This invention relates to locks, and more particularly to sliding shackle locks for general use, including also use on automobile tire carrier clamps to prevent tires from being stolen or, in other words, to locks of the general sliding or adjustable shackle type shown in the patent to Benson, No. 1,223,928, granted April 24, 1917, in which the lock-casing or block has openings extending from top to bottom or front to rear completely through the casing or block to adjustably receive the parallel arms of the substantially U-shape shackle, which arms may extend beyond each end of the casing and are adapted to be engaged by the lock mechanism extending in said openings or passageways in the path of travel of said arms respectively.

The invention resides more particularly in the locking mechanism and in the combination and interrelation thereof with the casing and shackle, and also in details of the casing or block and in details of the shackle construction.

The primary objects in view are to provide a very cheap reliable positive locking means; to provide a construction wherein the locking element or mechanism may be slipped on the arms of the shackle and the latter together with said locking mechanism correctly positioned in one plate of the casing and the other plate of the casing then applied and the whole riveted together, holding all parts permanently in correct position and relation, thus greatly reducing the labor and time heretofore required in assembling such locks; to provide such a combination of the shackle and locking element that the former, if inserted from the correct end or direction, will be positively engaged by the locking element and positively held thereby until released by the movement of said locking means or element by the key to inoperative position, but, if inserted from the wrong end or direction will be yeldingly engaged by said locking element, but will not be positively held by said locking element, and may be pulled easily out of the casing or block without any need to use the key, whereby all need for guard stop means for preventing insertion from the wrong end of the casing or wrong direction is eliminated; to provide a spring lock mechanism which may be held by the key in inoperative position when the key has been turned to a definite position and will not act to turn the key from such definite position when the key is released by the operator; and to provide a shackle having its loop or closed end provided with opposed faces extending from the ends of the parallel arms and converging toward each other with straight walls at an angle of approximately sixty degrees to obtain the quickest centering angle and the closest possible adjustment to hasp or fastener over a relatively large range so as to prevent rattling and, of more importance, to make such a tight fit that the movable lug I cannot be twisted, turned or rocked to such a position as to permit the removal of the spare tire even though the bolt J be removed, and so that the body or casing of the lock will so tightly engage the lug I as to prevent the insertion between the arms M of said shackle and the body or casing of said lock and the lug I of a prying instrument, all of which objects, among others, are accomplished by the combination, construction and arrangement of parts all as hereinafter more particularly set forth, described and claimed.

In the accompanying drawing, in which only two embodiments of my invention are shown merely by way of illustration of instances of the practice of my invention to aid in its better understanding, but with no intention of being limited to the details thereof, it being recognized that it is capable of numerous other embodiments:

Figure 1 represents a vertical cross-sectional view through a portion of a spare tire rack of ordinary construction in common use on automobiles, illustrating the application of a lock, according to one embodiment of my invention, to the securing lugs by which a mounted tire or casing is fastened to the rear of a vehicle, a part of one of the plates of the lock casing or body being broken away to better show the locking mechanism and the combination and interrelation of parts;

Figure 2, a sectional view on the line 2—2 of Fig. 1, the sides of the key-guide and support K being omitted in the interests of clarity.

Figure 3, a view similar to Fig. 2, only illustrating the locking element as spread to inoperative position and held so by the key;
Figure 4, a sectional view on the line 4—4 of Fig. 1, looking in the direction of the arrow;

Figure 5, a detail side elevation of the spring locking element;

Figure 6, a detail end elevation of the spring locking element;

Figure 7, a detail rear or bottom elevation of the spring locking element;

Figure 8, a detail sectional view on the line 8—8 of Fig. 1;

Figure 9, a view, similar to Fig. 2, of a modified form; and

Figure 10, a sectional view on the line 10—10 of Fig. 9, looking in the direction of the arrow.

Referring now in detail to the drawings, the lock block, casing or body comprises two plates A and B preferably riveted together by means of rivets C preferably integral with one of the plates, plate A for instance. Each plate is provided on its inner face, adjacent its bottom or rear end with a key supporting rib D in line with the key-hole disc or washer E and the angular key-guide and support K, the rib D and key-guide and support K on the plate A registering with the corresponding rib D and key-guide and support K on the plate B, the adjacent opposed edges of the ribs D and the top and bottom or front and rear part of the key-guides and supports K being formed to permit the insertion of the key L there between and to act as bearings and supports for said key L during the turn movement of the latter when spreading the sides 2 of the locking element or mechanism.

In the embodiments shown, the rivets C are integral with the plate A, four in number, and located one at each end of the rib D of said plate A and one on each side of the key-guide and support K near the top or front end of the said plate A, and the plate B is provided with a corresponding number of cooperating perforations respectively receiving said rivets C in assembling.

Said plates each have their top and bottom or front and rear ends cut out, as usual, on each side beyond said rivets and perforations respectively and are provided between said walls with arcuate supporting ribs, which walls and ribs of the one plate, in the assembling of the plates, register with the corresponding walls and ribs of the other plate to define passageways or openings completely through the lock block or casing for the reception of the arms M of the shackle as usual in this type of lock. Adjacent the top or front of the lock plates and on the distant faces thereof, each plate is provided with a long wide web 1 flush with the edge of the opening or cut-out therein so that the webs 1 of the respective plates A and B in assembled relation will register with each other and constitute bearing faces preventing canting of the shackle during the initial stage of insertion of the end portions of the arms M thereof.

The ribs D, key-guides and supports K, rivets C and webs 1 will preferably be integral with their respective plates as shown.

The locking mechanism consists of a single element, a long, wide, approximately V-shape sheet metal leaf spring, which has two side members 2 converging from front to rear or top to bottom and having its lower or rear edges free and normally held toward each other by the form and resiliency of said spring element as a whole, and have their upper or front and most widely separated portions connected together by the integral web 3, which web has each end acutely cut out, as at 4, to receive the respective opposed smooth inner faces of the arms M of the shackle, and has a central perforation 5 to receive and act as a bearing for the reduced end of the key L.

The sides 2 are each provided with an angular opening 6 extending from a point near the bottom or rear edge thereof to the top web 3, the openings 6 in the two sides 2 registering and being so located and of such size and shape as to snugly receive the key-guides and supports K of the respective plates, which key-guides and supports K maintain said spring element in correct operative position. Also, the four rivets C will aid, in the embodiments illustrated, in such positioning of the spring element, the web 3 of which corresponds in width substantially to the integral thickness of the lock block or casing at such point.

The shackle is comprised of two long parallel arms M each having notches 7 on both side faces and in registry, and having smooth opposed inner faces and smooth outer faces, the notches being formed with inclined sides and abrupt ends to be engaged by the edges of the respective sides 2 of the spring element, the sides of the notches being preferably formed on angles corresponding in degree to the inclination of said sides 2 of the spring element.

The parallel arms M of the shackle are of equal length and each extends from its free end to a point near the loop end of the shackle, starting at which point a straight portion 8 inclined at approximately 60 degrees extends for a considerable distance, relatively speaking, toward the other arm M, the portions 8 having their extreme and closer ends connected together by a short arcuate end portion 9, the inclined portions 8 and the end portion 9 together forming a sharp angle loop with long flattened side portions, and being integral with the arms M, all as well illustrated in Figure 1. It will be seen that as thus described and illustrated, the lock consists of but five dis...
tinct parts, the two plates A and B, the key-
hole disc or washer E, the spring element,
and the shackle, thus making for the greatest
simplicity and economy of material and
greatly simplifying the assembly operations,
whereby great economy of time and labor
in assembling is obtained. Also, it is to be
noted that, while the key-hole disc or washer
E, as desirable, it is not essential.

To assemble, the spring element will be
slipped along the arms M from their free
ends toward the end portion 9 with the web
3 nearer the latter, to a position such as
illustrated in Figure 1. The spring element
as thus applied to the arms M of the shackle
will then be positioned in the plate A, key-
hole disc or washer E fitted in place, the plate
B fitted in place, and then the ends of
the rivets C will be spread and the as-
sembly operation will be complete.

From the above description taken with
the illustration of the drawing it will be obvious
that the shackle may easily be improperly
inserted from the bottom, but it is also very
obvious that if said shackle should be in-
serted from the bottom or rear there would
be no abrupt faces of the notches 7 that
could be engaged by the lower or rear edges
of the sides 2 to prevent endwise withdrawal
of said arms.

Also, from Fig. 3, it will be seen that
when the arms M have been properly in-
serted from the top or front and are locked
by the sides 2 of the spring element, they
may be released by the insertion and opera-
tion of the key L, which is adapted to en-
gage the lower or rear portions of said sides
2 and spread them apart so that they will lie
out of the paths of said notches, and if said
key L be turned to, and left at, a position at
right angles to its insertion position it will
serve as a block holding said sides 2 spread
to inoperative position, permitting the easy
and quick unimpeded removal and insertion
of the shackle with one hand.

In the modification illustrated in Figures
9 and 10, in place of the single spring ele-
ment, two springs 2, each conforming in
size, inclination, shape and arrangement to
said sides 2, are substituted, being prefer-
ably held in place to the respective plates A
and B by rivets 2 preferably integral with
the respective plates. Otherwise the con-
struction, operation and combination of
parts are in all respects the same as that of
the embodiment illustrated in Figures 1 to 8.

The letter F designates the skeleton rim
forming part of, and supported by, the
usual iron tire rack, not shown, with which
most automobiles are provided for carrying
spare tires. A demountable rim G adapted
to have mounted on it a pneumatic tire or
spare casing, is loosely fitted over the rim
F. A metal lug H, welded, riveted, or both,
to the rim F, is provided with a notch or re-
cess in its upper end, a perforation interme-
diate its ends, and a bolt hole near its lower
end, and an opposing removable lug I, of
usual type, having its lower portion down-
wardly inclined away from lug H, and pro-
vided with a perforation and bolt hole reg-
istering with the perforation and bolt hole
in lug H and having a registering notch or
recess in its upper end, is normally tension-
ally held by a bolt J and its nut with its ad-
jacent face of its inclined portion in engage-
ment with the demountable rim G, forcing
the latter over on rim F and also spreading
the rim G radially, to secure the rims F and
G together and prevent any substantial rela-
tive movement between these rims.

To surely lock the removable lug I to the
lug H to prevent rattle and to prevent the
unauthorized removal of the rim G with the
spare tire mounted thereon, it is essential to
provide a lock that can be so adjusted that
the lock block or body will lie so closely to
the adjacent face of the lug I as to prevent
the insertion of a prying instrument between
said lug I and the lock block or body to pry
it off, and which will lie so closely to said
lug I and will bind said lug I and lug H so
tightly as to prevent the lug I from being
twisted or rocked in any direction relative
to lug H to such degree as would, even
shall the bolt J be removed, permit the
spare rim G to be removed with its spare
tire, and it is to accomplish this end that the
shackle is provided with the converging faces
8 inclined at an angle of approxi-
mately 60 degrees, as illustrated in Fig. 1.

In use the shackle will be applied to the
lugs H and I with the arms M 100
in the registering recesses and the registering
perforations thereof and with the free ends
of said arms presented rearwardly; the lock
block or casing is then applied to the free
ends of said arms and forced along the same
until it is in tight engagement with the ad-
jacent face of lug I with the opposing faces
of lugs H and I parallel to, and in full en-
gagement with, each other, and the opposed
faces of inclined portions 8 in biting engage-
ment with the walls of the recess and per-
foration respectively in lug H, thus guard-
ing against any play between the lock and
said lugs thus preventing any rattling or
noise, and guarding against any forced
movement of the lug I, in any direction
with relation to lug H, of sufficient extent as
110
to render said lug I inoperative to hold the
rim G on rim F even though the usual bolt
J be removed in an attempt at unauthorized
removal of the spare tire and rim.

Having thus described my invention, what
I claim as new and desire to secure by Let-
ters Patent is:

1. In a sliding shackle lock, the combina-
tion of a sliding shackle with a lock-casing,
said lock-casing comprising sections having
integral parts together, as assembled, constituting a key-guide and support, and a substantially V-shape spring locking means having leaves converging toward each other from front to rear and having the material of said leaves cut out to snugly receive said key-guide and support during the assembly operation, the said spring locking means being held in correct position solely by said key-guide and support, and the said shackle portion at an abrupt angle for a considerable distance toward the other arm portion and away from the free end portions of said arms, said inclined portion being integrally connected with the other arm portion.

2. In a sliding shackle lock, a shackle having two parallel arm portions having free ends, one of said arms having a straight inclined portion extending from its other end portion at an abrupt angle for a considerable distance toward the other arm portion and the adjacent extreme parts of said inclined portions being integrally connected.

In testimony whereof, I have signed my name to this specification at Lancaster Pennsylvania this 5th day of September 1924.

WILLIAM F. TROAST.