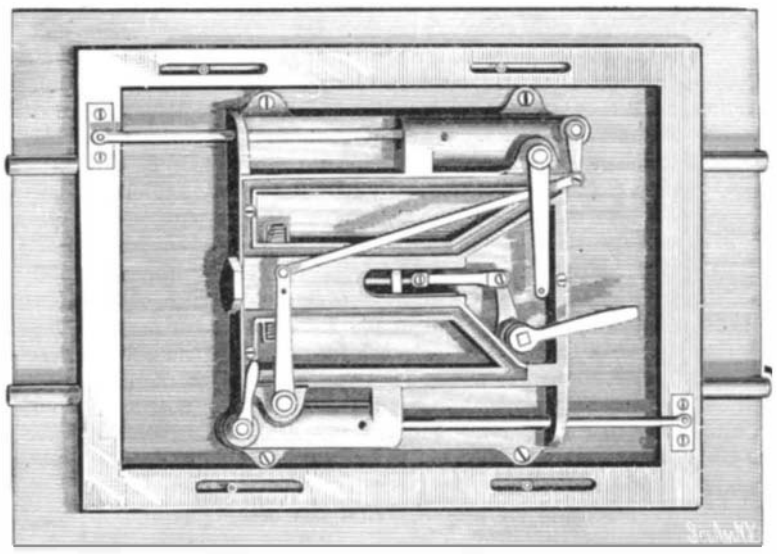
PNEUMATIC LOCK.

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 By means of compressed air, either piston can be operated, so that the bolts can be passed into or withdrawn from the apertures.

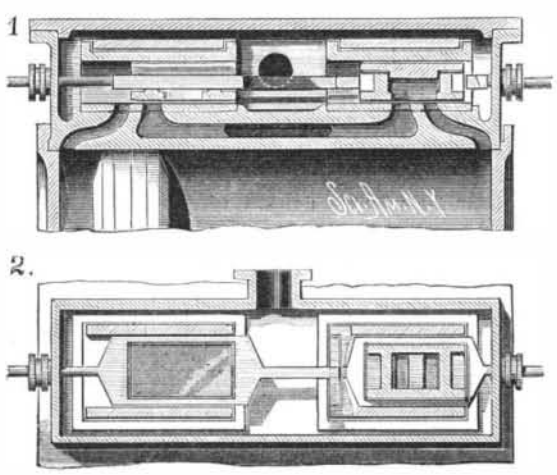
The locking case is held upon the inner surface of the safe door, and is furnished with an air compressing cylinder, the piston rod of which passes through a stuffing box in the end of the cylinder and is connected by a rod to a crank arm of a key shaft provided with a fixed or removable handle. At the 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.



FULLER'S PNEUMATIC LOCK.

BALANCED SLIDE VALVE.

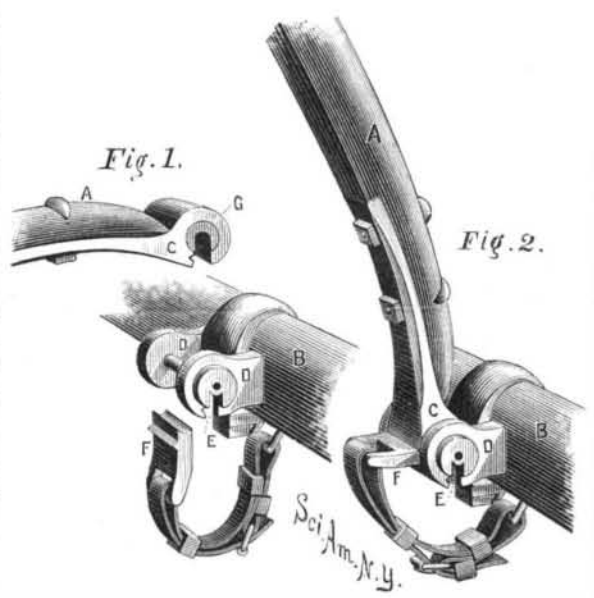
The slide valve shown in the accompanying engraving is constructed in such a manner as to lessen the friction and wear, thereby lessening the amount of fuel required to run the engine. Fig. 1 is a sectional side elevation, and Fig. 2 a sectional plan view. The valve is made in two parts, which are connected 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 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.



SMITH'S BALANCED SLIDE VALVE.

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 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 endwise 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.

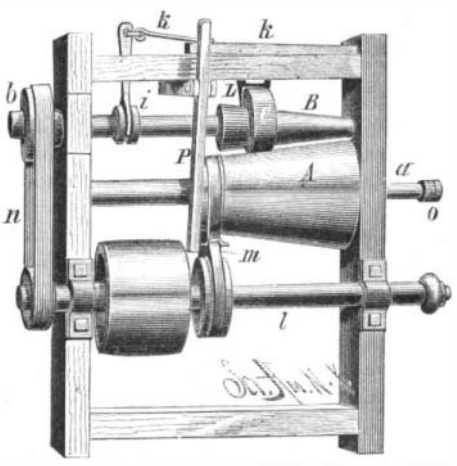
United States Patents.

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 distributers, 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 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.



LAIRD'S DEVICE FOR TRANSMITTING MOTION.

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

The Spider's Thread.

In a lecture at Boston, Mass., Professor Wood dealt with the phenomena of spider life. The female is larger and much fiercer than the male, who, while paying his addresses, is in constant peril, frequently losing some of his legs. In one tribe the female is 1,300 times as large as the male. The spider's thread is made up of innumerable small threads or fibers, one of these threads being estimated to be one two-millionth of a hair in thickness. Three kinds of thread are spun: One of great strength, for the radiating or spoke lines of the web. The cross lines, or what a sailor might call the ratlines, are finer and are tenacious—that is, they have upon them little specks or globules of a very sticky gum. These specks are put on with even interspaces. They are set quite thickly along the line, and are what, in the first instance, catch and hold the legs or wings of the fly. Once caught in this fashion, the prey is held secure by threads flung over it somewhat in the manner of a lasso. The third kind of silk is that which the spider throws out in a mass of flood, by which it suddenly envelops any prey of which it is somewhat afraid, as, for example, a wasp. A scientific experimenter once drew out from the body of a single spider 3,480 yards of thread or spider silk—a length little short of three miles. Silk may be woven of spider's thread, and it is more glossy and brilliant than that of the silkworm, being of a golden color. An enthusiastic entomologist is said to have secured enough of it for the weaving of a suit of clothes for Louis XIV.

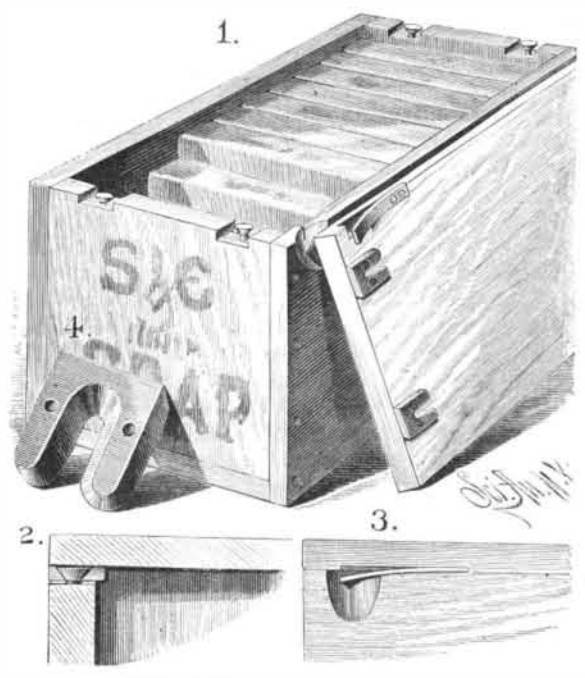
The New French Cruiser Sfax.

This cruiser, which was laid down at Brest eighteen months ago, was launched there recently. The Sfax, which is built of steel with twin screws and watertight compartments, is 290 feet long by 50 feet beam, and draws 23 feet of water, with a total displacement of 4,500 tons. The hull is entirely of steel, with a wood facing and a sheathing of copper. The vital portions of the vessel, such as the engines, boilers, and magazine, are protected by a deck with iron plates 2 inches thick. The Sfax carries six 6 inch guns, ten 5 inch guns on hydraulic carriages, and several revolving guns. Her two screws derive their motive power from two separate engines, which can develop at full pressure 7,500 horse power. The maximum speed is estimated to be 16¼ knots, and the Sfax will carry enough coal for a cruise of 6,200 miles. She has cost so far £153,000, of which about £80,000 has been spent upon the hull, and the remainder upon the engines, etc. If to this is added the expense of arming and equipping her, she will cost about £200,000.

DEVICE FOR SECURING BOX COVERS.

The body of the box is of ordinary construction, except that the end pieces are cut away at their upper edges, and that one of the side pieces is cut away to form the locking shoulder with which the free end of the spring engages for locking the cover in place. The outer surface of the side board is also cut away, to afford access to the spring for lifting it above the offset when the cover is to be removed. In the cutaway places are headed screws with which claw plates (shown detached and enlarged in Fig. 4), secured to the under side of the cover, engage to hold the cover securely upon the body. The screws stand flush with the upper edges of the end boards, so that when the cover is removed they will not interfere with the placing of a glass cover over the box for exhibiting the contents.

The claw plates may be stamped out of sheet metal, and secured to the cover by small nails or screws, or they may be made of cast iron. The spring is fastened to the cover,



SHAW & CHIDLEY'S DEVICE FOR SECURING BOX COVERS.

as shown in Fig. 1, and is so arranged that its free end will drop behind the offset just as the claw plates fairly receive the screws, thereby preventing all backward movement of the cover. The box is especially intended for the use of biscuit and soap manufacturers, who usually charge the boxes to their customers and have them returned to be refilled.

This invention has been patented by Messrs. H. A. Shaw and E. D. Chidley, of 784 Yonge Street, Toronto, Canada.

THE HARDEN HAND-GRENADE FIRE EXTINGUISHER.

Ever since P. T. Barnum, the renowned showman, brought to this country and attempted the general introduction of Phillips Fire Annihilator, about a quarter of a century ago, there have been a number of chemical fire extinguishers introduced, some of which have proved quite successful.

There has been recently introduced a very simple and inexpensive apparatus, called "The Harden Hand-Grenade Fire Extinguisher," and from the result of the numerous

HAND-GRENADE FIRE EXTINGUISHER

tests made before the public in this city, this would seem to fill a want not before obtained.

These little hand grenades extinguish fires on the same principle as the chemical fire engines, which are charged with carbonic acid gas, which by calculation possesses forty times the extinguishing effect upon fire that water has. These grenade extinguishers consist of a glass globe about four inches in diameter that resemble a small jug, and this contains the liquid which produces large volumes of fire extinguishing gas when brought in contact with flames.

The liquid it is said will stand a temperature of fifteen or twenty degrees below zero; thus all danger from its freezing and becoming useless when wanted is avoided.

A representative of the SCIENTIFIC AMERICAN was present at an exhibition trial of this extinguisher a few days ago, and witnessed the following experiments:

A fire was lighted at the side of a pine board fence, some 8 feet high by 15 long, the surface of which was coated with tar, and kindling wood and paper placed against it, the whole having a gallon or so of benzine scattered over it. The blaze sprang up almost instantly, and in less than half a minute the flames shot up twenty or thirty feet. To put out this fire, which it took but a few seconds to accomplish, three of the grenades were flung with enough force to break them and scatter their contents over the fence in the midst of the blaze.

Another trial was also made, in which the grenades were hung against the fence and the fire kindled under them. This time the blaze did not reach the height it attained in the former trial, but the grenades burst by the heat when the temperature had reached about 180° Fah., and the fire was again quickly extinguished. A watchman making the rounds of a factory with one or two of these in his hands would find them vastly more serviceable than a pail of water or a small hose, were either of the latter always on hand, as they so seldom are; and the grenades can be successfully used in cases where it is difficult to exactly locate or get near to a fire. To hang them in places where there is liability to fire, so they will burst before a fire has gained much headway, is one of their obvious uses.

For summer houses and stables, where the materials of construction are usually of an inflammable character and water is seldom at hand, these grenades would prove highly valuable. At the brewery of J. C. G. Hupfel a few days ago a fire broke out which promised to be more or less serious, but it was quickly extinguished by using four of the grenades.

An Ice-water Well.

In digging the well to supply the railroad tanks at Palouse Junction, W. T., the workmen passed through strata of alkali, clay, and finely-broken basalt rock, to a depth of 185 feet, where water of great purity and limitless quantity was found. The water in the well is five feet deep, and a steam pump, actively worked, makes little impression on the quantity. The most curious thing about the well is the fact that in digging the last fifty feet the workmen in the well had to wear heavy clothing and wrap their feet and legs in gunny bags to keep from freezing, while the men in the open air worked in their shirt sleeves. Water left in the bucket in the well over night would freeze. The water in the well does not freeze, because it flows too fast. The new well at Eltopia is seventy-five feet deep, nearly all the distance being through clay. The first twelve feet are through solid white alkali.—*Portland Oregonian.*

Intelligence of the Oriole.

On the western side of Central Park, very near 103d Street and Eighth Avenue, stands a row of elm trees, difficult to approach on account of a heavy growth of syringa bushes around them. On a branch of one of the trees, about sixteen feet from the ground, a pair of Baltimore orioles set to building a nest a few weeks ago. They chose the extreme end of the bough, with evident intention of making it a hazardous experiment for any bird nester to attempt to molest them. But in their excess of caution they appeared not to observe what the few persons whose eyes were keen enough to see the first labors of the little architects saw—that the branch was much too slender to support so large a nest as an oriole builds.

When the nest was about two-thirds finished the birds saw their mistake. The branch had bent so low that it was getting perilously near the grass. Work was at once stopped, and the builders sat close together for a long time, and seemed to be discussing the situation. Finally, they flew side by side to a bough about fifteen inches over the one on which their nest was, and, leaning over, inspected the distance. They seemed to be satisfied, and, though it was growing rapidly dusk, the birds flew away in opposite directions. In the morning it was found that they had firmly secured their habitation, and prevented the branch from bending lower, by passing a piece of white string, which they had found somewhere in the park, over the upper bough, and fastening both ends of it securely to the edges of the nest. The building then went rapidly on, and the orioles are now engaged in hatching their eggs. Very few persons have seen the nest, and there is a fair prospect that their skill and ingenuity will be soon rewarded by a brood of young orioles.

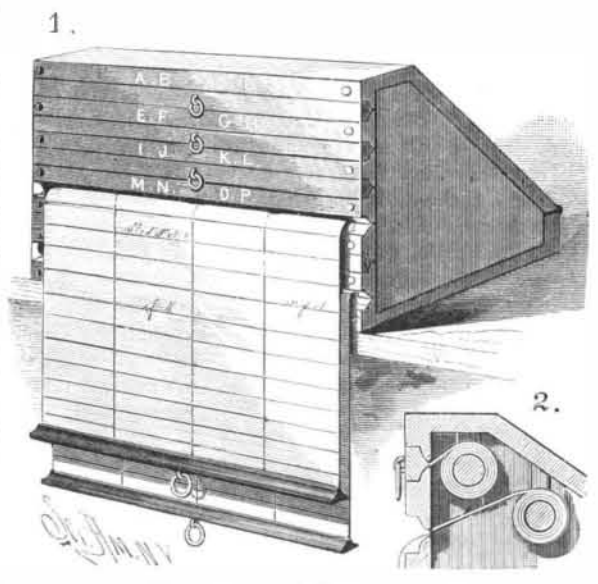
The Baltimore oriole is a very intelligent bird, but a New York ornithologist, who saw the nest, said he had never seen an achievement quite equal to this one before. He says the art of knitting fibers or strings together is well known to many birds. The weaver bird of India builds its nest out of a large, strong leaf, which it stitches together at the edges, making a compact and closely adhering funnel.—*New York Sun.*

Eucalyptus Globulus in Whooping-Cough.

The editor of the *N. E. Medical Monthly* having seen eucalyptus globulus recommended in pertussis, gave it a trial in his practice. He administered it in some twenty-five or thirty cases, and the results were of a very gratifying nature. Its effect was to greatly modify the severity of the paroxysms in every case, and in so abating the symptoms occasionally, that what gave promise of being a very severe attack in its incipiency turned out to be little more than what is known as a sympathetic cough. These results certainly merit for this agent a trial at the hands of other practitioners, for few will be prepared to admit that the best possible remedy for this affection has yet been employed.

INDEX FOR JOURNALS, LETTER FILES, ETC.

An index recently patented by Mr. Thomas C. Brown, of Norborne, Missouri, is conveniently arranged, and contains a great number of names in a very small space. The top of the box is inclined upward from the rear to the front, and is hinged to the back. The front is provided with a series of equidistant longitudinal slots, widened toward the outer surface to form grooves. As many spring rollers as there are slots are journaled in bearings within the case, and on each roller is fastened a sheet of strong paper muslin, to the outer edge of which is attached a slat fitting in the groove. Sheets fastened to the rollers, or pasted on the fabric, are



BROWN'S INDEX FOR JOURNALS, LETTER FILES, ETC.

ruled and divided into vertical columns, on which the names are written, with the corresponding page of the ledger, journal, etc. The initial letters of the names on each sheet are produced on the front of the corresponding slat. By pulling a slat the sheet is drawn outward so that the name and page number can be found; as soon as the sheet is released the spring roller winds it up again in the same manner that a curtain is wound on its roller.