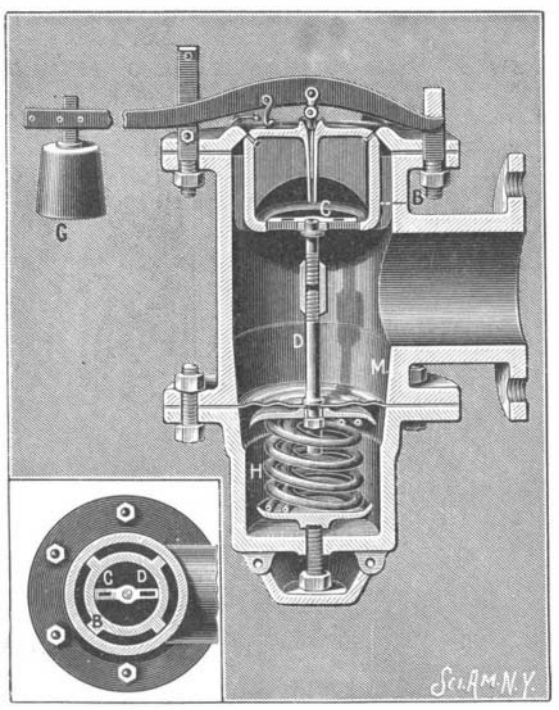
A NEW SAFETY VALVE.

We give herewith sectional and plan views of a new safety valve, for which we are indebted to La Nature.

The plate submitted to the action of the lever that carries the counterpoise, *D*, rests upon the top of a small cylinder, *B*, movable in a vertical direction in the valve box. This cylinder carries at its lower part a transverse piece, *C*, provided with two apertures, and into which is screwed a vertical rod. This latter is connected through a nut with another rod, *D*, which is fixed to a thin metallic disk, *M*, of which the circumference is clamped between the flanges of the valve box. Beneath the disk, *M*, there is a double spiral spring, *H*, which rests upon a disk that can be maneuvered by means of a screw protected by a cover hinged to the bottom of the box. The base of the latter is provided with an aperture for the purpose of revealing the existence of any leakages of steam that might take place through the disk, *M*.

The regulation of this valve is a very easy matter. The surface of the disk, *M*, is such that the pressure exerted upon it by the steam is equal to that exerted upon the cylinder, *B*, and the rod, *C*. Such pressure is obtained by regulating the tension of the spiral spring by means of the screw at the bottom. By acting upon the nut that connects the rods, *D*, the cylinder, *B*, may afterward be brought into contact with the plate submitted directly to the action of the lever carrying the counterpoise.

Such regulations will remain in force for pressures up to an amount determined by the conditions of equilibrium adopted; but it will no longer exist if the weight, *G*, be changed or the lever rendered stationary. In fact, if the weight be increased, the cylinder, *G*, will immediately descend, and the steam will escape. In like manner, if the lever be fixed, the pressure will cause the disk, *M*, to yield and carry along the cylinder, *B*, through the intermedium of the rod, *D*.



A NEW SAFETY VALVE.

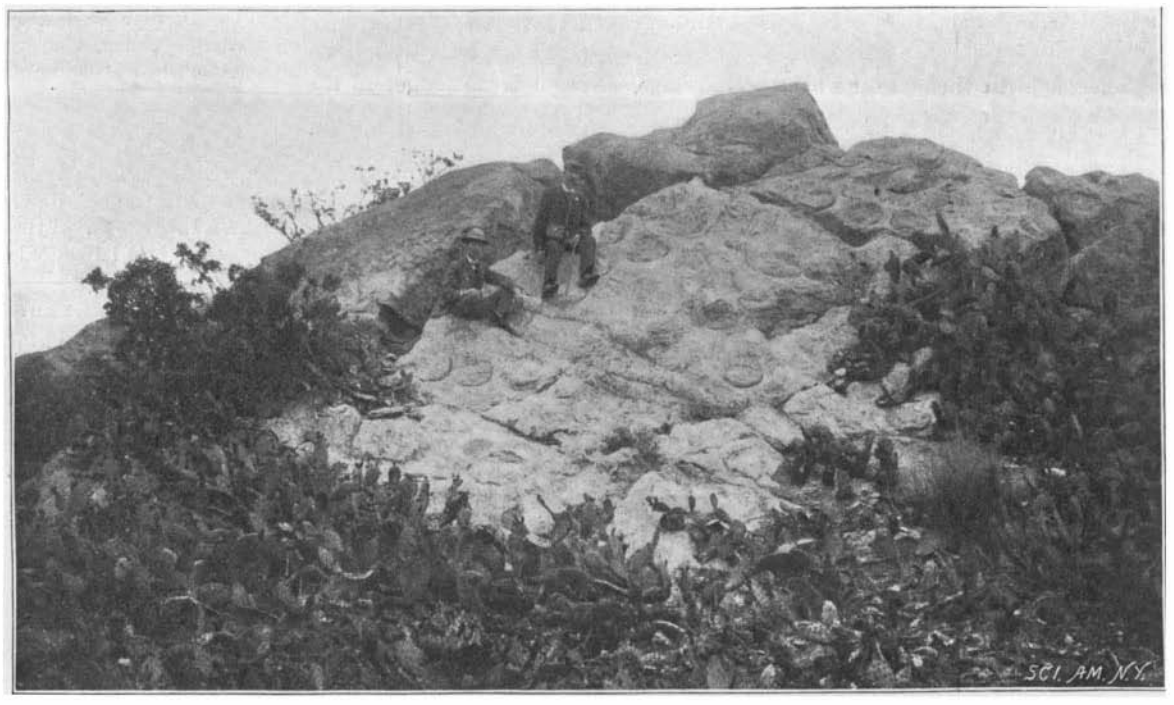
A CALIFORNIA VERDE ANTIQUE QUARRY.

BY PROF. CHARLES F. HOLDER.

The question whether we are advancing in the mechanical arts and great schemes of engineering is often suggested when we are confronted with the work of the ancients. The pyramids are the most stupendous works of man ever contemplated, and there appears to be nothing new under the sun. Interest in irrigation in the Southwest dawned within the past twenty years, yet in Arizona and New Mexico there are traces of a civilization so old that the mind falters in following it back. We see beds of streams cut through miles of country, even mountain ranges, and a maze of irrigation streams crossing and re crossing the land, made unknown ages in the past years, so perfect from an engineering standpoint that the experts of to-day are emptying them of the sand and débris of centuries and using them as the arteries that shall bring new life to this fertile part of what was the old American Desert. Everywhere we follow in the steps of the ancients, and on the island of Santa Catalina there is an interesting illustration of this.

When the whites first visited Southern California, they found in use among all the mainland Indians richly shaped ollas or mortars of steatite or serpentine, while scores of articles were formed of finer grades of the same, which experts have pronounced verde antique. In almost every grave ollas were found, and hundreds had been handed down and were in the possession of the Mexican descendants of the Indians. There were flat stones, perforated to hang on pegs, quaint ornaments, sculpturings of various animals and tally stones with lines cut in them. One found by the writer at Santa Cruz Island on the breast of a skeleton bore fifty or more straight marks—which might have been the man's age — and were all that could be made out.

Verde antique was valuable, and a search was made for the point of supply. Finally Prof. Schumacher, of the Smithsonian, discovered it on Santa Catalina Island, which lies off Southern California, in a locality named Pott's Valley, about fifteen miles from the little town of Avalon. Prof. Schumacher found on this island a perfect treasure house, and carried to the National Museum hundreds of objects representing the ancient California islanders. All the islands of this group were inhabited by a hardy race that had camps in every cañon where there was water, and Santa Catalina abounds in kitchen middens and places where these people lived. That they were a commercial race is shown by the ollas they made, and they were the merchants who supplied the races of Southern California with their pots and mortars or ollas.



THE ROUND SCARS INDICATE THE PLACES FROM WHICH THE OLLAS WERE BROKEN BY THE INDIANS.

SERPENTINE QUARRY AND MILL, SANTA CATALINA ISLAND, CAL.

Prof. Schumacher's attention was attracted at Pott's Valley by the remarkable rock shown in the accompanying illustration, where the scars of ollas that have been broken off by the islanders are plainly seen. The rock is a lofty mass of steatite that rises in the center of Pott's Valley, now called Empire Landing. It is a land-mark from a long distance at sea, and is overgrown and surrounded with cactus and various kinds of vegetation; indeed, the cactus hides a large portion of it—an almost impregnable chevaux de frise. The scars are circular and are the marks where the round ollas were broken off. The method of work was very primitive, the natives having only slate and quartz knives to work with. With these rude implements they carved out an object the shape of a cannon ball and as large as a football. Gradually this was picked away until, finally, it hung by a narrow stem, which was broken off. The inside was then slowly dug out with the same rude tools, and in time the olla acquired the smooth and often artistic form so familiar in all the museum collections. The common shape is round, but fine mortar shapes three feet in height were not unusual.

The writer some weeks ago went over this old manufactory very carefully and found it most interesting. Here was an aboriginal manufactory — an out-door workshop—in the immediate vicinity of which were found verde antique implements in various stages from the olla just outlined to the one that had been broken off leaving the scars in the rock. In a word, the complete evolution of the olla could be traced here, especially at the head of Cottonwood Cañon, back of Pott's Valley, where verde antique crops out in ledges in every direction. On many of these can be seen the work of the native carvers, while beneath are the piles and heaps of chips as they were left centuries ago.

The early Spanish navigators, Cabrillo and Viscaino, who discovered the island three hundred years ago, described the fine canoes of the natives. These, laden with ollas, crossed the Santa Catalina channel, and the natives exchanged them for game and skins not found here. The present owners of the island, recognizing the value of the stone for commercial purposes, have followed out the mute suggestion of the ancients by establishing at Empire Landing a sawing plant, opening up a valuable quarry and one that is unique, it is believed, having no prototype at least in this country. The verde antique resembles soapstone in the crude rock and would easily escape observation. It is of different degrees of hardness, and while so soft that it can be readily worked, it has great tensile strength, its chief value being in the remarkable manner in which it can be worked. Almost every possible object can be made from it from a boat to a screw. A great value lies in its imitation when polished of the darker grades of marble; and owing to its cheapness and durability it is in demand among architects for mantles, lining, electrical slabs, and where a perfectly polished surface is required with the strength of marble. The new city hall of Los Angeles and many of the fine buildings in that city and San Francisco are finished in it, the stone taking a rich polish, abounding in greens and yellows, grays and black.

A visit to this quarry is most interesting. Here, eight or nine hundred feet above the sea, is an elaborate plant and a series of saws that are capable of cutting out hundreds of feet of verde antique a week. The rock is first bored into with a steam rock drill, a modern improvement on the flint chips of the ancient owners of the soil. A series of borings make it an easy

matter to break off the slab, which is then by means of a huge crane lowered upon a car and run under the saws and blocked for cutting. The term saw would be misleading to the layman, as it is really a gang saw with blunt surface, and worked by the steam engine moves back and forth on the edge of the stone, not touching it, but cutting by the grinding into it of a mass of steel shot which are really the teeth of the saw. The rapidity with which this is accomplished is marvelous, and large slabs are cut out with ease—huge slabs for the side of a wall, fronts for fireplaces, aquarium sides or plates, tiles for flooring, etc. All the tanks of the Geological Station here were made from this stone, which apparently solves the question of producing a cheap but attractive aquarium and one so far as the tanks are concerned that can be built rapidly. The stone is cut into the proper shape and shipped to Los Angeles, where it is polished and applied to many purposes, and its development has become one of the valuable industries of Southern California.

A NOVELTY IN RAILROAD COLLISIONS.

The popular interest which a railroad collision possesses is, no doubt, due in part to the extraordinary manifestations of power revealed by the curious and often grotesque positions into which the various elements of the colliding trains are thrown. Although we do not see the solution of the popular conundrum as to what would happen if the "irresistible" were to strike the "immovable," we do have an opportunity to see how the huge moving mass of the locomotive and its load seeks out the line of least resistance and arranges itself accordingly. The confused entanglement which is known by the name of "railroad wreck" assumes its curious positions in accordance with strict physical laws.

The accompanying view of a wreck, which occurred recently on the Chicago and Alton Railway, was reproduced from a photograph, for which we are indebted to our esteemed contemporary The Railway Age. Our readers will understand how exceptional were the results of this collision when we explain that the coal car, upon which the locomotive is seen resting, is not one of the cars of the first train, but was the first car immediately behind the locomotive of the second train. The circumstances of the collision were as follows: Two heavy freight trains had been sent out over the lines, with about fifteen minutes' interval between them. The first train had been stopped at a tank to take water, when it was run into by the second train, which was being hauled by two engines and was running at the rate of about twenty miles an hour. The leading engine was flung to one side of the track, and, turning completely around, came to a rest headed in the opposite direction from which it had been traveling. The second engine, the one shown in our illustration, must, at the moment of the collision, have been forced into the air clear of the rails to a sufficient height to allow a forty-ton coal car, which was the leading car of the train, to shoot forward beneath it and catch it as it fell. In no other way could the relative positions, after the collision, of the engine, tender and coal car be explained. As a matter of fact, it is a common occurrence, where the locomotives meet front to front in collision, for the engines to rear squarely into the air and then fall sidewise or be thrown back upon their own trains. The mere momentum of the two engines alone would not accomplish this or fling a locomotive, as in the case of our illustration, clear into the air; but we must remember that behind the engines there is the stored-up energy of, say, a thousand-ton train moving at the rate of twenty miles an hour, which would be amply sufficient to force the locomotive clear of the rails.

The engine having elected to travel on other wheels than its own, the wrecking crew promptly accepted the suggestion, and, after backing the end of an empty coal car under the front end of the engine, as shown in the illustration, the two cars with their novel freight were hauled to the Bloomington shops for repairs. The weight of the engine is fifty tons, therefore, the total load of the car, including the coal, was about ninety tons. The bolsters were of steel, and it speaks volumes for the strength and general excellence of construction that it should have received and carried such an unprecedented burden without material injury.

Variations in Weight.

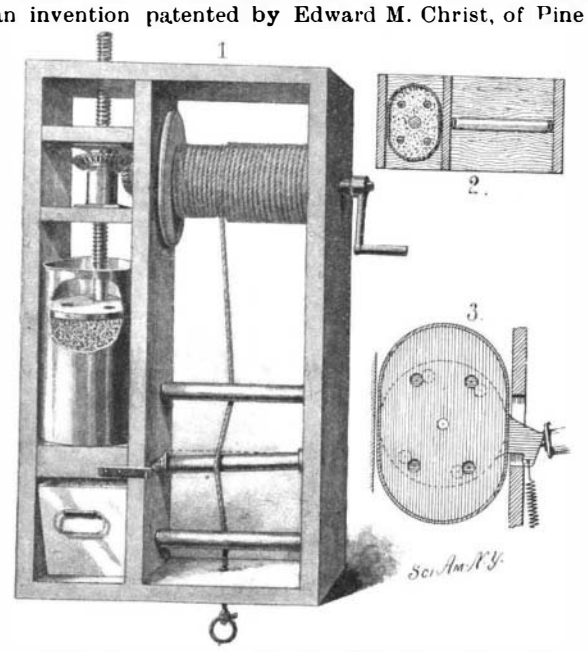
The following table, which is given by W. W. Wagstaff in the last number of Knowledge, is interesting:

Average.		lb.	oz.		lb.	oz.	
9	A. M.—Before breakfast	155	8	(losing	3	6)	during night.
10	A. M.—After "	157	4	(gaining	1	12)	
12	noon.—Before lunch	156	6	(losing	0	14)	
1	P. M.—After "	157	6	(gaining	1	0)	
5	P. M.—Before dinner	156	12	(losing	0	10)	
6¼	P. M.—After "	158	14	(gaining	2	2)	

By these figures it will be seen that an average person weighing 155 pounds loses 3 pounds 6 ounces during the night and that he gains 1 pound 12 ounces by breakfast and then that he loses about 14 ounces before lunch, that lunch adds an average of 1 pound and then he again loses during the afternoon an average of 10 ounces; an ordinary dinner to healthy persons adds 2 pounds 2 ounces to their weight. Of course excess in eating and drinking will change these figures, but they are interesting as averages.

A NEW FORM OF FIRE-ESCAPE AND LOWERING APPARATUS.

To provide a simple apparatus for lowering objects of any kind gradually, which apparatus will be particularly adapted for use as a fire-escape, is the purpose of an invention patented by Edward M. Christ, of Pine



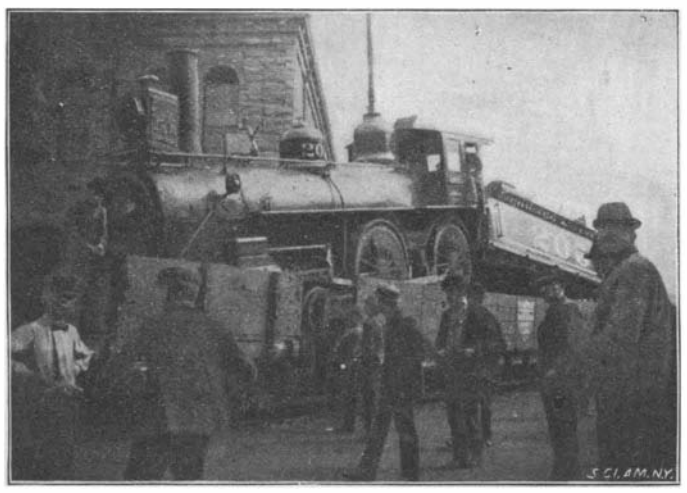
PERSPECTIVE AND SECTIONAL VIEWS OF THE FIRE-ESCAPE AND LOWERING APPARATUS.

Grove, Pa. The apparatus comprises essentially a sand cylinder with a valve outlet, in which cylinder a screw-driven perforated follower is contained, serving to regulate the rapidity of the descent.

Fig. 1 is a perspective view of the apparatus, the sand cylinder being broken away to show the follower. Fig. 2 is a cross-section taken immediately above the cylinder. Fig. 3 is a cross-section taken through the bottom of the cylinder.

The cylinder and perforated follower are supported in a frame in which a windlass is mounted. About the windlass a rope is wound, passing behind an upper and lower roller and in front of a central roller, so that it is bent out of the straight course, as shown in Fig. 1. The shaft of the windlass carries at one end a bevel gear meshing with a bevel gear on the threaded shaft of the follower. The bottom of the sand cylinder as well as the follower is perforated, providing a number of outlets for the sand. These outlets are normally closed by a valve plate, which is provided with openings adapted to register with the outlets in the cylinder bottom.

The valve plate has an extension or arm with which



CURIOUS COLLISION—COAL CAR BRINGS HOME ITS OWN LOCOMOTIVE.

a spiral spring is connected, serving to hold the valve plate in the position shown in Fig. 3. One end of the central roller is connected with the arm, the other end of which is loosely held in a bearing on the frame.

When the parts are in their normal position, the coil spring will hold the valve plate of the sand cylinder closed; but when the rope is pulled, the central roller will be thrown aside, thus swinging the valve plate, causing its openings to register with the cylinder outlets, and permitting the sand to flow into a receiving pan. The follower cannot descend until the sand begins to run, and the rapidity of its descent will be regulated by the quantity of sand dropping into the pan in a given time.

The degree of pressure on the rope automatically controls the flow of sand. The rotation of the windlass is regulated by the follower; hence the rope, with the object to be lowered, is caused to descend gradually. The rewinding of the rope will simultaneously raise the follower shaft and return the follower to its initial position.

Automobile News.

A representative of a German firm purchased one of each make of several automobiles at the National Export Exposition. He says he was attracted by the superiority of the ball-bearings and running gear of the American machines. He intimates that the superior points of the American machines will be taken advantage of, and will most probably be incorporated in their future output.

The electric automobile recently covered the distance between Atlantic City, New Jersey, to a point four miles west of Berlin, Camden County, a distance of fifty miles. The round trip was made at an average speed of 15 miles an hour, and a speed of 20 miles an hour was attained at times. The distance was carefully measured by three bicycles provided with cyclometers.

A steam plow invented by Colonel Templer, R.R., Director of the Military Ballooning and Steam Transport, has been given a trial near Aldershot, says The Mechanical Engineer, and fully carried out the objects for which it was designed. It threw up a 4-foot intrenchment at the rate of 3 miles an hour across a very rocky and rough country. Two of these machines are to be shipped at once for use with the South African field force in storming positions. The machine is so arranged that it will throw up works on either the right or left, and so powerful are the picks in front of the plowshares that rocks and stones are split to pieces and hurled upward.

The Automobile Almanac for 1900 and the Automobile Trade Directory is soon to be published by The Automobile Magazine, of New York, and will contain a large amount of valuable information interesting to automobilists, such as special reference to signs of the weather, moonlight tables, wind pressures, State ordinances, highway laws and directories of all kinds. We see from some of the advance statistics which have been furnished us that there are 688 automobiles in use in the United States, or about ten per cent of those used in France, that number being 6,546. No other country, however, can boast of as many automobiles as our own, Belgium coming next with 478; then comes Germany with 434 and Austria 403. Great Britain has 412. It seems that there are 190 manufacturers in the United States, but that of this number only twenty were in a position to deliver carriages on December 1, 1899. In France, on the contrary, there are 702 manufacturers and 1,150 dealers.

Laurel Wreaths.

It is an interesting fact that the large laurel wreath which was presented to Admiral Dewey by the United States Senate was composed of leaves grown in Africa. The wreath was about three feet in diameter and was made of silver laurel leaves mounted on a base of natural pampas grass. The leaves are pure silver gray on both sides and are delicately veined. The leaves have a white metallic luster and an exquisite softness of tone. The New York Tribune recently had some interesting facts concerning the silver laurel. It is looked upon by the natives of Africa as a sacred plant, and was used as a decoration for festive occasions. Its beauty and similarity to silver have induced collectors to send it to European countries, and the inroads on the growing stock have been so great that its exportation has been prohibited, and the leaves which now come to Europe and the United States are said to be smuggled, the price in New York being about 25 cents a leaf. By the presentation of the laurel wreath, the custom established by the Greeks many hundreds of years ago was followed, and by the ceremony Admiral Dewey became one of the host of laurel-crowned characters who figure in the chapters of history. The laurel of the ancients was dark green and was the same hardy plant which is now found in abundance in the Mediterranean region and in the Canary Islands. There were at least four shrubs and small trees known as laurel, or bay. The Laurens nobilis, or "Victor's laurel," known also as sweet bay, was one which was used by the ancients for the decoration of favorites. It was a large leathery, shining, reticulated leaf and with axillary cluster of yellowish-white flowers. The fruit is oval, bluish-black in color and about a half inch long. It is not as common in Europe as the species of cherry laurel or common laurel, which is also found in the United States.

THERE were nearly 22,000 deaths in 1898 from snake bites in India. According to The Medical News, the efficiency of the new serum is now fairly well established, but the price of a bottle, which is $1, puts it beyond the reach of most of the victims.