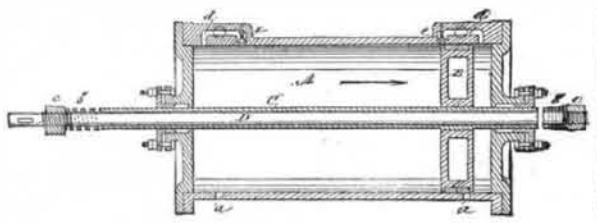
ENGINEERING INVENTION.

Steam-Cushioned Cylinder and Piston.

Mr. William Hanna, of Gilroy, Santa Clara county, Cal., has patented devices by which the concussion in the operations of pistons in steam cylinders is obviated. The device is cleverly shown in the accompanying engraving, in which A is a cylinder with the usual steam ports, and a piston, B, fixed on a tubular rod that works through stuffing boxes in both cylinder heads. D is a rod extending through and carrying the tubular rod and the piston, and connects with the crank; on this rod, near the ends of the tube, are screw collars, between which and the ends of the tube are spiral springs. These springs are adjusted in their tension by turning the screw collars, and allow endwise movement of



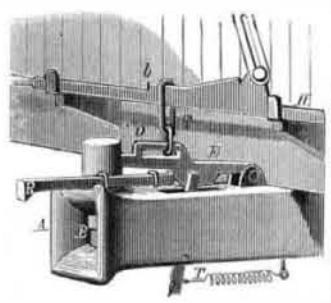
the tube on the rod under the steam pressure. The cylinder, A, is provided near each end with a U-shaped port opening at both ends into the cylinder, and fitted in the end most distant from the cylinder heads with a check valve opening outward. These ports are placed in such relation to the steam ports as that they are open at opposite sides of the piston, B, when the piston covers the steam port and before it has reached the end of the stroke, thus furnishing a passage for live steam from behind the piston to the front for cushioning the piston. It will be seen that this steam is taken from that in use, and the volume of steam used for cushioning, instead of being immediately exhausted, remains to start the piston back, thus effecting a saving.

An Improved Car Coupling.

Mr. Michael Winter, Sr., of Union City, Randolph county, Ind., has patented an improved device for coupling cars automatically.

The annexed cut is an illustration of the device, in which A is a drawhead provided with an end aperture, B, and on the upper side of which a lever, C, is pivoted to swing vertically in such a manner that the free end is at the front of the drawhead, where it passes into a slot in the head of the coupling pin, said pin passing through a vertical aperture in the drawhead. It is also provided with a longitudinal slot, D, and a cam projection, E, upon its lower edge, and is suspended from a long link, F, by a ring passing through a slot, D. It is provided with a notch in its lower edge at the rear of the cam projection, into which an inner angular arm of the sliding arm, R, can pass when it is pushed inward.

A bar, H, provided with a check stop, *b*, is held loosely and horizontally directly over the drawhead, on the end of the car or platform, by guides in which it can slide parallel with the end of the car. At or near the middle of its upper edge it is provided with a projection, beveled upward to its end, and also with handles at the ends. This bar also has a pivoted handle projectingfrom the end of the beveled projection, vertically to the top of the car.

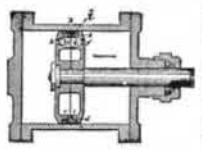


A sliding bar, R, provided at its outer end with a head and at its inner with a rectangular arm is held on top of the drawhead by two guide loops, the bar projecting from the end of the drawhead. An arm, T, is pivoted to the lower side of the drawhead and passes vertically through a slot in the head, and has attached to its lower projection a spring. When the parts are in the position shown in the cut they can be coupled. The drawhead, A′, holding the link, W, strikes the head of the rod, R, and pushes it toward the inner end of the drawhead, A. The rectangular arm of the rod presses against the cam projection of the lever, C, raising it and the pin, O, and carrying the upper end of the arm, T, toward the inner end of the drawhead. By this movement of the rod the pin is raised enough to let the link into the aperture, B, when it drops back to its former position and the cars are coupled. To uncouple the bar, H, is moved so as to cause the link, F, to slide up on the incline, thereby raising the lever, C, and coupling pin O, and permitting the link to be withdrawn.

An Improved Engine Piston.

Mr. John Carter Hale, of Stephens City, Frederick county, Va., has patented an improvement in pistons for steam engines, of which the annexed cut is an illustration.

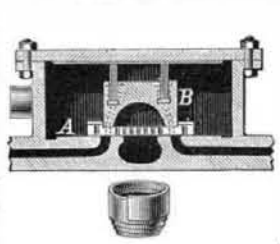
The piston is composed of two cast iron heads of equal size, having a peripheral recess, *b*, formed in a lateral annular rim, *c*, near the circumference, and adapted to be fitted together so as to make a steam-tight joint between the two rims. A lug, *d*, in one of the rims fits into a corresponding recess in the other, and at a point opposite thereto the rims are curved inward to form a ball cage, which is provided with a ball, and ports, *g* and *h*, leading through the piston heads, and a third port, leading through the rim, *c*, at the point of juncture. A groove, *i*, is formed near the edges of the rim, *c*, so as to form a continuous channel in the bottom of the recess, *b*, when the heads are screwed together. The steam packing, *k*, is a single ring, cut at a given point, and has its two ends recessed on opposite sides, so as to allow the ends to overlap each other laterally. To make this joint steam-tight a lining is secured to the inner surface of one of the ends so as to project beyond the joint, and to counteract the effects of increased thickness at this point the band is made correspondingly thick at the opposite side. It is designed that the packing shall not act as a spring, but shall be expanded solely by the action of the steam. When steam is admitted into the cylinder, at either side of the piston, a portion of it will enter through one of the ports into the cage, and thence through the third port into the groove, *i*, and the packing is expanded against the walls of the piston chamber. The expansion of the packing will vary according to the amount of the steam pressure exerted, and it will always relieve itself of strain when the steam is shut off.



A Novel Slide Valve.

A novel and useful improvement in slide valves has lately been invented and patented by Mr. William S. Hughes, of Long Island City, Queens county, N. Y., which is very clearly shown in the annexed engraving. The invention consists in volute springs combined with a slide valve in a manner to cut off a portion of the pressure, and at the same time allow automatic adjustment of the valve; also in a relief valve combined with the slide valve for the release of air compressed in the cylinder. The object of the invention is to balance the slide valves of steam engines, especially locomotive engines, and to prevent the wear and concussion produced in such engines when running without steam.

The accompanying engraving is a cross section of the valve and steam chest and an elevation of the balancing spring. A is the valve seat provided with ports, and B is the slide valve formed with an exhaust cavity as usual. The valve, B, is formed at its upper side with two annular cavities which contain coiled or volute springs, like the spring shown in the elevation in the drawing, that bear on the under side of the cover of the steam chest. The ends of the springs are filed down to insure true bearings and contact of the springs the entire circumference of the coils, and a wearing plate of hard metal is secured on the steam chest cover to prevent wear by the movement of the valve.

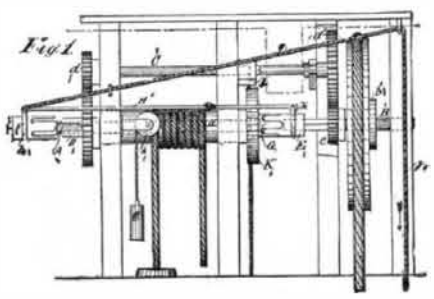


It will be seen that the springs are cylinders that cut off the area of surface which they inclose from the pressure of steam, and are proportioned to leave so much surface exposed to pressure as is necessary to hold the valve tightly to its seat against any ordinary back pressure. The springs also allow the valve to rise or rock when there is pressure caused by the engine running without steam. The side flanges of valve, B, are slotted, and the slots are covered by strips of metal held in place by flexible arms attached to the end flanges of the valve, B. These strips serve as valves that close the slots when pressed down by steam pressure, and give way to pressure from beneath, so as to relieve the main valve from the air pressure caused when the pistons are worked without steam.

An Improved Hoisting Machine.

Mr. Vernon C. Jarboe, of Wyandotte, Wyandotte county, Kan., has patented a new hoisting machine, constructed so that the power may be disconnected from direct action upon the winding drum and simultaneously applied thereto indirectly, for the purpose of increasing the lifting power of the apparatus.

In the annexed engraving the shaft, A, upon which the winding drum is attached, and a shaft, B, upon which the power pulley is secured, are journaled in the frame of the machine in a line with each other. Parallel with and above the shafts is the shaft, C, upon either end of which are fixed gear wheels, *d d′*, that receive motion from the gear, *e*, fixed upon the shaft, B. The gear, *d*, meshes with a loose gear upon



the shaft, A, and imparts motion thereto, and has upon its side a clutch, D, with which the sliding clutch, F, placed upon the square extended portion of the shaft, A, engages and imparts motion to the winding drum indirectly from the pulley shaft by the system of gearing described. The inner end of the shaft, B, is made square, and upon this portion is placed a sliding clutch, E, that engages with the clutch, G, formed upon the inner end of the shaft, A, for imparting motion directly to the winding drum. The clutches, E and F, engage and disengage with the clutches, D and G, by means of the sliding rod, H, to which the spring arms, *h h′*, which are secured around the clutches, are attached. The rod, H, is held by a weight secured to a cord which passes over the pulley, *k*, so as to engage the clutches, D and G, and to reverse this order and engage the clutches, E and F, the rod is drawn forward by the cord, *j*. Upon the shaft, A and B, are brake wheels, K and M, which are operated by suitable mechanism to control the speed of the shafts.

It will he seen that when the clutches, D and G, are engaged, the machine operates as a simple wheel and axle, and elevates light loads rapidly, and when the clutches, E and T, are engaged, the drum is operated through the medium of the gear wheels, and has slow motion and great power, and is capable of elevating very heavy loads.

MECHANICAL INVENTIONS.

Adjustable Socket Wrench.

The accompanying engraving shows an invention for which Letters Patent have been lately issued to Felix Chantrell, of Bridgeport, Fairfield county, Conn. The invention is a useful improvement in adjustable socket wrenches. The stock of the wrench is made of metal in T form, and has sockets in the ends of its three arms. It is made in two parts, the plane of division passing through the three arms, as shown in the engraving, and these parts are secured to each other, at or near the intersection of the three arms, by rivets, and also by steel bands shrunk upon the ends of the short arms.

Upon the inner side of one part of the long arm of the wrench is formed a projection which passes through and fits into a slot or mortise formed in the other part of the arm. The projection is made of such size as will give the necessary strength to resist the torsional strain upon the parts of the wrench when it is in use.

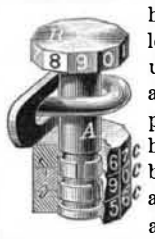
In the adjacent faces of the parts of the long arm of the wrench, near their lower ends, are formed recesses to receive a thumb wheel, which is of such size as to project upon both sides of the arm sufficiently to allow it to be turned by the thumb and fingers. A screw passes through the center of the thumb wheel, and is secured at its center to the wheel, so that the screw will be turned by turning the wheel. The screw has a right hand thread on one end and a left hand upon the other, to fit into screw holes in the adjoining parts of the wrench, so that they will be spread apart to enlarge the socket in the end of the long arm by turning the thumb wheel in one direction, and contract it by turning the wheel in the other direction. In this construction the screw assists in supporting the parts of the long arm against the torsional strain when the wrench is used.

By this device an easily adjusted, strong, and convenient socket wrench is provided at a moderate expense.

Permutation Padlock.

A large amount of money and inventive ability have been expended in making locks to secure banks and safes containing valuables against being broken into, while the common property of the house and barn is left with little or no protection from thieves and burglars except the common lock, which is little better than no protection at all.

Mr. James E. Dean, of Fishkill, Dutchess county, N. Y., has invented an improved permutation padlock that is cheap and simple, and may be used in the place of the ordinary padlock, and at the same time be more secure against picking. The invention consists of a bolt having a polygonal or cylindrical head numbered or lettered on its faces, and having about its end communicating or intersecting annular and longitudinal grooves; and in combination with this bolt, of polygonal or cylindrical ring sections, numbered or lettered on their faces, and provided with internally projecting studs, corresponding with the grooves in the bolt, the ring sections being rotary. These ring sections are coupled together, face to face, by flaring rings, as may be seen by the accompanying engraving, which is a perspective partly in section, so that they can move on each other, the design being to lock and unlock the lock by arranging the ring sections relatively to each other and to the bolt head according to keys formed by combinations of the letters or figures.



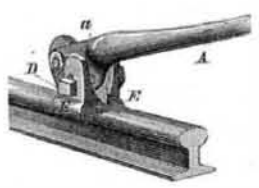
In the engraving, A represents the bolt provided with polygonal head, B, whose faces are numbered, as shown, and at its end said bolt has formed in it annular and longitudinal grooves. *c c c* are three ring sections provided internally with studs designed to enter the cylindrical and longitudinal grooves on the bolt, A. The lower ring section is closed at the bottom to prevent the discovery of the combination and the picking of the lock. If the ring sections, *c c c*, are rotated to a certain adjustment relatively to each other and to the bolt head, B, the lock may then be put over and upon the end of the bolt, A, by rotating the lock until the studs upon the ring sections successively coincide with the

longitudinal grooves in the bolt, A, and at the same time pressing the lock upward on the bolt to lock the hasp on the staple, as shown.

Car Starter.

Mr. Charles B. Underhill, of Lancaster, Erie county, N. Y., has patented a very ingenious improvement in that class of devices that are designed to start and move cars on the rails, and is nicely illustrated by the annexed engraving.

A is a lever having in its slotted end a roller fixed on a transverse pin, the roller being designed to apply to a wheel of the car to be started. At *a* the lever is wedge-shaped in cross section, the point of the wedge being downward, and just above the end of the wedge the lever is transversely perforated to receive the fulcrum bolt, D. E E are like halves of the clamps of the starter, the lower parts of which are cut away on their insides to fit the rail. The inner faces of these halves slope upward and outward to their tips, and on their outer faces they are straight to the tops of their slotted holes, *f*, and thence to their tips are inclined outward. The fulcrum bolt passes through the holes, *f*, of the clamp, and a hole in the lever, the head of the bolt being in contact with one-half of the clamp, E, and the nut with the other. By throwing up the lever, A, to apply the starter, the broad part of the wedge is raised from between the halves of the clamp, E, and the fulcrum, D, is also raised to its utmost extent, thereby the clamp is loosened from the rail, and when thus loosened may be moved along the rail or wherever may be desired. When the starter is applied to move a car the lever is brought gradually down with its wedge portion between the clamp sections, the fulcrum bolt being at the same time pressed down in the holes, *f*, and thereby the clamps, E, are pressed outward and their jaws inward to grasp the rail, and the greater the pressure the more firmly the rail is grasped.

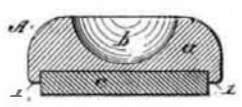


This starter is cheap, strong, durable, easily applied, and very effective.

A New Furniture Socket.

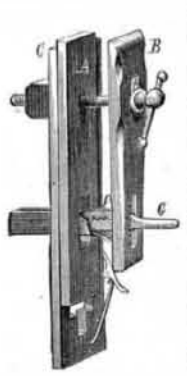
Casters placed upon the legs of furniture, by which it may be easily moved from place to place, are a great convenience, and they are sometimes also a source of annoyance, as they allow the furniture to move when it should remain stationary. This annoyance may be easily overcome by placing under each caster a device that has been lately patented by Charles Haring, of Watkins, Schuyler county, N. Y., and is illustrated by the annexed cut.

The device is a padded socket, composed of the body, that is made in circular form, with a recess in its upper surface, and a disk of rubber or other soft or elastic material, attached to the bottom by cement or other suitable means. The body is made of any durable material—such as wood, metal, or hard rubber—but iron is preferable, on account of cheapness and the weight assisting in holding the pad in place. The under side of the body is recessed to receive the disk, the annular shoulder of the recess setting down over the disk, protecting its edges and retaining it in place. The disk is made thick enough to prevent the contact of the body with the floor or carpet. In use the socket is placed beneath the furniture leg, with the caster wheel or end of the leg resting in the recess of the body. The recess prevents the leg from slipping from the socket, and the furniture is held from being accidentally moved.



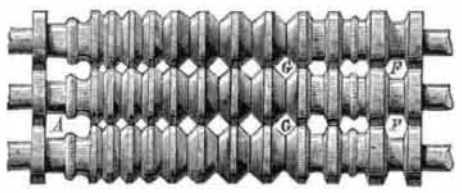
An Improved Bench Vise.

A cheap, convenient, and easily operated bench vise for carpenters' use has been lately patented by Mr. Jesse L. Parker, of Fountain City, Wayne Co., Ind. In the accompanying engraving, which illustrates the invention, A and B are the jaws of a vise, and C is a bench leg provided with a slot, to permit the up and down travel of the vise. A tenoned screw block is mortised into the jaw, B, its tenons moving in the bench leg, and its shoulders bearing against the inside of the leg. The upper screw passes into the block through the jaws, A, B, and draws them together. The screw block also serves to guide the vise up and down in the leg, C, and is held at any desired elevation by a lever, catch, and spring, upon the side of the leg. A notched treadle, G, designed for holding the lower ends of the jaws in any desired position, passes through and is pivoted to a longitudinally slotted block, F, which extends rearward through a corresponding opening in the jaw, B. The treadle extends outward from the jaw, A, for the convenience of the foot of the operator and is held in its desired position by a spring on its underside, and a catch plate on its upper side. It will be readily seen that this vise may be adjusted to any height and to any size with very little trouble to the operator.



A New Machine for Rolling Rectangular Bars from Old Rails.

Mr. John J. Thomas, of Zanesville, Muskingum county, O., has patented new and improved machinery for rolling old railroad rails into merchantable bars. This work is accomplished by a set of grooved rollers, forming passes in the shape of a pear-head rail with a thickened base, and a series of decreasing regular and irregular hexagon passes, and flat hexagon passes having recesses in the flat side, and



also a series of square reducing passes gradually decreasing in size. The accompanying engraving illustrates the series of rollers.

The rail, being thoroughly and uniformly heated, is passed through the passes, A, B, and F, and is formed into a billet, which can be passed through the grooves, G, which gradually reduce its cross-section to such an extent as may be desired.

By this means the pieces of rail are converted into bars at a single heat, as the decrease and change in cross-section takes place in such a manner and so rapidly that the iron or steel cannot cool before it has passed through the machine.

ELECTRICAL INVENTIONS.

A New System of Electrical Lighting.

An ingeniously devised combination of a voltaic arc electric lamp with an air exhauster, arranged so that a vacuum may be continually maintained about the carbons, has been patented by Mr. Amedee M. G. Sebillot, of Denver, Arapahoe county, Colorado, of which the annexed cut is an illustration.

The carbons, A A′, which are attached to carbon holders are contained in a globe, B, and are attached to pistons, D D′, fitting in the cylinders, E E′, between which the globe, B, is held, the ends of the cylinders fitting so closely against the globe as to form an airtight joint. The carbon-holding rods pass through packing boxes in the inner ends of the cylinders, E E′. Screw rods provided with milled buttons at the outer ends pass into threaded apertures in the pistons, D D′. By turning these screws the carbons may be adjusted. The screw rods are locked by screws, *a a′*. An air channel leads down through the wall of the cylinder, E′, to a tube provided with a stopcock which connects to the main chamber, M′, of the compound air pump, from which the air is continually pumped, so that when the globe and the tank are in communication there will be a vacuum in the globe, which will be maintained as the pumps operate continuously.

The lamp is contained within a parabolic mirror by which the rays of light are thrown horizontally and downward. This mirror is arranged in the form of an overhanging circular cornice on the top of a high tower, and a ring of the above described lamps is arranged within it and below the overhanging part. The globe of every lamp must be connected with the main tank of the air pump.

The compound air pump is composed of a series of air pumps which regularly and gradually decrease in size, so that the tank in which there is the most perfect vacuum will be the largest.

The carbon holders are connected to the poles of an electric generator of any suitable kind, and a derrick is provided for raising and lowering the device.

New Electric Arc Lamp.

We give an engraving of an improved electric arc lamp, lately patented by Mr. Henry B. Sheridan, of Cleveland, O. This lamp employs two or four carbon rods converging toward the point of combustion, and allowed to gravitate toward each other, by a friction escapement, controlled by a differential magnet placed in a shunt circuit, and affected by the fluctuations of the current.

The carbon rods are suspended by chains from drums of different diameters, the positive carbon being connected with the chain from the larger drum, and the negative carbon being connected with the chain from the smaller drum, so that notwithstanding the difference in the rate of the consumption of the two carbons, they always maintain the arc at the same point.

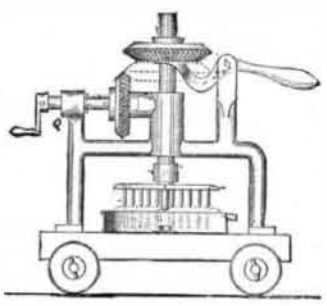
The construction is such that a strong current holds the carbons apart, and by means of a pawl and ratchet arrangement the feeding device separates them more or less, when the current is very strong; as, for example, when the carbons touch previous to lighting. In this case it separates them to form the arc, after which the regulation is accomplished for the greater part by releasing the arms as the current weakens, allowing the carbons to approach sufficiently to maintain the standard length of the arc.

METALLURGICAL INVENTION.

An Improved Amalgamator.

A novel machine for amalgamating ores for the separation of the precious metals from the waste mineral matter has been patented by Mr. Angus McKellar, of Fort Douglass, Utah, and is illustrated by the annexed engraving.

Upon a platform mounted on wheels, so that the machine may be moved about, is a double vertical standard, Q, supporting a central sleeve. Through this sleeve passes an upright vertically adjustable shaft, on the top of which is keyed a bevel gear wheel, and on the bottom of which is held by a set screw a rake consisting of cross bars having downward projecting teeth. In an upright arm of the standard is pivoted a lever, whose forked end embraces the upright shaft just below its bevel gear wheel, whereby the shaft and rake can be elevated and lowered. Into the upper portion of the standard, Q, is journaled a horizontal shaft, to the inner end of which is attached a bevel gear wheel, and to its outer a crank, through which power is applied for operating the rake. Set loosely upon the platform is a settling and amalgamating pan, having in its center a step to receive the lower end of the rake shaft when the rake is in operation. At the upper edge of the pan is a discharge spout, for the purpose of carrying off the muddy water and smaller particles, and having a screen at its inner end to prevent the escape of the sand and metal. In the bottom of the pan is from one-fourth to one-eighth of an inch of quicksilver, when ready for work, and to this chemicals may be added if desired. Powdered mineral earth then being delivered into the pan, a small jet of water is also introduced at the center, and the rake being lowered by the forked lever, so that the gear wheel of the crank shaft shall mesh with the gear wheel of its shaft, the crank is turned, and the rake is rotated until the material is mixed to the consistence of mud, when the supply of earth is shut off and a larger supply of water added, and the rake is rotated in the opposite direction until muddy water ceases to flow. The operator then skims off the upper layer of sand and ore that is free from gold. The washing and skimming are repeated several times, when the pan is removed and its contents submitted to the usual operations for separating the gold and quicksilver.



MISCELLANEOUS INVENTIONS.

New Picture Exhibitor.

An invention for exhibiting ornamental cards, and which gives more ornamental effect than is ordinarily furnished, has been lately patented by Mr. Augustus Lueckel, of Brooklyn, N. Y.

This is a combination of a folding card with a supporting frame or easel. The supporting frame is a sheet of cardboard having a portion cut out, to form a supporting leg, which holds the frame at a proper inclination.

The folding card consists of a main portion attached to the cardboard, and leaf portions attached to the main portions by flexible connection, so that they may be folded down upon the main portion, or opened out, as shown in the engraving.

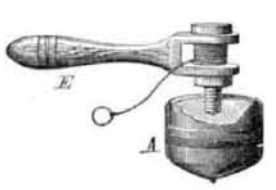
On the face of the main card is a picture, and both sides of the hinged portions are similarly ornamented, so that five separate pictures are given.

Around the edges of the body card is a bordering of ruffed or plain material, and fringe is added as a finish. The cards mounted in this way are highly ornamental, and are displayed to the best advantage.

A Novel Spinning Top.

Mr. Johnathan Hill, of New York city, has patented a novel spinning top, of which the accompanying engraving is a good illustration.

The top, A, is made of any suitable material, and is provided with the ordinary point, upon which it spins. In the center, at the top, is formed a screw hole, fitting loosely upon the screw-thread on the lower end of a spindle which passes through and runs freely in a hole formed in a slot at one end of the handle, E, and is retained in its place by a head formed above the handle, and a collar which fits tightly on the spindle under the handle.



The top is screwed to the spindle, and the spindle turned still further to wind a cord which is fastened to it in the recess of the handle. When the cord is drawn the spindle is turned in the direction to screw it into the top, and when it is wholly unwound it stops the spindle, and the momentum of the top causes it to run off the spindle and spin upon the surface, over which it is held until its momentum is exhausted.