NEW RAILROAD OVER THE ROCKY MOUNTAINS OF COLORADO.

It was not many years ago that the ore production in the State of Colorado did not exceed three or four millions of dollars a year. The introduction and extension of the railroad systems throughout the State, in spite of the many physical difficulties that stood in the way, has worked a great change, and towns which, a few years ago, contained but a few scattered houses, with a handful of desperadoes as its only inhabitants, are now flourishing cities, with its town hall, theaters, and perhaps a few churches. This is due to the fact that Colorado has risen to the first rank among the States and Territories as a producer of the precious metals, for gold and silver combined, as well as for silver alone; while for gold it holds, according to the last census report, the fourth rank. In relation of production to area it also holds the first rank for gold and silver combined, and for silver alone, and the third for gold alone.

The tremendous increase in the production may be noticed in the fact that the yield in 1880 amounted to $19,250,000 in gold and silver alone, and if there be added to this the value of lead and copper in crude metal produced, there would be a total value of metallic product of over $22,750,000. How dependent this product is upon the extension of the railroad systems throughout the State is illustrated by the growth of the product in proportion as the railroads were multiplied.

A most interesting engineering work is now being prosecuted in the counties of Ouray and San Juan, and if reference be made to a map of Colorado, it will be seen that the town of Ouray is the terminus of one branch of the Denver and Rio Grande Railroad. It will also be observed that Silverton, which is separated from Ouray by high mountains and deep valleys, is also the terminus of another branch of the Denver and Rio Grande Railroad. It is proposed to connect these two towns by a railroad, to be known as the Silverton Railroad, and the work on it is now being prosecuted. Owing to the wild and rugged nature of the country through which the road passes, rather primitive methods have been resorted to in the construction of the road, which would suggest Mexico or South America rather than one of the richest mining States of the Union. The road is being built in the bed of an old turnpike toll road that connected these two points, and which was constructed by and is the private property of Mr. Otto Mears, a prominent citizen of Colorado, and one who has done much to develop the State by introducing extensively the toll road systems. This road is 23 miles long, and at certain points had to be blasted out of solid rock. It was constructed at a cost of over $200,000. One of the views, which we reproduce from a photograph, gives a good representation of one of the wildest sections, where the road was cut out of the side of the cliff.

It winds along a mere ledge on the face of the cliff and the rocks tower above for thousands of feet, while a thousand feet below flows the Uncompahgre River through a deep gorge, which is impassable to man.

It is said that there are over 5,000 mining claims and mines recorded and being worked within ten miles of this point.

In the cut at the right, the toll road is again seen as it passes over the stream above the Bear Creek falls. The railroad will pass over the stream at this point. The falls are very beautiful, and fall in a single unbroken sheet, a distance of over 600 feet, and form one silver wave unvaried save by an eternal rainbow. Some idea of the height may be gained by comparing the falls with the pines growing upon the banks above. Silver Lake, which is represented in the middle cut, is situated above the timber line on King Solomon's mountain, at an altitude of about twelve thousand five hundred feet. The surrounding country is very rich in ores, and at the right of the lake is located the Silver Lake Black Diamond mine, one of the richest producers in Colorado, yielding as it does gold, silver, lead, and copper ores. The road leading from the mine to the valley on the other side of the lake may be indistinctly seen. A little above this valley, at about the center of this picture, is the Buckeye mining property, which is also very rich in ore.

The method of transporting the rails is illustrated in the bottom cut. The rails are strapped to the backs of donkeys, the ends dragging on the ground behind. The donkeys are not provided with either bridles or bits, but follow each other up the sides of the mountains single file. The railroad, when completed, will be 17 miles long. The highest altitude reached is 11,200 feet, at a point near Red Mountain. There will be fourteen side tracks connecting with the main track, which will bring fourteen mines into direct railroad communication with the great railroads of the State. The expense of this narrow gauge road is estimated at about $1,000,000. The maximum grade is 237 feet per mile.

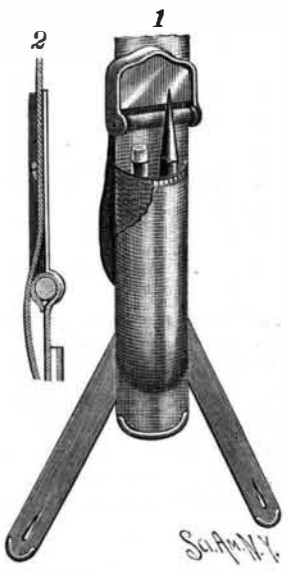
To melt rubber.—Rubber can be melted by heating in a can over a water bath, that is, the heat must be hot enough to melt, but not burn.

A New Society of Engineers.

Under the auspices of the Engineer Corps of the Navy, steps have been taken to organize the "American Society of Naval Engineers." The object of the society is to promote a knowledge of naval engineering by the reading, discussion, and publication of papers on professional subjects; to publish the reports of boards and accurate accounts of the trials of all naval machinery, plans of new machinery, and of the results of such experiments and other inquiries as may be deemed essential to the advancement of the science. The society will be composed of members, associates, and honorary members, comprising engineers at present connected with the navy and those formerly connected with the service.

A SUSPENDER POCKET FOR PENCILS, ETC.

The illustration herewith represents a suspender made with a pocket so arranged as to conveniently hold small articles, such as pencils, spectacle cases, and the like. It has been patented by Messrs. Tom B. Pell and James W. Knox, of Lewisport, Ky. In the lower end of the buckle, by which the suspender is vertically adjusted, is a crossbar from which depends a strip or piece of non-elastic webbing, to the face of which is secured a pocket, open at the top and closed at the bottom. This pocket consists preferably of elastic webbing, in which the elastic runs transversely. The lower ends of the suspender are attached to the piece of webbing back of the pocket, the suspender being adjustable without interference with the pocket portion.



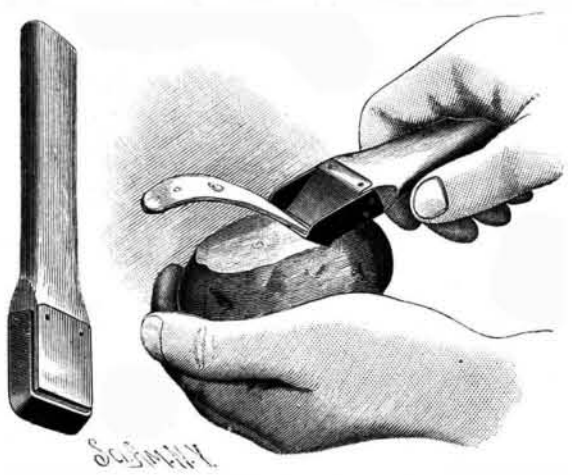
PELL AND KNOX'S SUSPENDER END.

Frozen Water Pipes.

The season for frozen pipes is approaching, and the *Southern Lumberman's* answer to an inquirer is worthy a trial. "If the pipe is underground, or covered by a wooden conduit, place a bushel or more of unslaked lime over the point where the pipe is known to be frozen, put water enough on the lime to slake it, and cover with old sacks, canvas, sawdust, or anything that will keep the heat the slaking of the lime generates from going off in the air. This is a better plan than to dig up the pipes and apply fire by burning coke or wood, but will require more time. Where water pipes are conveyed only a few inches underground, as is customary in the South, the lime process might be superseded by the burning of slabs and refuse over the line of pipe. But the best plan is to prevent the pipes freezing, on the broad principle that an ounce of prevention is worth more than a pound of cure."

AN IMPROVED VEGETABLE KNIFE.

A simple form of knife whereby vegetables can be easily and rapidly pared without unnecessary waste is



FOOTE'S VEGETABLE KNIFE.

shown in the accompanying illustration, and has been patented by Mr. Frederick S. Foote, of No. 167 West Twenty-third Street, New York City. The blade has side members or ears by which it is secured to the handle, the central cutting edge of the blade standing a short distance in front of a metal-faced edge of the handle, and projecting slightly below it. The lower surface of the handle is made flat to act as a guard to prevent the knife from entering the vegetable or object being cleaned too great a distance. The side members of the blade are sharpened near their outer corners, for removing eyes of potatoes or reaching depressions in the surface of vegetables being pared.

Correspondence.

Oersted's Discovery of Electro-Magnetism.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN for December 22, Mr. Hopkins says, in his very interesting article on "Simple Experiments in Physics," that Oersted made his celebrated discovery of the connection between electricity and magnetism while passing through his laboratory, compass in hand, and having his attention attracted to the strange behavior of the needle. The inference is that the discovery was accidental. The usual accounts given of this experiment accord with that given by Prof. Mendenhall, in his "Century of Electricity." Oersted, in common with other scientists of that time, had long been convinced that there must be some connection between electricity and magnetism, and was seeking to establish it experimentally. To quote from this author:

"It was in the winter of 1819–20 that Oersted's efforts were crowned with success, and his victory was won in the presence of many besides himself. It was during the inspiration of a lecture before his pupils that the thought occurred to him to try a new mode of attack. A battery of considerable power was on the table, and near by was a suspended magnetic needle. He announced to his hearers what he was about to try, and then seized the wire joining the two poles and placed it parallel and over the needle. Instantly the needle swung out of its position, and one of the most magnificent discoveries of modern science stood revealed as an accomplished fact."

The great importance of this discovery makes the circumstances under which it was made of considerable historical importance. Hence, would like to know which is the correct version.

W. M. STINE, *Prof. Physics.*
Department of Physics and Chemistry,
Ohio University, Athens, O., Dec. 24, 1888.

To the Editor of the Scientific American:

With reference to the letter of Prof. W. M. Stine, referred to me by you, I will say that my understanding of the circumstances under which the discovery of electro-magnetism was made by Oersted is in accordance with the article referred to.

Shaffner, in his "History and Description of the Semaphoric, Electric, and Magnetic Telegraphs of Europe, Asia, Africa, and America," p. 114, describes a visit to Oersted's laboratory as follows:

"In the year 1854 I visited Copenhagen, and the first object of my curiosity was to see the laboratory of Oersted. Through the generous attention of M. Faber, the Director-General of the Telegraphs of Denmark, my desire was gratified. I saw the room in which electro-magnetism was dicovered and the small compass that developed it.

"Professor Oersted was engaged in arranging some wires connected with the voltaic battery, preparatory to making some electrical experiments which he had in view. While thus adjusting the wire conductor, he had in his hand a small compass, some two and a half inches in diameter. Sometimes his hand, with the compass, was above the wires, and at other times below them. He observed the needle of the compass to move, and his attention being once directed to the development, the discovery followed as a sequence. That discovery, at the time, was made known in the following language, viz.: 'When a magnetic needle is properly poised on its pivot at rest in the magnetic meridian, and a wire arranged over and parallel to the needle, in the same vertical plane, and the ends of the wire made to communicate, respectively, with the poles of a voltaic battery, the needle will be deflected.'"

Dr. Alfred Ritter von Urbanitzky, in his "Electricity in the Service of Man," page 8, says: "It has been said that an apple falling to the ground caused the discovery of the law of gravitation; the motion of a frog's leg led to the discovery of galvanism; chance led Oersted to observe the influence an electrical current has on the magnetic needle."

Clerk-Maxwell, in his "Electricity and Magnetism," vol. 2, page 475, refers to this circumstance as if it were accidental. In all the other authorities which I have examined, this question is left open to conjecture.

GEO. M. HOPKINS.
New York, December 28, 1888.

Small Bore Balls.

Recent experiments on the effects in the human body of the new French balls (Lebel gun) have shown many interesting facts. The ball of the Lebel gun is a small one (8 millimeters diameter, instead of 11), which travels faster than those formerly used (570 meters per second, instead of 450), and is clad in a dress of *maillechort* (German silver), which gives it a greater hardness. It produces much smaller wounds, and these are more limited than with other balls; bones are not so much shattered; and the fact that the ball does not (up to the distance of 1,200 meters) remain in the body, renders the treatment much easier. The Lebel ball may be considered as a humanitarian and philanthropic instrument, in a large measure.