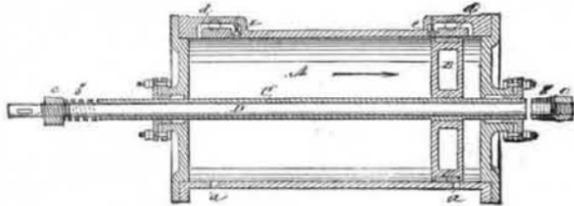


**ENGINEERING INVENTION.**

**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



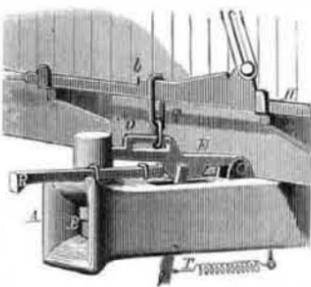
the tube on the rod under the steam pressure. The cylinder, A, is provided near each end with a U-shaped port opening at both ends into the cylinder, and fitted in the end most distant from the cylinder heads with a check valve opening outward. These ports are placed in such relation to the steam ports 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 projecting from the end of the beveled projection, vertically to the top of the car. A sliding bar, R, provided



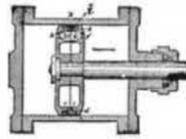
at its outer end with a head and at its inner with a rectangular arm is held on top of the drawhead by two guide loops, the bar projecting from the end of the drawhead. An arm, T, is pivoted to the lower side of the drawhead and passes vertically through a slot in the head, and has attached to its lower 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, e, 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.



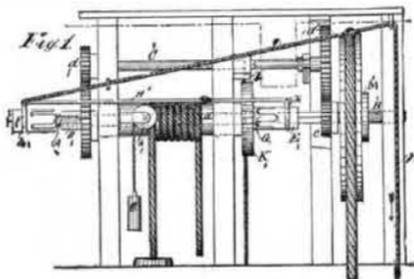
A is the valve seat provided with ports, and B is the slide valve formed with an exhaust cavity as usual. The valve, B, is formed at its upper side with two annular cavities which contain coiled or volute springs, like the spring shown in the elevation in the drawing, that bear on the under side of the 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 be 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 Chantrel, 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 thread 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

