

# MAN AS A BURROWING ANIMAL

**His Recent Triumphs in the Work of Tunnel Building**

WHEN man takes to emulating the mole, and becomes a burrowing animal, he accomplishes remarkable feats. In imitating birds and fishes he has done wonders—such stupendous things that you might think he would be satisfied. Not he! His ambition stops not with dominion over the surface of the earth and the waters thereof, nor yet over the air. He has been burrowing in great earnest for a number of years, and the results of his work underground are marvelous.

He has grubbed his way through the base of the Alps for one thing; has linked Italy and Switzerland by fast train on a nearly level track. He is making New York city a part of North America. New York, you know, has always regarded itself as an island surrounded by nothing worth mentioning. Now it must acknowledge relationship with the rest of the continent. Father Knickerbocker is such an industrious mole that subterranean and subaqueous operations in which he is engaged or has recently completed will show a cost of about \$400,000,000.

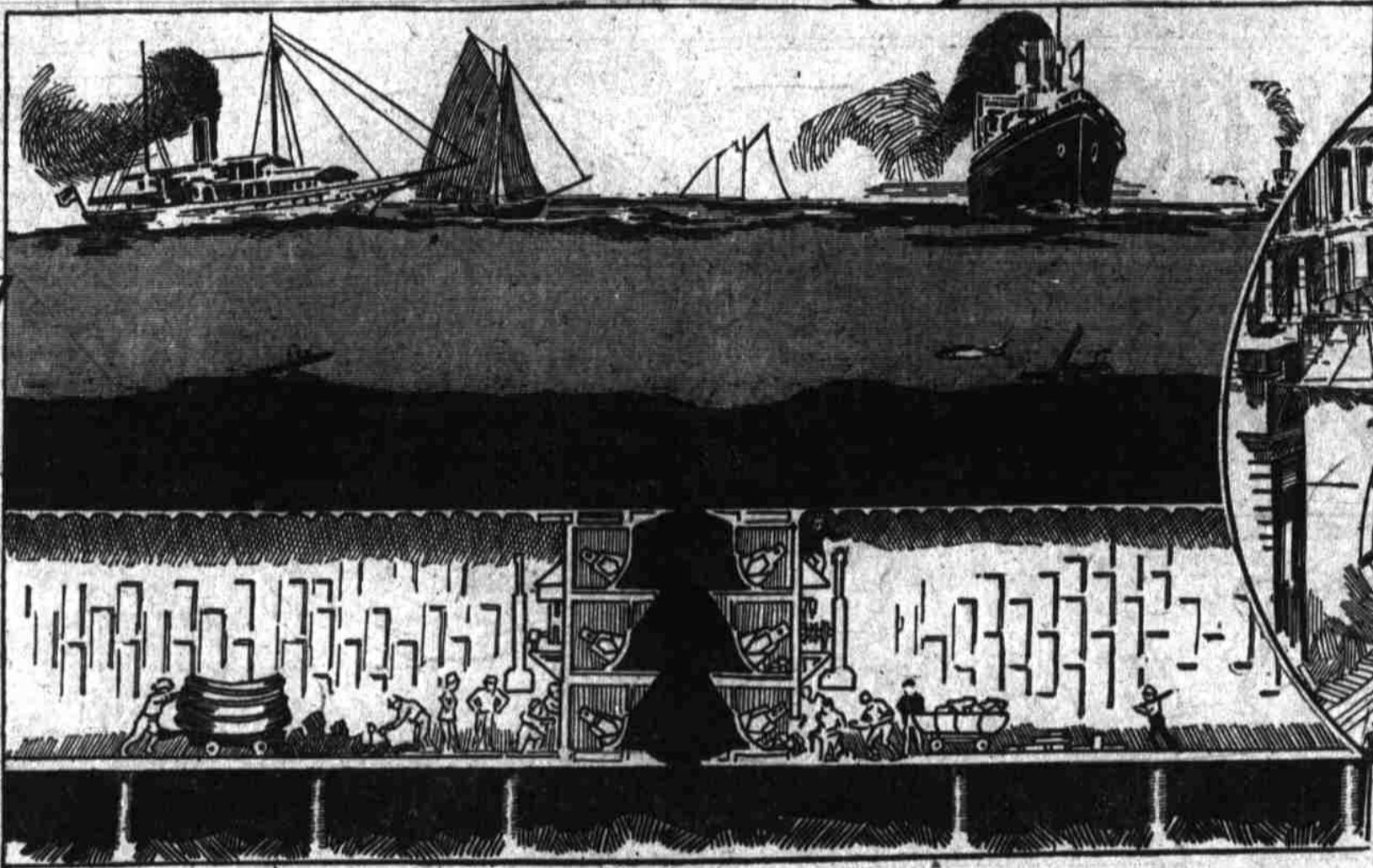
But the world may be given even a greater surprise by the mole, man. He proposes to burrow under the English Channel to France—twenty-four miles—and under Bering Straits from Alaska to Siberia. He promises to make it possible for the traveler to journey by sleeping car all the way from New York to London.

What divides Italy from Switzerland? Not long ago one would have correctly answered, "The Alps." Now a better answer would be, "Nothing." For with the opening to traffic of the Simplon tunnel—the longest in the world—that imposing barrier, which Napoleon surmounted by one of the greatest feats of his day, practically ceases to be a barrier. Napoleon built a road over the Alps; present-day Napoleons have demolished the Alps. How strange it seems, now that one may go by fast train through the twelve miles of tunnel, from the land of flowers and cerulean skies to the very throne of the snow king—how strange to think that but a few months ago the intervening pinnacles of towering evergreen and whiteness made these places almost as far apart as the temperate zone of the United States from the North Pole!

How strange, too, to consider that the mountains still stand there, as forbidding as ever in appearance, but all ineffective in face of the cunning devices of man! For a man has virtually burrowed through the base of the Alps—the prize mole feat of the centuries. This most stupendous work of its kind has been for some time attracting attention all over the world. Passengers are making the trip in a few hours. It is becoming one of the best paying railroads in Europe. With the boring of the main tunnel completed, work was begun on a smaller tunnel, parallel to the first one, which is designed to permit of travel both ways at the same time. These tunnels are to be made self-ventilating by cross galleries, 300 feet apart. At one terminus is the town of Brig, in Switzerland; at the other, Iselle, in Italy. Modest villages where the great project was first promulgated, these places have become prosperous, and are rapidly growing. Costing \$15,000,000, the great work was paid for jointly by the Swiss and Italian Governments. Ten thousand men were employed in carrying it out.

**ENORMOUS OBSTACLES CONQUERED**

It is scarcely possible for the normal mind to conceive of the immensity of this achievement; of the enormity of the obstacles; of the discouragements, artifices, hardships associated with it. Not the least of the difficulties was the encountering, now and then, of boiling hot springs, which, if they did not scald the workers outright, made it very unpleasant for them, and always delayed operations for days. At one time the temperature rose to 151 degrees Fahrenheit, and work could not be resumed until the temperature was cooled by spraying with ice cold water to counteract the effect of the scalding springs. This means that machinery for manufacturing ice had to be introduced down in the bowels of the earth, and, in addition, spraying apparatus had to be installed. Fifty-eight thousand cubic feet of air per minute was supplied for the workers. The amount of water discharged per minute by means of drains cut in the rock was 15,000 gallons. Another difficulty met was a great bed of moving sand, which threatened to bury the workers alive. Water welling up into the workings at times threatened to stop progress. Special tools, such as the Brandt drill, which advanced the tunnel from the Swiss side more than twenty feet daily, were invented to complete the tunnel; hardest of granite, encountered in many places, did not at all deter the determined workers. And, most wonderful, perhaps, of all facts connected with this triumph of engineering, the workers who started simultaneously from the Swiss and the Italian side, met in the middle of the mountain—met so evenly that there was scarcely a fraction of an inch difference on either side when the openings came together. Several years were consumed in this boring operation—considerably less time than a mole could have made his way through. Simplon, indeed, what next? Does anything in the tunneling line seem impossible? It is believed by many, and the belief will probably be among the realities of the future, that at no very distant day tunnels will join England, France and North America and Siberia. So, even though the Atlantic should never be bridged with rail, it may be possible to go from New York to London in a Pullman sleeping car. That little really impossible, not only the Simplon

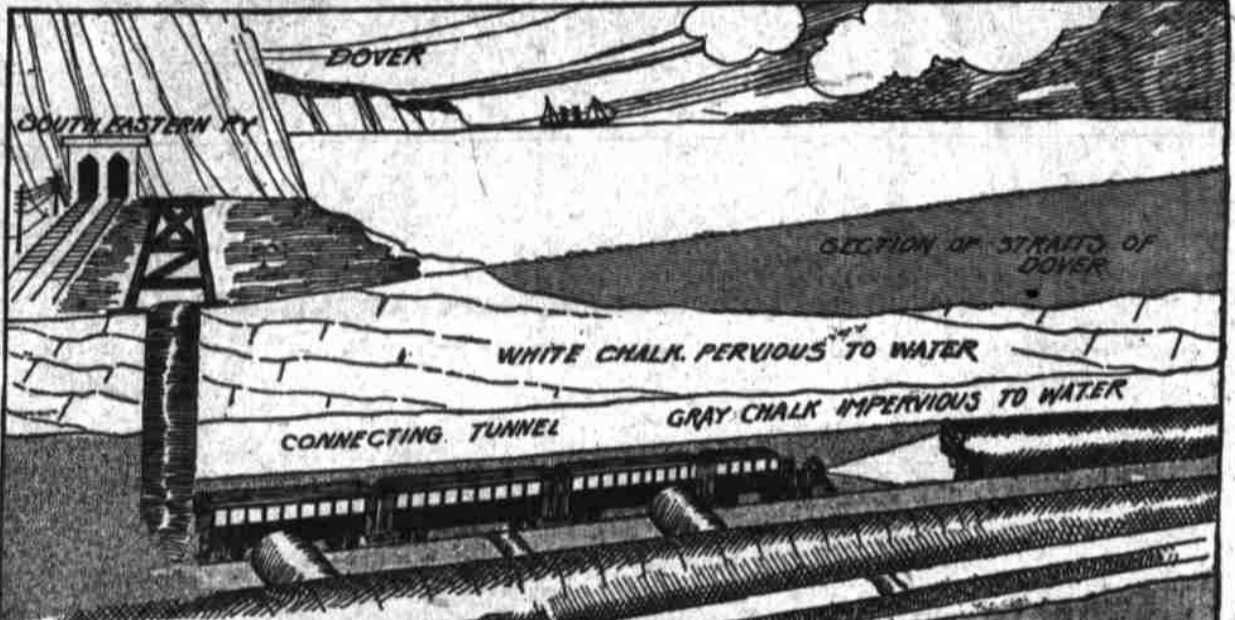


Meeting of Tunnels under the Hudson River at New York

feet shows. One need go no farther than New York city to find accomplished a thing almost as wonderful as the tunneling of the English Channel—a more costly, difficult thing than the digging of the Panama Canal. Indeed, subway improvements recently completed or nearing completion in New York will cost the city and individual corporations no less than \$250,000,000. Those that may be referred to as facts accomplished or to come are: The Pennsylvania improvements under the East river, \$50,000,000; Hudson Company's tunnels, subways, etc., \$100,000,000; Battery tunnels and subway extension, \$9,000,000; New York and Long Island tunnels, \$4,000,000; subway extension, \$90,000,000. But in addition to this must be considered the great project to pipe water to the city from the Catskills, which has already been started, and for which contracts averaging \$2,000,000 a year have been given out. The final estimated cost of this water enterprise is \$182,000,000. Which ought to convince any one that Father Knickerbocker is somewhat of a mole himself. The cost of the lock canal across the Isthmus of Panama is estimated to be about \$140,000,000, and for the sea level \$272,000,000.

**CANAL EASIER THAN TUNNELS**

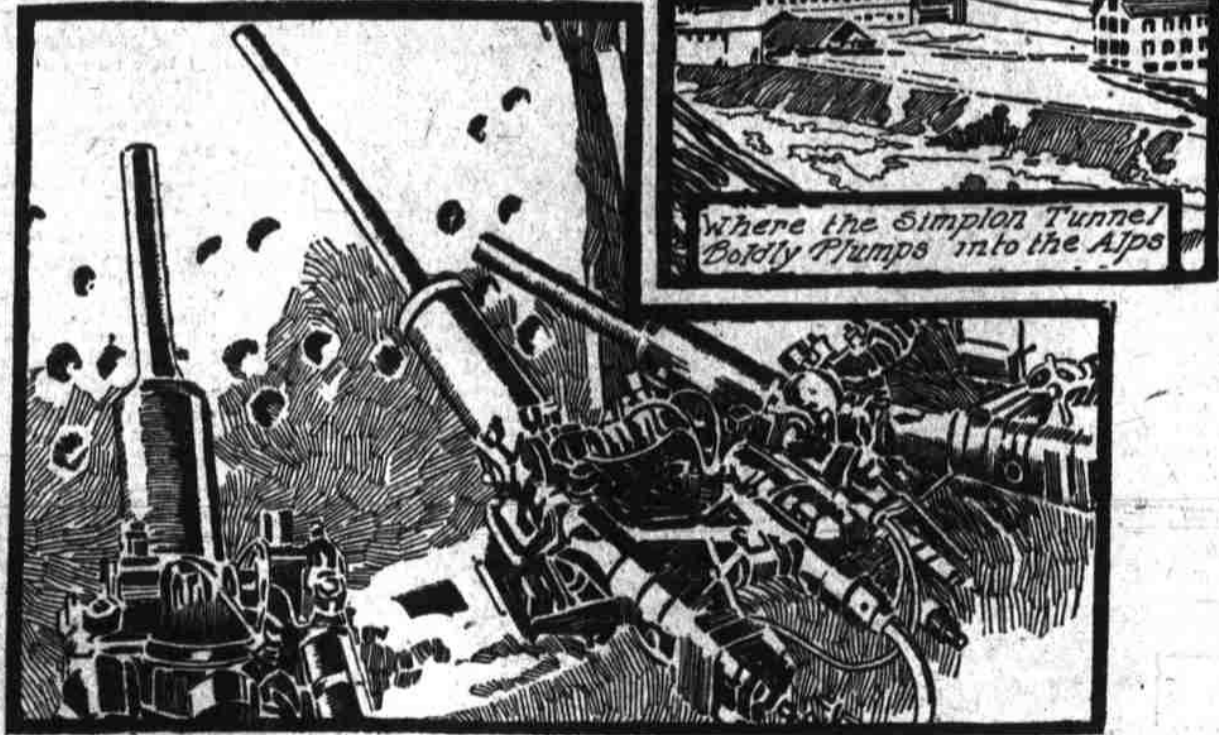
Much is said of the difficulty of digging the Panama Canal. Experts have recently declared that it does not compare in difficulty with the tunnel excavations at New York. Says John E. Munby, a distinguished engineer: "The cross-tunnel of the Pennsylvania improvements necessitate handling some of the ground by compressed air shovels, as the emission of any quantity of fumes possibly detrimental to workmen is not permitted in underground work. Similarly, the use of animal power for hauling is rarely possible, and man power being impracticable on a large scale, the use of electrical or compressed air haulage apparatus is necessary. "Again, all underground work must be conducted by artificial light, and therefore, for the same avoidance of fumes, electric wires and pipe lines must be maintained under the worst possible conditions of moisture and corrosion and liability to breakage by blasting." And this refers to dry land boring only. Immensely greater are the difficulties in tunneling under water. There the workers—"sand hogs," they are called—must breathe compressed air while they work, for this is necessary to keep the water from rushing in and drowning them. Sometimes it does come in, and then, if the man cannot get to the safety lock or draw the emergency curtain in time, they perish. Compressed air itself is responsible for the death of, on an average, a man a day on the New York workings. For if one comes too suddenly from the compressed air chamber caisson to the outer atmosphere he gets the caisson disease, and collapses. It's more dangerous to be a human mole than just an ordinary old-fashioned mole. The Pennsylvania Railroad's plan is to tunnel under the Hudson river, continue across Manhattan Island to



Scheme for Double Tunnel under the English Channel



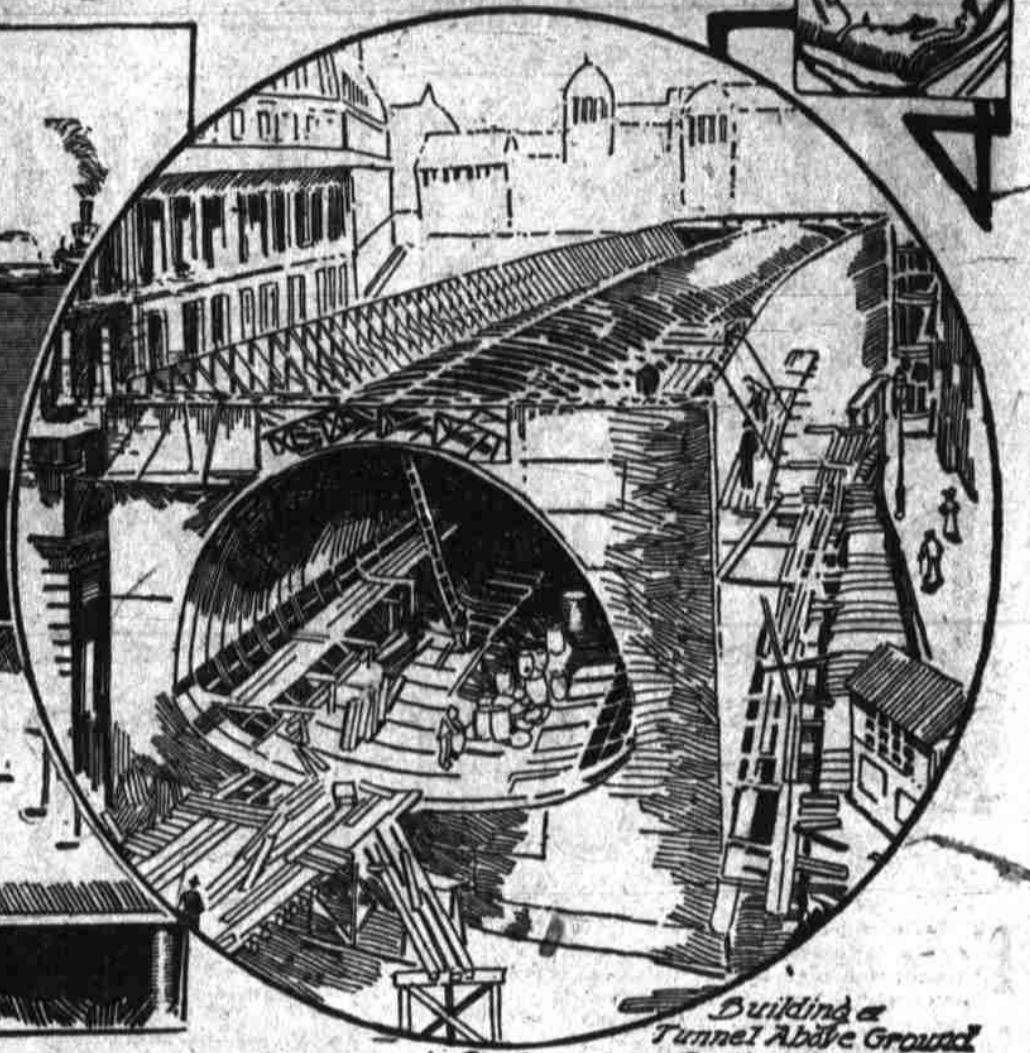
Where the Simplon Tunnel Boldly Plunges into the Alps



Hydraulic Boring Machines at Work

Thirty-third street tunnel under the East river, and then come out on Long Island, where immense yards and stations will give Brooklyn direct railroad connections with the rest of the world. Carrying big trains across the river on ferry boats will be practically done away with when these tunnel improvements are complete. A peculiarity illustrating the ingenious trend of tunnel work of the time is incorporated in the Pennsylvania tunnel. Instead of resting on the concrete bottom of the tunnel, the tracks will be supported by immense steel piles resting on the rock foundation beneath the river—some of them must be 150 feet long to reach it—so that there will be no strain from within on the great tube—it will simply be required to keep out the water. This work will be completed before 1910. Another big enterprise is the building of the Belmont tunnel from Long Island City to the Grand Central station by the Long Island Railway Company. As is the case with the Simplon tunnel, that being constructed under the Hudson river—the first part of the Pennsylvania scheme—was so well planned by the engineers that the holes started from the opposite sides of the river met perfectly in the middle. To get a vivid idea of what the human mole has done in New York, one might stand, some time, at the corner of Sixth avenue and Thirty-second street, where five railroads actually are superimposed. Lowest of the subway at that point is that of the Pennsylvania company, for express trains from the West and local trains from New Jersey and Long Island.

Next is the three-track trolley subway. Above this, again, are the subway tracks of the Hudson system, connecting with four tubes under North river, bringing trolley cars from the nearby Jersey cities. Over this are the surface tracks of the Sixth Avenue Railway, and then the elevated structure. Off and on for years there have been periodical attempts to tunnel under the English Channel from Calais, in France, to Dover, in England. Indeed, once, years ago, the work was actually begun on the English and French sides simultaneously, both governments having passed the required legislation. But suddenly there was a stop to the work. In the British Parliament there arose a preponderance of opinion against the desirability of being connected by land with the Continent, for this might prove too ready a means to bring in an invading force in the event of war. Think of England becoming known as "northwest France," say, all on account of man's propensity to emulate the mole! But the channel tunnel proposition will not down, for it represents progress; and against that force England's conservatives find themselves growing helpless. As late as last winter the agitation in Parliament and among the people became so strong that the continuation of the tunnel seemed on the point of being taken up. But the measure was lost at last. Although the bill to empower the resumption of work on the tunnel has been killed temporarily, it is believed



Building a Tunnel Above Ground To Be Sunk into Position Later in Paris

150 feet of this chalk above them, which would seem to be very good protection against an influx of sea. The chalk may be bored easily by a rotary steel cutter, and it is believed that the twenty-four miles could be completed in less time than the twelve miles of the Simplon tunnel. Would it not be strange to think of an all-rail route from the United States to Europe? The scheme for a tunnel under Bering Straits from the northwestern coast of the American continent to Siberia has for years been discussed, and the matter has been pressed in Russia by Baron Lotoz de Lobel, representing the American-Transasiatic-Siberian Company. A year ago the Russian Government was disposed to consider the plan favorably. On April 3, this year, however, the Cabinet of the Czar rejected a proposal made on behalf of the American syndicate for the construction of the tunnel, but, as is the case in England, this is one of the steps of modern progress which cannot be permanently postponed. It seems but a question whether England or Russia will first wake up to the fact. One of the tunnel projects that have been formulated is the proposal to link Ireland with Scotland. The cost of this would be \$50,000,000. Another project which has been talked of for twenty years is the connecting of the Isle of Wight with England.

**Millionaire Collects Small Sum**

FORTY-ONE years ago Jacob Schnellbacher, a millionaire brewer, shoe manufacturer and real estate owner, of Peoria, Ill., then a boy in Germany, led a cow two and one-half miles, for which he was promised 24 cents. The owner of the cow failed to pay, but Schnellbacher never forgot. Even after he had won a fortune he continued to dun a nephew of the debtor, who lives in Chicago, for the money. Meeting the nephew in the Rookery Building, Mr. Schnellbacher demanded the money. An accountant figured out the debt at compound interest, and said it amounted to 7 1/2 cents. To each of his three sons Schnellbacher gave twenty-five of the pennies. He kept 2 cents and the half of a penny, which had been saved in two to effect an accurate settlement of the claim.

**Bells Ring Out Their Own Lives**

BELLS—church bells, town hall bells, fire bells, all kinds of bells—are born only to die. They ring out their life. Each bell has a predestined fate—it can stand so many blows and then expires. If a bell is not rung, it may live indefinitely; but if it is rung, the day will come when the last stroke of the hammer will break its heart, choke its breath and send a crack shivering through the metal. A 350-pound bell, which was carefully observed, and which was struck by blows of 1 1/2 pounds of force broke after 11,000 blows. A 4000-pound bell broke after 19,000 blows of 250 pounds force.

**Romantic and Little Known Facts about Paint**

A LITTLE less than half a century ago there was not a gallon of machine-made paint in the world. At that time all house paints were made in the old-fashioned way—by stirring turpentine, white lead and linseed oil together with a stick. Today the paint industry is one of the greatest in America. There are upward of 250 paint factories in the country, employing more than 50,000 people. The annual output of these factories is approximately 100,000,000 gallons. From nothing in 1860 to a sea of paint in 1907! If this annual product could be brought together it would make a "sea" of paint a little over half a mile square and ten feet deep. In it could be floated much of the navy of the United States. A discussion in Congress one member referred to the United States as the "paint pail of the world." At present this "paint pail" needs additional stirring, and one of the greatest paint manufacturers in the country says that there is room for 10,000 more men in the industry. "We want men—men—men" is the cry in almost every paint factory. From this "world's pail" is sent out paint to every civilized land under the sun. American paint is used in India, China, all the countries of South America, in Europe, Africa and the South Sea Islands. Three years ago paint almost created a revolution in Costa Rica. In that little country's capital city there was a native establishment, wherein paint was manufactured by the simple stirring process. Then came the first shipment of American paint. The owner of the local industry was a politician in high favor, and he tried to get government action to prevent the entrance of American paint. But he lost. He was soon threatened with bankruptcy by the hustling Americans. He threatened to turn against the government unless action was taken—and did so. Many of his constituents supported him. Paint became the great topic of conversation in the Costa Rican capital. A carload of the American product was waylaid and dumped. The store of one of the American agents

**"PAINT SCHOOLS" ARE COMMON**

"Paint schools" are now quite common. The manufacture of paint has become a science, and in a large number of the big plants courses of study and practical work are given young men applicants who have an ambition to become experts. That there is a large and steadily growing field for young men with these ambitions is shown in the fact that 1000 skillful chemists are now employed by American paint factories. Statistics recently made for the government show that city people paint their homes on an average of every two and one-half years; farmers, every seven years. Of 10,000 rural house owners visited, 4000 still used the old-fashioned paint can and turpentine bottle. 4000 used ready-made materials and 1400 used no paint at all. The little town of Fairview, Ohio, was at one time entirely painted by the women of the place. The women, after urging the men to vain to do the work, sent a committee to a big paint manufacturer, who was induced to donate the paint for the advertising he would get out of it. There were 127 buildings painted in the place, which included the village hall and church. Few people know that a turpentine famine is threatening, and that if turpentine alone were used as a thinner in paints the product would cost the consumer several times what it does now. There are also other and better "bases" than white lead. Recently the French Government passed a law prohibiting the use of white lead because it was injurious to health. Zinc white is now used largely in its place. It is predicted that within the next ten years the paint industry of the United States will represent a capital of a billion dollars, will employ 100,000 men and will produce annually at least 300,000,000 gallons of paints and varnishes.