

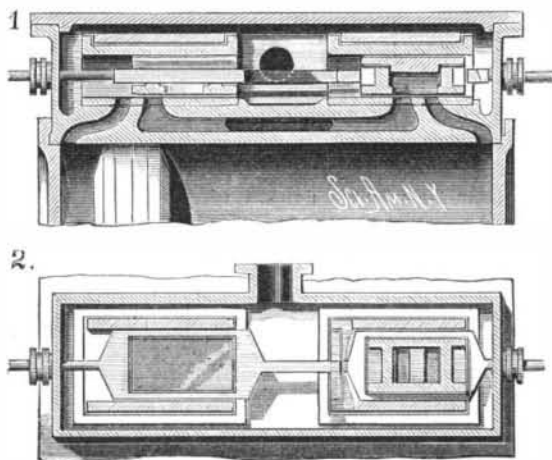
**PNEUMATIC LOCK.**

In an invention recently patented by Mr. A. W. Fuller, of 34 Hamond Street, Boston, Mass., a casing is provided with two cylinders whose pistons move in opposite directions and are connected with a frame carrying the bolts. By means of compressed air, either piston can be operated, so that the bolts can be passed into or withdrawn from the apertures.

The locking case is held upon the inner surface of the safe door, and is furnished with an air compressing cylinder, the piston rod of which passes through a stuffing box in the end of the cylinder and is connected by a rod to a crank arm of a key shaft provided with a fixed or removable handle. At the top and bottom of the casing are formed two cylinders, whose piston rods project from the opposite ends of the cylinders and connect with the frame by bolts. Between the air compressing cylinder and the others are formed air chambers, which communicate with the central cylinder by valves; the closed end of this cylinder also has a port closed by an inside valve. The opposite ends of the outside cylinders are furnished with ports closed by valves connected with levers, as shown in the engraving. The cylinders have outlet ports and end ports, connected as clearly shown in the engraving. The operation of the device is very simple. The door is closed, and the upper valve is so adjusted that its cylinder will be in communication with the adjoining chamber. The compressing piston is then operated by means of the key or handle, the compressed air passes into both chambers and forces the upper piston outward, moving the frame in the same direction, thereby passing the bolts into the holes in the safe frame and locking the door in place. The piston will have passed the outlet port and allowed the compressed air to escape from the cylinder. When the safe is to be opened, the lower lever is operated by a key, or by a time lock or other device, and its valve is moved so as to permit the compressed air to pass into the cylinder, thereby forcing the piston and frame in the opposite direction, withdrawing the bolts. As it may happen that the upper piston will not pass the outlet port, and the compressed air will not be allowed to escape from behind the piston, there is arranged an end outlet port, the valve of which is opened from the lower lever as soon as the latter shifts the lower valve, thus permitting the compressed air in the cylinder to escape.

**BALANCED SLIDE VALVE.**

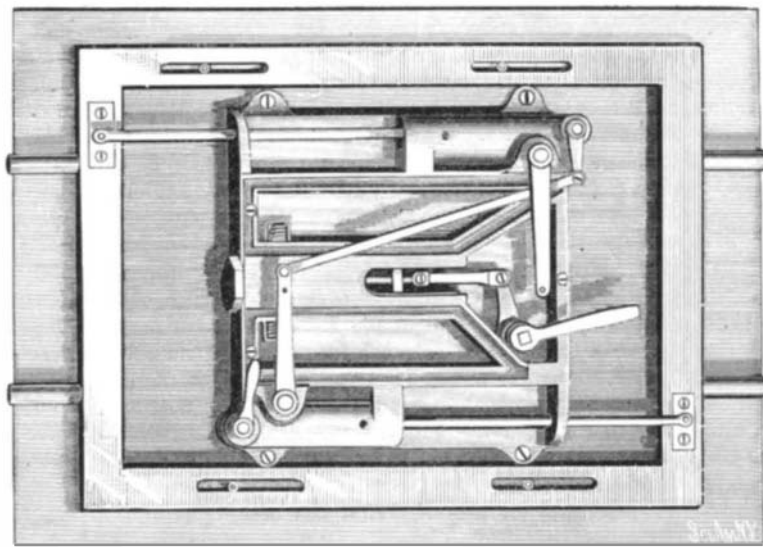
The slide valve shown in the accompanying engraving is constructed in such a manner as to lessen the friction and wear, thereby lessening the amount of fuel required to run the engine. Fig. 1 is a sectional side elevation, and Fig. 2 a sectional plan view. The valve is made in two parts, which are connected by a bar. The piston rod is connected with the parts by yokes passing around them, the sides being recessed to receive the yokes and allow the requisite play. The parts have recesses in their ends to increase the steam capacity of the steam chest, and have recesses in their lower sides for the passage of exhaust steam. Each part is placed in a valve box having close sides and top and open ends, and which is made of a length equal to the combined length of the part and its stroke. The height of the box is a little less than that of the valve chest, to form a steam space above the box, and the interior height of the box is a

**SMITH'S BALANCED SLIDE VALVE.**

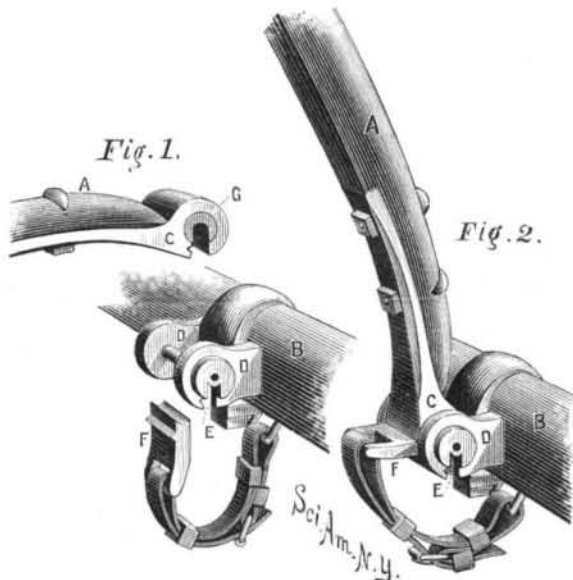
little greater than that of the valve, to form a space to receive a steel plate, upon the ends of which are formed upwardly projecting flanges that fit steam tight into recesses formed in the ends of the top of the valve box, so that no steam can enter between the top and plate. The steam pressure upon the upper edges of the flanges will hold the plate down closely upon the part of the valve, thus taking up the wear and preventing any downward steam pressure from coming upon the top of the valve, and causing the valve to work with the least possible friction. By this construction there will be very little wear upon the rubbing surfaces of the valve, and so the power required to work the valve will be reduced to a minimum. This invention has been patented by Mr. William G. Smith, whose address is 374 West Fifty-fifth Street, New York city.

**IMPROVED THILL COUPLING.**

The clip is formed with the cheek pieces, D, and with studs which retain the block of rubber back of the thill iron, C, to prevent rattling; the cheeks are also formed

**FULLER'S PNEUMATIC LOCK.**

with inwardly projecting studs which constitute the pivot pin of the thill coupling, and one cheek is slotted below the stud, as indicated at E, and has a V-shaped recess formed in it. The thill iron has a slot and cavity which correspond in size and shape with those in the cheek piece, the slot being of such size as to fit over the pin of the clip. The form of the key for locking the clip and thill iron together

**STRUCK'S IMPROVED THILL COUPLING.**

is clearly shown at F. It is made concave upon its inner edge to fit the pin, and is formed with a loop at its outer edge by which it may be attached to the strap. The slot in the thill iron is inclined downward and slightly forward when the thills are held in working position, while the slot in the clip is inclined downward, so that the thill slot will stand in front of the other, thereby holding the key out of line with the cheek slot and absolutely preventing it from working out.

To attach the thills to the clip, the thill iron is placed in the clip upon the pin, in such a position that the slots will be in line when the key is forced into the slot in the thill, when it will be held from edgewise movement by the tongue entering the recess. By raising the thill the key will be carried in front of the slot in the clip, so that all edgewise movement of the key will be prevented by the cheek pieces. Constructed in this manner the coupling is simple, strong, and cheap, and while preventing rattling it is secure against accidental uncoupling.

This invention has been patented by Mr. Charles E. Struck, who may be addressed for further information, care of Messrs. J. M. Quimby & Co., 836 Broad Street, Newark, N. J.

**A New Polar Expedition.**

A new plan for a polar expedition has been submitted by several officers of the Russian Navy to the Minister, Admiral Shestakoff. Starting with the conviction that it is impossible to reach the North Pole by sea on account of the islands that surround the polar region, the Russian officers propose to start an expedition in sledges from the New Siberian Islands, which are 900 nautical miles distant from the goal. This space is to be covered by sledge parties, who would make depots of provisions in the newly discovered islands, and thus slowly but surely advance toward the north, securing at the same time the return journey of the expedition. When elaborated, the scheme will be submitted to the learned societies of Russia and the necessary funds raised, partly by subscription, though it is probable that, if the Government approves it, it will advance at least part of the expenses.

**The Licht-Paus Process.**

Herr Nickel, of Chemnitz, has a licht-paus process; the process is intended to reproduce by licht-paus, in blue lines upon a white ground, any kind of a drawing by using the well known licht-paus paper, which is sensitized by treatment with citrate of iron and ammonia, and red prussiate of potash. The process is based upon the production of a negative copy of the drawing to be multiplied, by using as follows a special licht-paus fluid: Take some filtered gum arabic and mix it with acetic acid, in order to render it fluid and prevent it from spoiling; then add a little dissolved soap, in order that the lines drawn by this mixture may not be brittle when dry. Add India ink to this mixture until a drawing made with it is quite visible. Make a copy in the usual way, with this ink, of the drawing to be copied, drawing upon the rough side of the ordinary paper. Then with the finger rub upon the same side of the copy as much common, soft, black chalk as the paper will take on. The chalk had better be previously pulverized. When all that has been done, the drawing is laid in water and then carefully rinsed. By this means the whole of the lines drawn with licht-paus ink dissolve out and disappear, leaving the drawing in sharp, white lines upon a black ground. If this negative copy is to be often used, it is recommended that it should be fixed by brushing it over with a broad hair pencil dipped in spirit varnish, or by coating it with a solution of gum arabic to prevent the black chalk from spreading over the white lines. When such a negative has been made, one may proceed to throw off an unlimited number of licht-paus pictures by means of the sensitive blue licht-paus paper, which gives blue lines on a white ground, by which a further carrying out of the licht-paus by means of colors is facilitated.

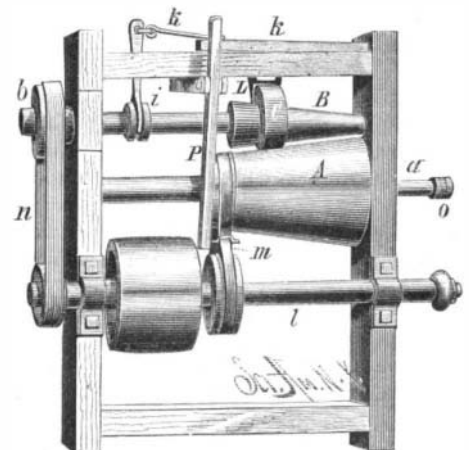
**United States Patents.**

Of the nearly 300,000 patents which have been issued by the Government, as shown by a table prepared by Commissioner Butterworth, 10,204 have been for metal working machines, 8,238 for stoves and furnaces, 5,505 for railway cars, 6,740 for mills and thrashing, 6,606 for harvesters, 6,686 for plows, 5,872 for applications of electricity, 5,060 for boots and shoes, 5,111 for steam engines, 5,254 for lamps and gas fixtures, 4,993 for laundry, 3,568 for seeders and planters, 3,504 for railways, 2,417 for wearing apparel, 2,429 for dairy utensils, 2,888 for fences, 3,418 for metaling, 2,453 for beds, 3,156 for pumps, 3,719 for water distributors, corset patterns have been 969 times patented, 754 machines for knitting, 734 nut and bolt locks, 1,219 methods of tanning hides, 884 fire escapes, 500 artesian wells, 440 bread and cracker machines, 1,580 chairs, 450 vegetable cutters, 567 fire engines, and so on, through a long list.

**DEVICE FOR TRANSMITTING MOTION.**

The engraving shows a simple and effective device for transmitting motion from one pulley to another so that the driving pulley, moving at a uniform speed, will operate the driven pulley at a variable speed without stopping the motion of the driver. It is applicable to all kinds of machines which must run at a certain, or different speeds, without regard to the speed of the motor. It can be easily applied to saw mills as they are now built, and the advantages it possesses when so used will be apparent.

The saw arbor, *l*, feed belt, *n*, gig belt, *m*, feed arbors, *a* and *b* and the pinion, *o*, are arranged like those in the machines now built; but in place of the friction pulleys now in use, the parts, *A*, *B*, *C*, *L*, *i*, and *k*, are substituted. These, in connection with the lever, *P*, the upright handle of which is not shown, cause the shaft, *a*, to revolve in either direction, thereby moving the saw carriage forward or backward as desired. The carrier, *L*, extends through the frame, so that

**LAIRD'S DEVICE FOR TRANSMITTING MOTION.**

the operator may with his foot move the belt, *C*, to the right or left, increasing or decreasing the speed of the carriage as the log is carried up to the saw. The belt, *C*, is of somewhat greater length than is necessary to encircle the largest portion of the pulley, *B*, and is of such a thickness that it is firmly gripped by the pulleys at its passage between them.

This invention has been patented by Mr. W. E. Laird, of East Calais, Vermont.