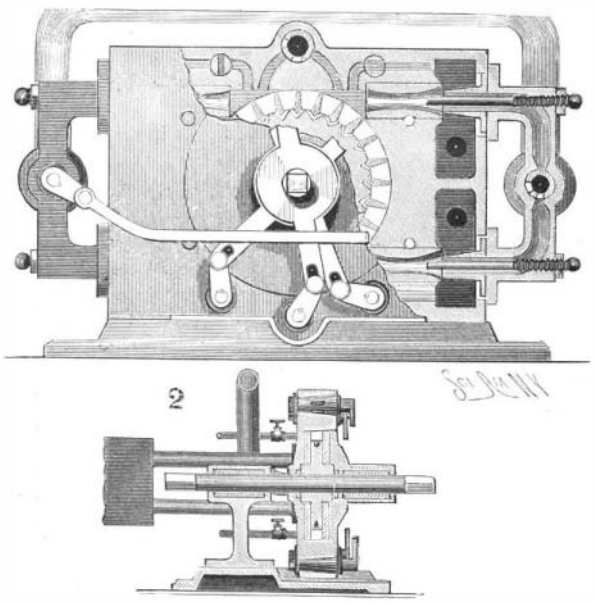
Preservation of Photographic Materials in a Vacuum.

Mr. Steffans has suggested the preservation of sensitized paper and plates in vacuo as a practical means of preservation in the case of articles sent out commercially; an excellent suggestion and one which merely amounts to extending to commercial use that which has long been done in the experimental laboratory. Several sheets of paper may be rolled up and sealed in an exhausted orange-colored glass tube, and even the soldering up of an exhausted tin case is a very easy matter, a method of doing this, which we have frequently practiced, being as follows: The tin casing must be so supported inside as not to collapse, and all being closed by soldering, except a minute countersunk pinhole for exhaustion, the countersink is tallowed, and a small bead of very fusible solder is laid in. A suitable solder is Wood's fusible metal, cadmium 1, tin 2, lead 4, bismuth 7; this melting between 60° and 70° Centigrade. To exhaust the air and at the same time fuse the bead of solder is a very easy matter. A small glass bell jar, rimmed with India rubber and connected with the air pump, is pressed down on a flat surface, and at the right moment a pointed copper soldering bit, which passes through a stuffing box, is brought down on the bead of solder. The whole question merits the attention of those who pack photographic goods, especially for export. In practice, the soldering bit would be heated electrically or by steam, and it must be remembered that a temperature below the boiling point of water is sufficient if the above mentioned solder is used.—Amateur Photographer.

A NEW TYPE OF ROTARY ENGINE.

In the engraving annexed we present two views of a novel rotary engine, driven by the action of a volume of water impelled against the piston by steam jets. Fig. 1 is a partial vertical cross section of the engine. Fig. 2 is a vertical longitudinal section, certain parts being omitted.

The casing of the engine has a central chamber in which the piston turns, and two water chambers on each side of the central chamber. The four water chambers communicate with the central chamber by means of throat tubes, and with a condenser by means of pipes, the same quantity of water being, therefore, constantly circulated through the casing. The water chambers communicate with valved relief passages extending parallel with the throat tubes, and serving to prevent back pressure against the piston. Above and below the piston two by-passes are located, each controlled by a two-way valve. These by-passes serve to regulate the action of the piston. Steam nozzles extend into the throat tubes and communicate with the arms of a main steam-feed pipe having two branches, each of which feeds two of the four arms. Each pair of arms is connected by a two-way valve by means of which the steam may be thrown into any one of the arms or cut off entirely. The two valves are connected to move in unison by means of a connecting rod. Through the steam nozzles and throat tubes valved exhaust tubes pass, which carry off an amount of water equal to the steam condensed. The various valves



SCOTT'S ROTARY ENGINE.

of the relief passages, by-passes, and pipe-arms are controlled by an arrangement of crank arms and levers, as shown in Fig. 1.

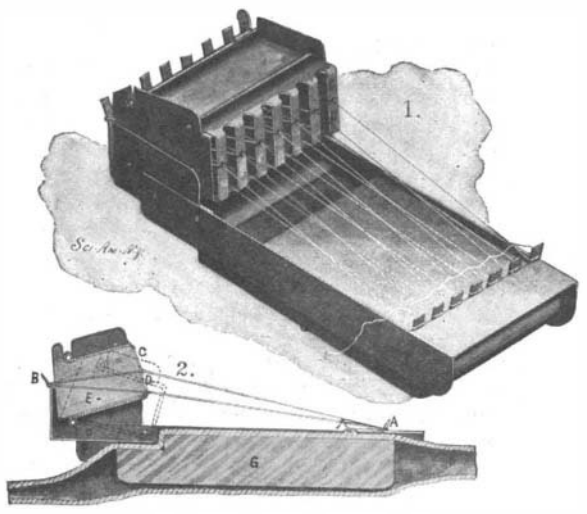
Assuming the valves to be adjusted, as shown in Fig. 1, then the active steam nozzles and water chambers will be those at the upper left hand and lower right hand corners. The steam passing through the nozzles mentioned will draw the water from the corresponding water chambers and impel it against the piston in opposite directions. The back-pressure produced by the action of the steam on the water causes a quantity of water to be forced into the exhaust tubes—a quantity equal to the amount of condensed steam. The four nozzles and water chambers, it will be observed, work in diagonally opposite pairs. The engine is reversed by means of the valves in the steam-pipe arms and the relief passages. The inventor of this engine is Mr. James Scott, 73 Motomachi, Hadokate, Japan.

AN APPARATUS FOR DARNING STOCKINGS.

A machine for darning stockings and other fabrics has been invented by Mrs. Hannah C. Hamann, of 3535 Half Howard Street, Omaha, Neb., which machine is so constructed that the work done is the equivalent of a weave, the darned or mended portion being equally smooth on both sides.

Fig. 1 is a perspective view of the device, and Fig. 2 is a longitudinal section.

The apparatus consists of a main frame, *F*, and a



A DARNING MACHINE.

frame, *E*, pivoted to an auxiliary frame riveted to the main frame. At its front end the main frame, *F*, is provided with a cross-bar having a series of upwardly projecting teeth, coinciding in position and number with teeth formed on a back piece of the auxiliary frame. Notched fingers, *D*, project vertically up from the bottom of the pivoted frame, *E*. From the hinged cover plate of the frame, *E*, notched fingers, *C*, extend downwardly, corresponding in number and location with the fingers, *D*. In connection with the main frame, *F*, a block, *G*, is employed.

In using the device, a square opening is made in the portion of the stocking to be darned; the block, *G*, is passed into the stocking so that the upper face will be beneath the opening in the stocking, and is forced upward into frictional engagement with the main frame, *F*. A warp-thread is then threaded on the teeth of the main frame and of the auxiliary frame, in the manner shown in the illustrations. The loose end of the warp-thread is passed through the eye of a needle, and the needle is passed through the perfect portion of the fabric adjacent to the opening, and under two strands from the inside to the outside of the fabric. The thread is then carried back over one strand and returned again under two strands, the operation being repeated until the end of the opening to be closed is reached. The pivoted frame, *E*, is now alternately raised and lowered so as to produce a changing shed in the arrangement of the warp-threads. The needle is passed between the upper and lower threads of the shed, alternately from one side to the other as the position of the warp-threads is changed, the thread attached to the needle and forming the cross or weft-threads being carried forward. Each time the needle passes back and forth between the separated warp-threads it also passes through the edges of the opening. The thread is drawn properly in place to close the opening and present a surface perfectly smooth on both sides.

An American Blue Grotto.

Many of the beautiful phenomena seen at the celebrated Blue Grotto of the island of Capri are reproduced on a small scale in a cavern at Lake Minnewaska, New York. This lake is situated on the Shawangunk range of mountains at an elevation of about 1,700 feet.

The cavern is formed by several huge rocks of white quartzite overhanging the water so as to form a comparatively dark hole, and the space between the under side of the sloping rocks and the water varies from about two feet to not more than two inches.

The cavern faces the southwest; it is very irregular in shape, and at one point the roof and walls reverberate in response to a deep bass note. The water just at the entrance to the cavern is 33 feet deep, and two or three feet away, 40 feet; it is very transparent at considerable depths. As the rocks overhang so close to the water, the optical effects can only be seen by a swimmer, and it was while swimming along the shore that H. Carrington Bolton discovered the American Blue Grotto three years ago, and described the same in Science. As one approaches the mouth of the cavern the bluish color of the water is noticeable, but the beautiful effects are best seen by entering the opening and looking outward toward the light.

The water varies in color from Nile green through turquoise blue and sky blue to deep indigo blue, and in all these shades exhibits the silvery appearance, when agitated, characteristic of the grotto at Capri. A body immersed in the water has a beautiful silvery sheen, similar to the reflection of moonlight. The water has these colors at all hours, but they are strongest when the sun is in the zenith; late in the afternoon the slanting rays of the sun enter the opening and light up the cavern, greatly diminishing the optical effects.

Another pleasing phenomenon must be mentioned. Just below the water line, where the rocky sides are lapped by the waves, the white quartzite exhibits a brilliant siskin-green hue; this bright color is limited to a space about three or four inches below the level of the lake and to certain walls of the cavern. The bare arm immersed in the water partakes of the green color when the light is reflected at one angle, and of the silvery blue color at another angle.—Science.

AN IMPROVED SASH-BALANCE.

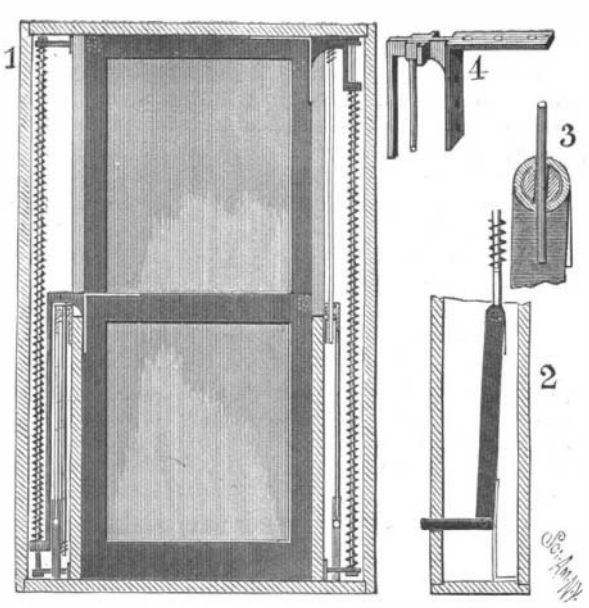
A patent has been granted to Joseph A. Manahan, of 23 East 129th Street, Manhattan, New York city, for an ingenious mechanism by which a window can be automatically operated.

Of the accompanying illustrations, Fig. 1 is a front elevation of a window with the mechanism applied, parts being in section; Fig. 2 is a section showing a detail; Fig. 3 is a section of a locking device employed; Fig. 4 is an enlarged view of the bracket for the lower sash.

To diagonally opposite corners of the two sashes brackets are secured, each provided with a vertical locking-rod and a projecting guide-arm moving on a guide-rod. Coiled around each guide-rod is a spring which acts against the corresponding guide-arm. Each locking-bar slides longitudinally through a lock or clutch (Fig. 3) which consists of a sleeve having a longitudinal bore and a transverse cut. In the transverse cut a pivot is placed which has a perforation corresponding with the vertical bore of the lock, so that the locking-bar passes through both lock and pivot. The locking-bars are normally locked because the pivot is slightly turned or jammed in the lock by the action of the spring-pressed lever (Fig. 2). When the lever is thus held at an angle, the vertical bore of the lock is out of alinement with the perforation in the pivot, for which reason the locking-bar cannot move up or down, but is jammed in fixed position.

In Fig. 1 the sashes are shown in closed position. When it is desired to open either sash, the proper button is pressed against its spring so as to turn the pivot in the lock and release the locking-bar. The coiled spring will then open the sash. When the proper elevation has been reached, the lever is allowed to spring back to hold the locking-bar. A slit is cut along the window-casing for the passage of the brackets and their guide-arms and rods. The closing of the sashes is effected by hand.

The bracket shown in Fig. 4 differs from the upper



MANAHAN'S SASH-BALANCE.

sash bracket, only in having a depending shank, a construction due to the position of the bracket. A mechanism of the character described is particularly applicable to car windows.

UTOPIA is now known to be located at Orsa, in Sweden. The community has, in course of a generation, sold $4,600,000 worth of trees, and by means of judicious replanting has provided for a similar income every thirty or forty years. In consequence of this commercial wealth there are no taxes. Railways, telephones, etc., are free, and so are school-houses, teaching, and many other things.