Aug. 6, 1968 H. HICKMAN 3,395,555

MAGNETIC PADLOCK

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FIG. 1

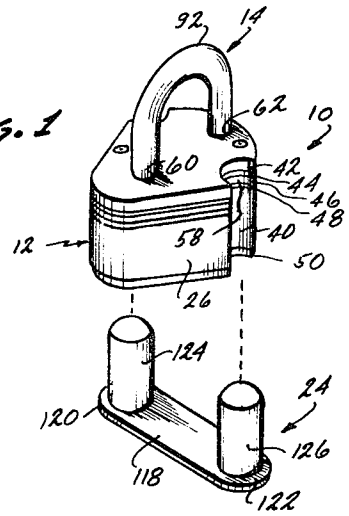


FIG. 3

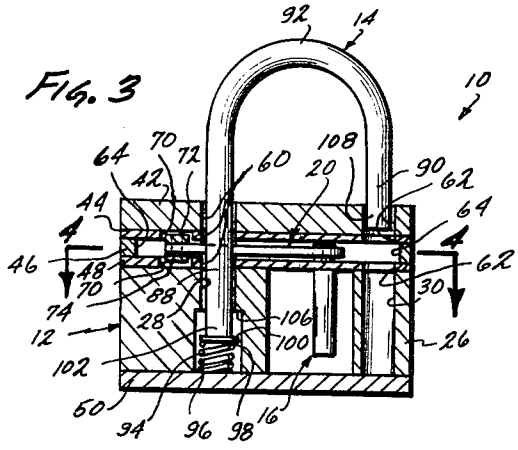


FIG. 4

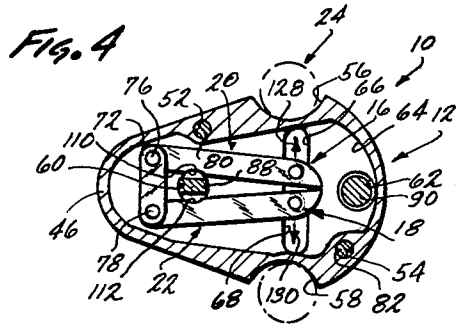
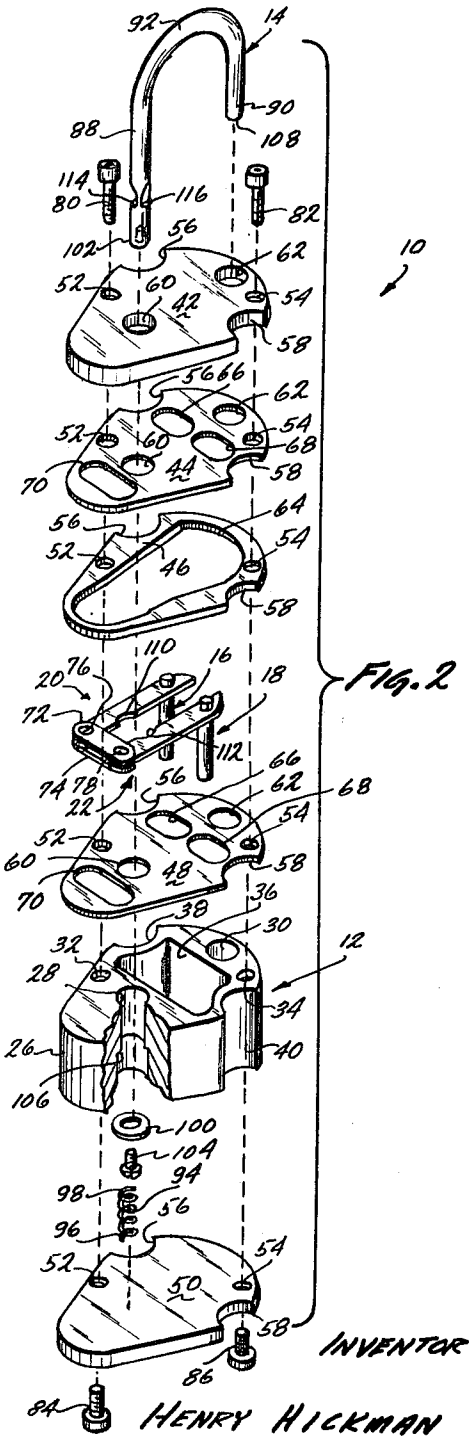


FIG. 2



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MAGNETIC PADLOCK

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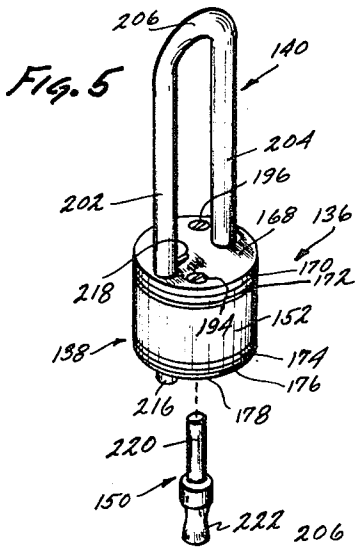


FIG. 5

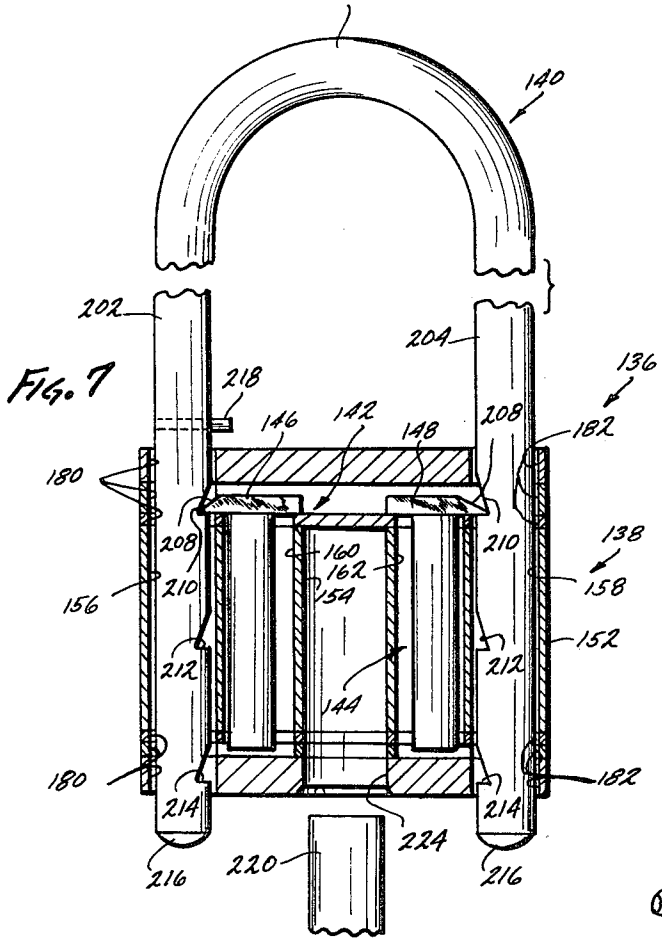


FIG. 7

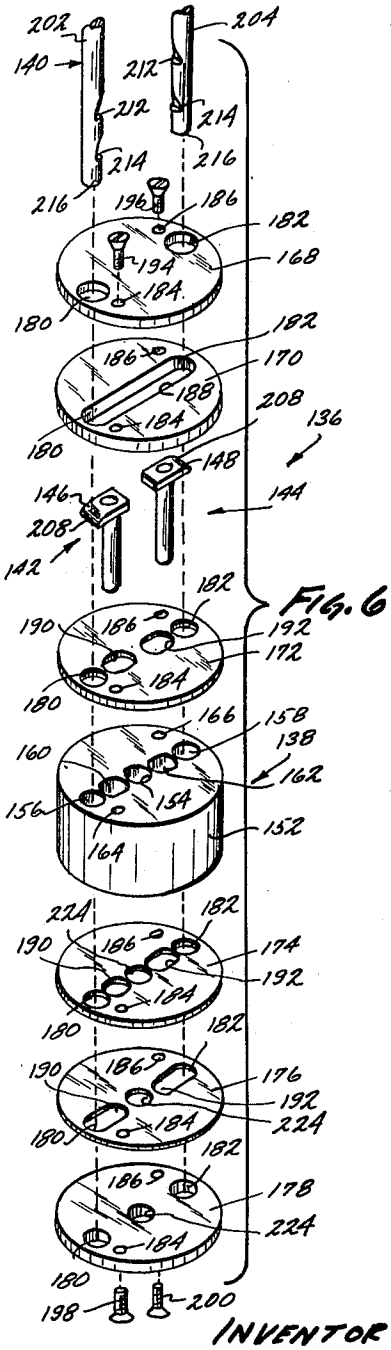


FIG. 6

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MAGNETIC PADLOCK

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7 Claims. (Cl. 70—39)

ABSTRACT OF THE DISCLOSURE

A magnetic padlock has a non-magnetic body provided with a first pair of bores reciprocally receiving the arms of the hasp and a second pair of bores receiving cylindrical magnets which are laterally shiftable therein. The magnets carry engaging means for engaging the hasp to keep it in a locked position. The magnetic properties of the magnets normally maintain them shifted in their bores to a hasp-locking position. A magnetic key shifts the magnets laterally to an unlocked position.

BACKGROUND OF THE INVENTION

The background of the invention will be set forth in two parts.

Field of the invention

The present invention relates generally to the field of magnetic locks and more particularly to a new and useful magnetic padlock having a non-magnetic body in which permanent magnets are mounted in such a manner that the magnetic properties of the magnets will normally shift them laterally into locking engagement with a hasp.

Description of the prior art

Such United States patents as Patent Nos. 428,247; 468,807; 1,686,202; 2,384,208 and 2,966,789 show that it is broadly old to provide magnetic locks. Patent Nos. 468,807 and 2,384,208 also show that it is broadly old to provide magnetic padlocks.

The padlocks disclosed in the patents have the disadvantage that they are comparatively expensive to manufacture because of the number of moving parts employed therein.

SUMMARY OF THE INVENTION

In view of the foregoing factors and conditions characteristic of magnetic padlocks, it is a primary object of the present invention to provide a new and useful magnetic padlock not subject to the disadvantages enumerated above and having a minimum number of moving parts.

Another object of the present invention is to provide a new and useful padlock having a non-magnetic body portion in which permanent magnets are mounted for moving laterally into locked engagement with a padlock hasp by magnetic attraction.

According to the present invention, a magnetic padlock is provided which includes a non-magnetic body portion having a plurality of cylindrical bores provided therein. A U-shaped hasp is operatively associated with the body portion and includes a pair of arms reciprocally mounted in a first pair of bores.

At least one of the arms on the hasp has a first position where it is seated in an associated bore and a second position where it is removed from the bore for engaging an article to be locked by the padlock. A pair of permanent magnets are mounted in a second pair of bores which have a diameter exceeding the diameter of the magnets sufficiently that the magnets are free to shift laterally in their associated bores. In a first embodiment of the present invention, the magnets are arranged within their associated bores in such a manner that natural attraction

of the magnets for each other shifts them laterally into locked engagement with the hasp. In a second embodiment, natural attraction of the magnets for the hasp shifts the magnets into locked engagement with the hasp.

In both embodiments of the present invention, means is carried by the magnets for engaging the hasp to prevent its releasable arm from being moved to an unlocked position. A magnetic key is provided for each embodiment which draws the magnets out of locked engagement with the hasp when the key is positioned on the body portion in a predetermined manner.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of use, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings in which like reference characters refer to like elements in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of a magnetic padlock constituting a first embodiment of the present invention;

FIGURE 2 is an enlarged, exploded perspective view of the padlock of FIGURE 1;

FIGURE 3 is an enlarged, vertical cross-sectional view of the padlock of FIGURE 1;

FIGURE 4 is a cross-sectional view taken along line 4—4 of FIGURE 3;

FIGURE 5 is a perspective view of a magnetic padlock constituting a second embodiment of the present invention;

FIGURE 6 is an enlarged, exploded perspective view of the padlock of FIGURE 5; and

FIGURE 7 is an enlarged, vertical cross-sectional view of the padlock of FIGURE 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring again to the drawings and more particularly to FIGURES 1–4, a magnetic padlock constituting a first embodiment of the present invention, generally designated **10**, includes a non-magnetic body portion **12**, a U-shaped hasp **14**, a pair of permanent magnets **16**, **18**, hasp-engaging means **20**, **22** and a magnetic key **24**.

The non-magnetic body **12** includes a main body portion **26** provided with a pair of cylindrical, hasp-engaging bores **28**, **30**, a pair of screw-receiving bores **32**, **34**, a magnet-receiving chamber **36** and a pair of key-receiving recesses **38**, **40**.

The body **12** also includes first, second, third, fourth and fifth plates **42**, **44**, **46**, **48** and **50**, respectively, each having screw-receiving apertures **52**, **54** and key-receiving recesses **56**, **58** provided therein for forming continuations of the bores **32**, **34** and the recesses **38**, **40**, respectively. The plates **42**, **44** and **48** are also provided with apertures **60**, **62** forming continuations of the hasp-receiving bores **28**, **30**, respectively; the plate **46** is provided with an elongated opening **64** accommodating the hasp **14**, the magnets **16**, **18** and the engaging means **20**, **22**; the plates **44**, **48** are provided with a pair of elongated apertures **66**, **68** cooperating with chamber **36** to form cylindrical bores having larger diameters than associated magnets **16**, **18** permitting lateral shifting of magnets **16**, **18** within body **12** and the plates **44**, **48** are provided with elongated openings **70** accommodating a pair of links **72**, **74** pivotally connecting the engaging means **20**, **22** together by associated pins **76**, **78**, respectively. Plates **42**, **44**, **46**, **48** and **50** and main body portion **26** are connected together by a pair of internally threaded pins **80**, **82** and associated screws **84**, **86**, respectively.

The hasp **14** includes a long leg **88**, a short leg **90**, and a bight portion **92**. The long leg **88** is reciprocally mounted in a cylindrical bore formed by the apertures **60** and the cylindrical bore **28** and is biased to an upward position therein by a compression spring **94** having one end **96** bearing against plate **50** and another end **98** bearing against a washer **100** fixed to the lower end **102** of leg **88** by a screw **104**. The washer **100** also prevents withdrawal of leg **88** from body **12** by engaging a shoulder **106** formed in a body **12** by counterboring bore **28**. The short leg **90** is reciprocally mounted in a cylindrical bore formed by the aperture **62** and the bore **30** and includes a lower end **108** which is elevated above body portion **12** by spring **94** for engaging an article to be locked by padlock **10** when key **24** is used in a manner to be hereinafter described.

The magnets **16**, **18** are laterally shiftably mounted in the cylindrical bores formed by associated elongated apertures **66**, **68** and chamber **36** and have their poles arranged in such a manner that magnets **16**, **18** will be attracted to each other for bringing an arcuate recess **110**, on engaging means **20**, and an arcuate recess **112**, on the engaging means **22**, into engagement with shoulders **114**, **116**, respectively, provided on long leg **88** for maintaining hasp **14** in a lowered, padlock-locking position.

The key **24** includes a grip portion **118** having a first end **120** and a second end **122** carrying cylindrical magnets **124**, **126** respectively. The magnet **124** is adapted to to be engaged in the space formed by recesses **56** and **38**; and the magnet **126** is adapted to be placed in the space formed by the recesses **58** and **40** for shifting magnets **16**, **18** laterally in the direction of arrows **128**, **130**, respectively (FIGURE 4) by attracting the magnet **16** to the magnet **124** and the magnet **18** to the magnet **126** for bringing associated engaging means **20**, **22** out of engagement with associated shoulders **116**, **116**. Since compression spring **94** is pushing the shoulders **114**, **116** against associated engaging means **20**, **22** with some force, the magnetic attraction between magnets **124**, **16** and **126**, **18** may not be sufficient to move magnets **16**, **18** laterally. In this event, hasp **14** may be pressed downwardly camming engaging means **20**, **22** outwardly by cam surfaces **128**, **130** provided on leg **88** above associated shoulders **114**, **116**, respectively.

In use, the padlock **10** may be unlocked from the condition shown in FIGURES 1 and 2 by engaging magnet **124** in recesses **38** and **56** while magnet **126** is engaged in recesses **40** and **58**. The magnet **124** attracts magnet **16** shifting it laterally in the direction of arrow **128** freeing engaging means **20** from shoulder **114** and the magnet **126** attracts magnet **18** shifting it laterally in the direction of arrow **130** freeing engaging means **22** from engagement with shoulder **116**.

Spring **94** then moves hasp **14** upwardly until lower end **108** is elevated above plate **42** so that hasp **14** may be swung on leg **88** bringing end **108** away from body **12** for engagement with an article to be locked by padlock **10**. After this engagement, body **12** may be swung on leg **88** until leg **90** is aligned with aperture **62** in plate **42** so that hasp **14** may be depressed until shoulders **114**, **116** are below engaging means **20**, **22**. Assuming that key **24** has been removed from body **12**, the magnetic attraction between magnets **16** and **18** will move them laterally within their associated cylindrical bores formed by chamber **36** and associated elongated apertures **66**, **68** until arcuate recesses **110**, **112** encompass leg **88** above shoulders **114**, **116**.

Referring now to FIGURES 5–7, a magnetic padlock constituting a second embodiment of the present invention, generally designated **136**, includes a non-magnetic body portion **138**, a magnetizable, U-shaped hasp **140**, a pair of magnets **142**, **144**, a pair of engaging means **146**, **148**, carried by by the magnets **142**, **144**, respectively, and a magnetic key **150**.

The body **138** includes a main body portion **152** which

is provided with a central, key-receiving, cylindrical bore **154**; a pair of hasp-receiving, cylindrical bores **156**, **158**; a pair of elongated, cylindrical magnet-receiving bores **160**, **162** and a pair of cylindrical, pin-receiving bores **164**, **166**.

The body **138** also includes first, second, third, fourth, fifth and sixth plates **168**, **170**, **172**, **174**, **176** and **178**, respectively, all of which are provided with hasp-receiving apertures **180**, **182** and pin-receiving apertures **184**, **186**, forming continuations of the bores **156**, **158** and **164**, **166**, respectively, in main body portion **152**. The plate **170** is also provided with an elongated slot **188** which communicates with the apertures **180**, **182** for accommodating the engaging means **146** and **148**. The plates **172**, **174** and **176** are also provided with the elongated openings **190**, **192** forming continuations of the bores **160**, **162**, respectively.

The several parts of the body **138** are maintained in assembled relation by a pair of internally threaded pins **194**, **196** and associated screws **198**, **200**, respectively, which engage the cylindrical bores **184**, **164**, and **182**, **166**, respectively.

The hasp **140** includes a pair of legs **202**, **204** connected together by a bight portion **206** and may be connected to the body **136** by engaging the leg **202** in the bore formed by bore **156** and aperture **180** and by engaging the leg **204** in the bore formed by the bore **158** and the aperture **182** and is maintained in locked engagement therewith by the engaging means **146**, **148** each having a wedge-shaped end **208** engaged in one of a plurality of notches **210**, **212** and **214** provided in associated legs **202** and **204**. The legs **202** and **204** each include a free end **216** which is prevented from extending beyond plate **178** more than a predetermined amount by a suitable fixed pin **218** carried by the leg **202** and engageable with the plate **168**.

The magnets **142**, **144** are laterally shiftably mounted in associated bores formed by the bores **160**, **162** and apertures **190**, **192**, respectively, with engaging means **146**, **148** slidably mounted in opening **188**.

The magnetic key **150** includes a permanent magnet **220** which is affixed to a handle **222** and which is insertable through an aperture **224** provided in each of the plates **174**, **176** and **178** into cylindrical bore **154** between magnets **142** and **144** for attracting them and shifting them laterally within their associated bores **160–190** and **162–192** so that associated engaging means **146**, **148** will move out of engagement with hasp **140**. Since the hasp **140** is made out of a magnetic material, magnet **220** will be oscillated between end **216** of legs **202** and **204** when an attempt is made to insert magnet **220** into aperture **224** if end **216** extends substantially beyond plate **178**. Thus, the stop pin **218** is used to prevent undue extension of end **216**.

In use, the hasp **140** may be inserted into body **138** and will become automatically locked into position therein by the magnetic attraction of magnets **142** and **144** to associated magnetic legs **202** and **204** shifting magnets **142**, **144** laterally so that engaging means **146**, **148** will engage associated legs **202**, **204**, respectively. The padlock **136** may be unlocked by inserting magnetic key **150** into bore **154** attracting magnets **142**, **144** so that they move laterally bringing engaging means **146**, **148** out of engagement with associated legs **202**, **204**.

While the particular magnetic padlocks herein shown and described in detail are fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that they are merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

What is claimed is:

1. A magnetic padlock, comprising:

a non-magnetic body portion having a plurality of substantially cylindrical bores provided therein;

a hasp operatively associated with said body portion, said hasp including a pair of arms reciprocally mounted in a first pair of said bores, at least one of said arms having a first position where it is seated in an associated bore and a second position where it is removed from said bore for engaging an article to be locked by said padlock;

a pair of padlock magnets mounted in a second pair of said bores, said padlock magnets each having a major axis lying parallel to the major axis of each of said arms, said second pair of bores being of a diameter exceeding the diameter of said padlock magnets sufficiently that said padlock magnets are free to shift laterally in their associated bores while said major axes of said padlock magnets remain substantially parallel to the major axes of said arms;

means carried by said padlock magnets for engaging said hasp to prevent said one arm from being moved to said second position, said padlock magnets being arranged in said bores in such a manner that the magnetic property of said padlock magnets acting on a body within said padlock normally moves said padlock magnets laterally bringing said engaging means into engagement with said hasp; and

magnetic key means positionable on said body portion adjacent said pair of padlock magnets for shifting said padlock magnets laterally to a position where said engaging means is free from said hasp.

2. A padlock as stated in claim **1** wherein said padlock magnets attract each other to bring said engaging means into engagement with said hasp.

3. A padlock as stated in claim **2** wherein said engaging means includes a first engaging portion having one end carrying one of said padlock magnets and a second engaging portion having one end carrying another of said padlock magnets, each of said engaging portions having a second end physically connected to a link, said engaging portions being pivoted on said link for engaging opposite sides of one of said legs when said padlock magnets are attracted to each other.

4. A padlock as stated in claim **3** wherein said key means includes a first key magnet positionable on one side of said body portion to shift one of said padlock magnets laterally and a second key magnet positionable on the other side of said body portion to shift the other of said padlock magnets laterally, whereby the attraction of said padlock magnets for each other is overcome.

5. A padlock as stated in claim **1** wherein each of said arms is made from a magnetic material for attracting an associated padlock magnet thereto.

6. A padlock as stated in claim **5** wherein said engaging means include a first engaging portion carried by one of said padlock magnets and having a wedge-shaped end facing one of said legs and a second engaging portion carried by the other of said padlock magnets and having a wedge-shaped end facing the other of said legs, each of said legs having a notch engageable by an associated wedge-shaped end when said magnets are attracted to an associated leg.

7. A padlock as stated in claim **6** wherein said key means includes a single key magnet insertable into a third of said bores located in said body portion between said second pair of bores for attracting said padlock magnets thereto.

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RICHARD E. MOORE, *Primary Examiner.*

ROBERT L. WOLFE, *Assistant Examiner.*