such as strap **16** fixedly connected to the wire **13** and rotatably supporting wire **9** of the cage door **10**.

The latch **20** consists of an elongated sheet of resilient material which may be of sheet steel somewhat longer than the distance between the vertical wires **3** and **5** and somewhat narrower than the distance between the horizontal wires **6** and **7**. The latch as shown in FIGURES 1 and 2 has a hemicircular bend **22** at its leftward end, the inner radius of which is not less than equal to and is preferably slightly larger than, the radius of the vertical wire **3**.

The midportion of the latch **20** may be bent on a large radius if required so that when the latch strip is properly installed an area **24** on the outer side of said midportion of the resilient latch strip **20** bears forcibly on the inner side of the vertical wire **4**.

Near the rightward end of the latch strip a U-shaped bend **26** is shown which is preferably of equal or slightly larger radius than and is deeper than bend **22** and which faces the same direction as does the bend **22**. The depth of the U-shaped bend **26** is sufficient to accommodate both vertical wires **5** and **8**. The tips of the U-shaped bend **26** join the left and right sides of the latch strip at the bends **30** and **29**, respectively.

The rightward end of the latch strip **20** is here shown as a nose **27** and is preferably bent along the width of the strip at any convenient angle to the longitudinal axis of the strip away from the cage interior.

Operation

The latch **20** may be installed on the cage **1** in the position shown in FIGURES 1 and 2 by first orienting said latch outside the cage **1** such that its longitudinal axis is horizontal and parallel to the plane of the cage end **2** with the bend **22** to the left and the inner radius of said bend facing said cage end. The leftward end of the latch strip is first inserted between the vertical wires indicated at **4** and **5** and a pair of horizonatl wires herein indicated at **6** and **7**. The leftward end of the latch strip **20** is then moved to the left past wire **4** and then further left and outwardly from the cage interior until the inner surface of the bend **22** engages the outer surface of the wire **3**. At this point the inner surface of the bend **26** has automati-

cally engaged the outer surface of the wire 5 and the latch is installed.

Said latch strip may also be installed, given the same pre-installation orientation as above mentioned by inserting the nose 27 between the vertical wires 3 and 4 and the horizontal wires 6 and 7 and moving said nose first rightwardly past the wire 4 and then further rightwardly and outwardly until the inside of the bend 26 engages the outside of the wire 5. At this point the inner surface of the bend 22 engages the outer surface of the wire 3 and the latch is installed.

The installed latch strip 20 is limited in its vertical movement by the horizontal wires 6 and 7 and its rightward-leftward and inward-outward movement as a whole by the configuration of the bends 22 and 26 and the compressive forces between said bends and the vertical wires 3 and 5, respectively, established by the stressed installation of the resilient latch strip 20.

Removal of the latch, should it be desired, can be accomplished by first disengaging the bends 22 and 26 from the wires 3 and 5, respectively, and then reversing either of the above-mentioned installation procedures. Said latch is preferably installed near the midpoint in height of the cage and opposite the cage end whereon the door is hinged, as shown in FIGURES 1 and 2, but said latch may be installed at another point in height on said cage end or on the top or bottom of said cage if more convenient. Such placement will not impair the effectiveness of said latch and may be desired for certain special uses.

Assuming the cage door 10 to be closed and latched, said door may be opened by moving the nose 27 away from the center of the door (toward the viewer in FIGURE 1) until the bend 29 is beyond the door at which time the door is free to swing open. Assuming the cage door 10 to be open, said door may be closed and latched simply by swinging the door toward the closed position during which operation the door wire 8 rides on the nose 27 causing said nose to move resiliently away from said door. As said door rides past the bend 29 the rightward end of said latch is forced toward the center of the door by its resiliency and position of installation to the point where the inner surface of the bend 26 contacts the outer surface of the wire 5. The door is now restricted from inward or outward movement by the latch strip surfaces joining the bend 26 to the bends 30 and 29, respectively.

Modification

The above latch strip is easily made in a modified form to work effectively on mesh-type cages which differ structurally from the cage described in connection with the above latch strip. FIGURES 3 and 4 show installed a latch strip adapted to use with mesh-type cages wherein the mesh opening is smaller and the wire diameter may be smaller. The modified latch strip 40 may be of lighter gauge resilient material and will not distort lighter cage wire because the latch strip 40 bears against wire lengths forming a common side of two adjacent mesh openings thus, in effect, distributing the bearing force over twice the wire length and latch width than would be the case were an unmodified latch used with this small mesh cage.

The latch strip 40 is also modified to work with a cage door 10*a* which is hinged outside the cage door opening and which also overhangs the cage end opposite the end of which the door is hinged.

The modified latch strip is otherwise and with few exceptions similar to the principal embodiment in configuration and installation and is identical thereto in operation. Therefore, the foregoing description of the embodiment of FIGURES 1 and 2 will, with the addition of the suffix "*a*" to the identifying numbers, suffice to describe the embodiment of FIGURES 3 and 4 excepting as indicated otherwise hereinafter.

An elongated notch 42 preferably slightly wider than the diameter of the wire 46 is placed along the central longitudinal axis of latch strip 40. Said notch is open

at and extends from the leftward end of the latch strip to the right a distance preferably somewhat greater than the spacing of the wires 3*a* and 4*a*.

The midportion of the latch 40 is preferably bent in a shallow approximately Z shaped manner as shown at 47 such that the upper break 48 of the Z bend is at a distance from the bend 22*a* equivalent to the spacing between wires 3*a* and 4*a*.

Operation of FIGURE 3 Form

The latch 40 is preferably installed on the cage 1*a* in the position shown in FIGURES 3 and 4 by first orienting said latch outside the cage 1*a* so that its longitudinal axis is horizontal and parallel to the plane of the cage end 2*a* with the bend 22*a* to the left and the inner radius of said bend facing midcage end. The leftward end of the latch strip 40 is first inserted between the vertical wires indicated at 4*a* and 5*a* and a pair of horizontal wires herein indicated at 6*a* and 7*a* so that the notch 42 essentially surrounds the horizontal wire 46. The leftward end of the latch strip 40 is then moved to the left past wire 4*a* and then further left and outwardly from the cage interior until the inner surface of the bend 22*a* engages the outer surface of the wire 3*a*. At this point the inner surface 49 of the latch strip 40 slightly to the left of the bend 26*a* has automatically engaged the outer surface of the wire 46 at the wire 5*a* and the latch is installed. Removal of the latch, should it be desired, can be accomplished by first disengaging the bends 22*a* and 26*a* from the wires 3*a* and 5*a*, respectively, and then reversing the above-mentioned installation procedure.

Assuming the cage door 10*a* to be closed and latched, said door may be opened by moving the nose 27*a* away from the center of the door (toward the viewer in FIGURE 3) until the bend 29*a* is beyond the door at which time the door is free to swing open. Assuming the cage door 10*a* to be open, said door may be closed and latched simply by swinging the door toward the closed position during which operation the door wire 8*a* rides on the nose 27*a* causing said nose to move resiliently away from said door. As said door rides past the bend 29*a* the rightward end of said latch is forced toward the center of the door by its resiliency and position of installation and to the point where the inner surface of the bend 26*a* contacts the outer surface of the wire 5*a*. The door 10*a* is in this position restricted from further inward movement by the latch strip surface joining the bend 26*a* to the bend 30*a* and by the overhang of said door. Said door is restricted from outward movement by the latch strip surface joining the bend 26*a* to the bend 29*a*.

Although a particular preferred embodiment of the invention has been disclosed above for illustrative purposes, it will be recognized that variations or modifications of such disclosure, which come within the scope of the appended claims, are fully contemplated.

What is claimed is:

1. In a mesh-type enclosure, such as an animal cage, having a swinging door and at least three spaced, parallel, elongated members of which one is adjacent and parallel to the swinging edge of said door, the improvement in a latch construction for said enclosure which comprises:

a latch member comprising an elongated strip of resilient material having a generally concave portion adjacent one end thereof and a second generally concave portion adjacent the other end thereof, said first and second concave portions projecting transversely in the same direction from the remainder of said strip, said first concave portion closely embracing a first side of one of said elongated members, the second concave portion being embraced around the same side of that one of said elongated members adjacent the swinging edge of said door and a portion intermediate said concave portions passing around and lying snugly against an opposite side of the intermediate one of said elongated members, said second

concave portion being deeper than said elongated member adjacent said door and being adapted to receive said edge of said door thereinto.

2. In a mesh-type enclosure, such as an animal cage, having a swinging door and at least three spaced, parallel, generally coplanar elongated members of which one is adjacent and parallel to the swinging edge of said door, the improvement in a latch construction for said enclosure which comprises

a latch member comprising an elongated strip of resilient material having a generally U-shaped portion adjacent one end thereof and a second generally U-shaped portion adjacent the other end thereof, said first and second U-shaped portions projecting transversely in the same direction from the remainder of said strip, said first U-shaped portion being hooked around the outside of one of said elongated members, the second U-shaped portion being hooked around the outside of that one of said elongated members adjacent the swinging edge of said door and a portion intermediate said U-shaped portions passing around and lying snugly against the inside of the intermediate one of said elongated members, the second U-shaped portion being of sufficient depth that the arms of the U extend inwardly beyond said elongated member adjacent said door for embracing the swinging edge of said door.

3. In an enclosure of generally mesh-type construction, having a swinging door whose swinging edge is adjacent a corner of said enclosure, and said enclosure including serially arranged first, second and third parallel elongated members wherein said third member defines a corner of said enclosure and further including first, second and third cross members positioned transversely to said first, second and third parallel members, the improvement in latch construction therefor comprising:

a strip of elongated resilient material of length exceeding the distance between said first and said third parallel members and of width greater than the distance between any two adjacent ones of said cross members but less than the distance between said first and third cross members, a slot in said resilient member parallel with the lengthwise extent thereof and of length greater than the distance between said first and second parallel members but less than the distance between said first and third parallel members, the end of said resilient member divided by said slot being arranged and positioned to embrace the outer side of said first parallel member, a mid-portion of said resilient member extending past and in contact with said second parallel member with said slot embracing an intermediate one of said cross members, and the portion of said resilient member near the end thereof opposite said slotted end lying outside of and engageable with said corner of the cage defined by the third parallel member and a U-shaped portion nearer to but spaced from the said last-named end of said resilient member arranged to receive and embrace the swinging edge of said door.

4. The device defined in claim 1 wherein the extremity of said resilient member adjacent the second U-shaped portion is bent in a direction away from the hinge portion of said door to provide a ramp for leading the swinging edge of said door into said second U-shaped portion.

5. In a cage having a sidewall comprising at least three spaced, parallel, elongated members, one of which forms an end edge of said sidewall, and a swinging door having a free end movable toward and away from a position adjacent said one elongated member, the improvement in a latch structure for the cage which comprises:

a one-piece, elongated latch strip of resilient material, said strip having a concave portion at one end partially closely embracing one side of the elongated member farthest away from said one member, said strip extending therefrom toward said one member with an intermediate portion thereof contacting the opposite side of the intermediate member, said strip having a second concave portion arched in the same direction as said first concave portion and disposed adjacent said one member, the free edge of said door being receivable into the concavity of said second concave portion, and a nose portion extending from the end of said second concave portion remote from the remainder of the strip, said nose portion defining an acute angle with the adjacent part of said second concave portion.

6. A latch construction for releasably holding a door in place at one end of a mesh-type cage, comprising:

a one-piece, elongated strip of resilient material having two parallel concave portions extending crosswise of the strip adjacent the opposite ends thereof with their concavities facing in the same direction and a nose extending from the end of one of said concave portions.

7. A latch construction for mounting on the sidewall of a mesh-type cage and adapted for releasably holding a cage door in position, comprising:

an elongated strip of resilient material having a first U-shaped section adjacent one end of the strip, said first section extending crosswise of the strip and being bent in one direction out of the plane of the portion of the strip adjacent thereto and being curved through an angle of at least about 180 degrees, said strip having at the other end thereof a second U-shaped section which is parallel with said first section and which is bent in said one direction out of the plane of the portion of the strip adjacent thereto so that both sections project in the same direction from said strip, said second U-shaped section being of greater depth than said first section, and a nose extending from the end of said second section remote from the remainder of the strip and defining an acute angle with the adjacent part of said second U-shaped section.

8. A cage construction, comprising:

a cage having a pair of spaced apart sidewalls formed of criss-crossing wire members;

a door hingedly mounted on the end of one of said sidewalls and having a free end swingable toward and away from the end of the other sidewall;

a one-piece, elongated, latch strip mounted on said other sidewall, said strip having a U-shaped portion at its inner end which opens toward said other sidewall from outside the cage and which snugly embraces one of the wire members thereof, the intermediate portion of said strip being received within the cage and contacting another of said wire members from inside the cage, said strip having another U-shaped portion adjacent its outer end which opens toward said other sidewall from outside the cage, the free end of said door being receivable into said another U-shaped portion, said strip having a nose at its outer end which extends from said another U-shaped portion away from said cage and which is inclined away from both said sidewalls.

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