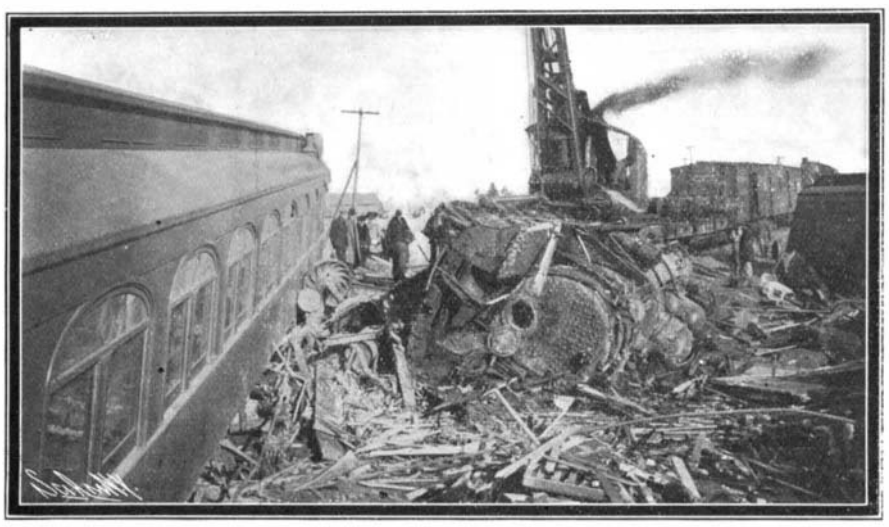
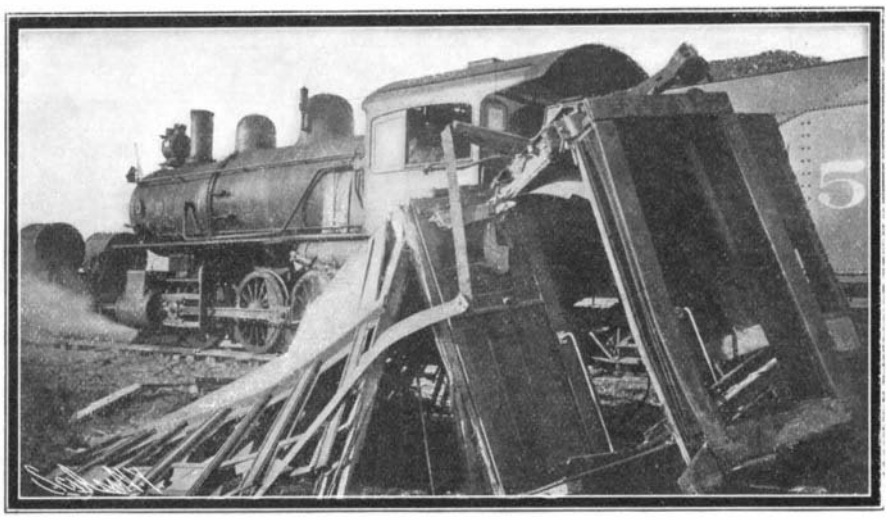
### PULLMAN CARS IN RAILROAD ACCIDENTS.

It is during the Christmas season, and for a few weeks before and after, that experience has taught us to look for a great increase in the number of railroad accidents. We thought that last year was a painful record; but it has been exceeded by the list of horrifying disasters that have marked the past two months. We present illustrations of a wreck that occurred recently on the Frisco system at Godfrey, a small station near Fort Scott, Kansas. The collision took place early in the morning of December 21, 1903. It seems that the brakeman on a freight train which was standing on a siding at Godfrey had been sent out to flag the "Meteor," a fast passenger train, which was due at the time. The express thundered up to the little station at a speed of about 60 miles an hour, and seeing all clear, the engineer carried his train through with the throttle well open. The brakeman either failed to do his duty, or his signal was not seen, and the express crashed into the freight, with the result that twelve persons were killed and a larger number were seriously injured. The wreck of the train was almost complete. The engine was stripped of everything that could be torn away, cab, fittings, smokestack, etc. The tender was completely wrecked, as were the mail car, the baggage car, and the smoker. It is significant, as will be noticed from one of our engravings, that although the first-class coaches and the baggage and smoker were so badly wrecked, the Pullman showed its usual resisting qualities, to which we referred a few weeks ago in this journal. It will be seen that the particular car shown in our illustration has all of its windows intact but one, which is slightly broken.



The Wrecked Engine and One of the Pullmans of the Express; the Latter is Practically Uninjured.



Vestibule and Portion of Side of Day Coach.

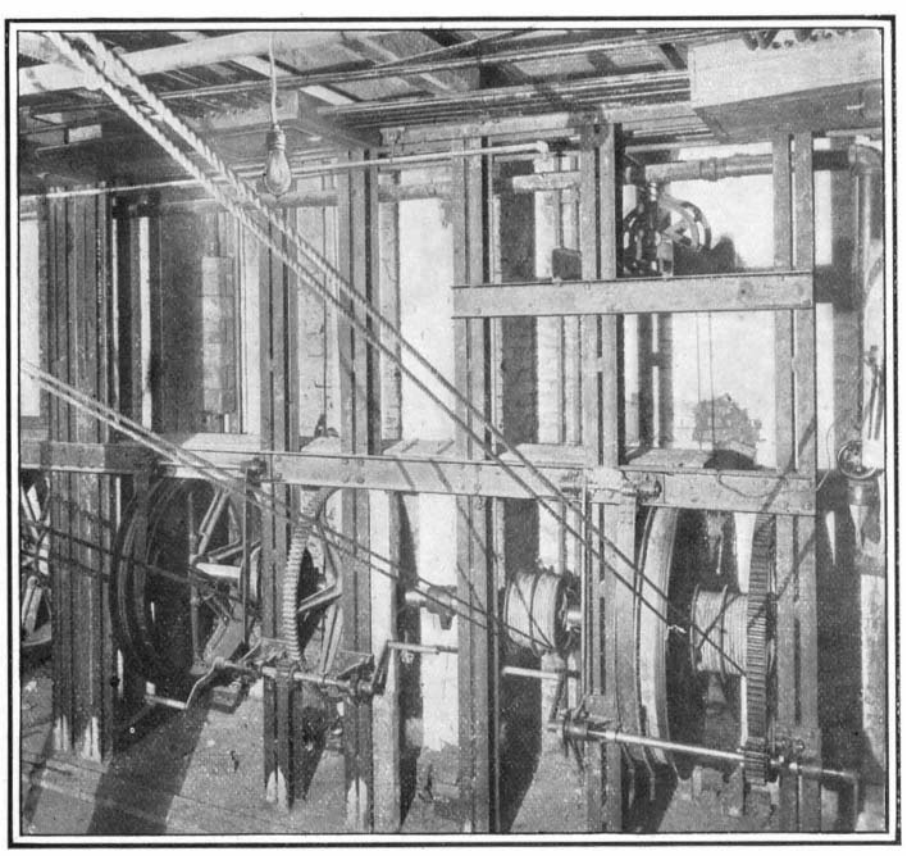
RESULT OF A COLLISION AT SIXTY MILES AN HOUR.

A correspondent, Mr. D. N. Byerlee, of Hood River, Oregon, has this to say on the subject of the safety of Pullman cars: "If you will but consider that the mail, baggage, and day coaches act as a sort of cushion between the Pullmans and the engine, you will realize the saving to the Pullmans and the greater than ordinary damage that will result to the day coaches and their passengers. This is really the fact. Keep the Pullman cars off the trains and the loss of life will be reduced to a minimum. But if, as your note would indicate, you would build the entire train as the Pullmans are, you will not have overcome the difficulty. With no light cars to crush and deaden the impact the shock would be so great, coming to a dead stop from a speed of say 60 miles an hour, that almost every passenger would be killed. I do not believe the remedy is so much in the strength of the cars as in the manner of operating the road. If all the cars were built like the Pullmans it would equalize the death rate, and perhaps lower it somewhat. But when we have a perfect block system and our government enacts such stringent legislation as holds in Mexico and enforces it as rigidly as they do in Canada, we shall hear of very few casualties indeed. Twenty-one years' experience and observation in railway service confirms me in the belief that 90 per cent of the casualties are due to carelessness and recklessness, and this certainly is criminal." We fully agree with our correspondent that the position of the Pullmans at the rear of the train conduces largely to the immunity of Pullman passengers from death or serious injury; but it by no means follows that were the case reversed, and the Pullmans placed in the middle or at the front end of the train, they would telescope and crumple up with the same fatal effects that occur in first-class day coaches. As a matter of fact, the Pullmans, by their position at the rear of the train, are occasionally called upon to take the full brunt of a rear-end collision. Recently one of the leading engineers on the Rapid Transit subway in New York described to the editor an instance of this very form of accident. He was in a day coach in the middle of a train, at the rear end of which was the private car of a well-known manufacturer of air-brake apparatus, which while stopped by signal outside the Harrisburg station, was run into by a heavy Chicago and New York express. The private car received the full shock of the collision and proved strong enough to transmit it to the train ahead, pushing the cars together and causing the two day coaches ahead of it to telescope, with a result of 50 per cent fatalities or injuries to the occupants of the two cars. No one was killed, or even seriously injured, in the private car. This was a case where the Pullman, after mitigating the shock by the amount of its own inertia, was strong enough to transmit what was left of it to the train ahead without suffering serious injury itself. The point made by our correspondent that, if all cars were built as strongly as the Pullman, the passengers would be killed by the shock of suddenly arrested motion, is, we think, very much open to question. They would be badly bruised, and limbs would be broken perhaps; but there would be none of the grinding, crushing, and tearing of limb from limb that marks the telescoping of two cars.

At the same time our correspondent unquestionably hits the nail upon the head when he attributes the loss of life not so much to the weakness of the cars as to the careless manner in which our roads are operated. As long as trainmen consider that rules relating to the running of trains are elastic and subject to modification at the will of the individual employe, they will continue to slaughter people in the brutal manner that has characterized the past few weeks. In the older countries the railroad cars, compared with our day coaches, are mere eggshells in strength, and yet we know that during the last year of operation on the roads of one European country, not a single passenger was killed. Judging, however, from the slow progress that we are making, it will be many years before our trainmen have learned to render our block system effective by implicitly obeying them; and until that time has come, we certainly think that it would be advisable to build our cars so that not even combined stupidity, carelessness, and willful neglect of signals can wreck them.

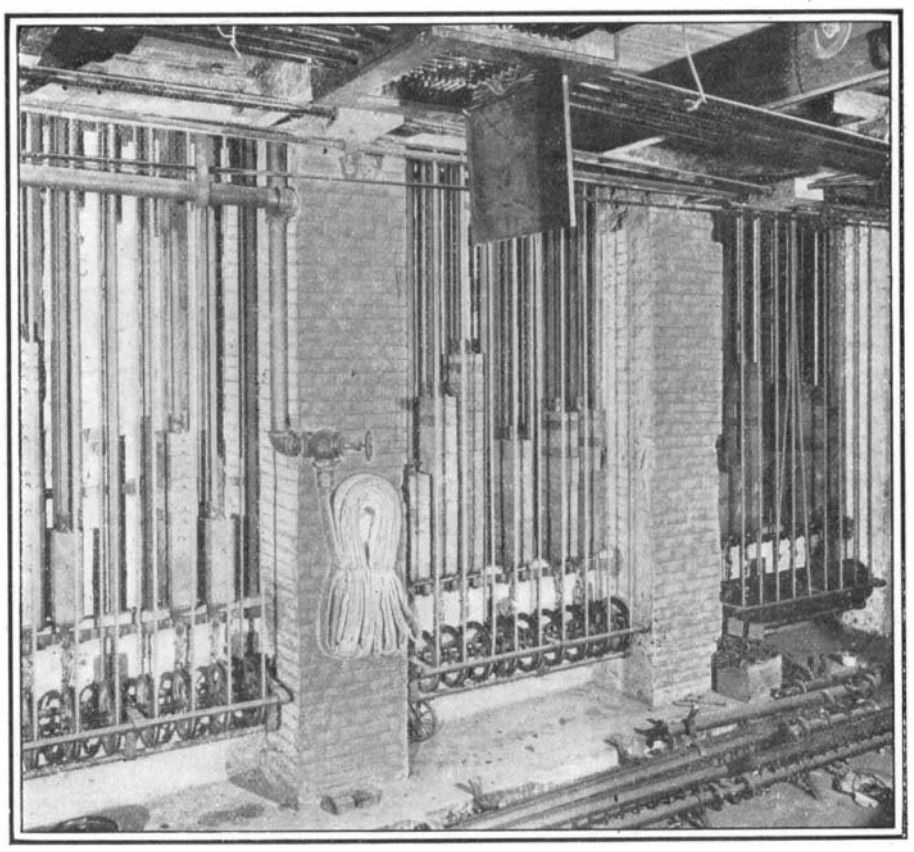
### THE NEW STAGE OF THE METROPOLITAN OPERA HOUSE.

"Bayreuth," "Parsifal"—what splendid names to conjure with! Now, thanks to the new stage of the Metropolitan Opera House, we have our own Bayreuth





Winches for Raising and Lowering the Bridges.





Counterweights for the Drop Scenes and Borders.

THE NEW STAGE OF THE METROPOLITAN OPERA HOUSE.

in New York, where we can give the "solemn festival play."

There is absolutely no reason why "Parsifal" should not be produced in New York rather than in a small, uncomfortable, and highly expensive Franconian town. The Wagnerian idea is to carry the book, the music, the scenery, as a concrete proposition. He wrote the words and the music, designed the whole stage setting, and was his own conductor and stage manager, so we have a case of undivided responsibility. The musical world trembled when it was suggested that "Parsifal," the Holy of Holies, was to be performed in New York; but it has been done, and in the opinion of some critics as well done as at Bayreuth, or even better.

"Parsifal," more than any other of Wagner's operas, depends upon the appeal to the mind through the eye.

The *mise en scène* of this imposing pageant requires great resourcefulness on the part of the stage director. When it was decided to give "Parsifal," a new stage became imperative, and the services of Technical Director Carl Lautenschläger, of Munich, were secured, and in conjunction with Mr. Theo. G. Stein, the architect, a modern stage was installed, capable of making quick changes and transformations. It was their aim to build a stage which would also minimize the amount of labor and render hitches and accidents almost impossible, and that they succeeded admirably is shown by the enthusiasm which the scenic and mechanical effects provoked. The first visit to a stage is always a revelation; the vast size of the room, the rising and dropping scenery, the under-stage mechanism, the lights and the orderly confusion, all tend to cast a rosy light on the theatrical life.

A few generalities are in order. The audience really sees a very small portion of the stage, for behind the curtain is a rectangular structure much higher than the roof of the auditorium. This great height is rendered necessary in order to raise the hanging scenes bodily, without resorting to the necessity of rolling them up. Everything above the arch of the proscenium is termed the "flies." The stage proper is the rectangular platform on which the players or singers stand. The sides of the stage are termed the "wings," and here the singers and ballet enter through the various so-called "entrances," the number depending on the number of "wings." The stage is divided widthwise into sections, and these sections of the stage floor can be raised above or lowered below the stage, depending on their construction, so that whole scenes can be raised or lowered as the case may be, or mountains or other high places built up in a short time. Great depth of cellar is necessary in order to permit of whole scenes being lowered. The top of the stage is known as the "gridiron" or "rigging-loft;" it consists of a slotted floor adapted to carry sheaves for the ropes which serve to support the drop scenes, borders, and gas battens which formerly carried the gas lights and now serve to carry the electric lights. To insure uniform motion and to distribute the weight, there are five ropes to each scene or border, and they pass over pulleys ranged at equal intervals across the width of the gridiron. There are 63 sets of ropes in the new Metropolitan Opera House stage, and the weights to be borne are all counterweighted so that the cloths can all be worked from the first fly gallery as easily as a dumbwaiter. The counterweights are inclosed to prevent accidents. Twenty-eight flymen now do the work of sixty.

In "Parsifal" it is necessary to have two elaborate transformation scenes, and this is accomplished by means of panoramas, four in number, situated in the wings and secured at the upper end to the first fly gallery. The panoramas are huge spools 36 feet long, and the painted canvas is reeled from one spool on one side of the stage to the other. The panoramas are suspended from a trolley serving to carry the weight of the canvas in its width-wise passage along a wire. With the aid of the panoramas, it is possible to produce the remarkable change from the woodland scene to the stately Hall of the Grail Knights, while Gurnemanz and Parsifal appear to be walking the entire distance. The movements of the various panoramas are accurately timed and the effect is good.

We now come to the under machinery, which is elaborate, but still very simple. We have already referred to the "bridges" or movable sections of the stage. At the Metropolitan, the first four are adapted to sink, carrying the scenery, properties, etc., with them; they can also be used to raise whole scenes, saving interminable waits. When a bridge is to be used to raise scenery which rests on its deck or floor, the floor of the stage must be removed. Instead of being taken up in sections like trap doors, ropes are attached underneath that portion of the floor of the stage which is superimposed over the bridge. These ropes pass over pulleys and then to winches. The flooring corresponding to the length of the bridge is taken out in two sections, one right, one left. This is accomplished by means of two pieces of the flooring which are depressed slightly at one end, allowing the two sections of flooring to store themselves in grooves underneath the fixed floor of the wings. The bridge is now raised by two men operating a winch. The bridges are heavily counterweighted so that the labor is comparatively light. The bridges are 42 feet 9½ inches long, 3 feet 8 inches and 2 feet 8 inches wide. Their depth is 21 feet. In the magic garden of Klingsor, the entire kiosk and scenery is let down into the cellar by the bridges, producing an awful scene of destruction. It is prefaced by a short scene which shows us the magician's tower, and we have selected this scene for the drop scene shown. The back drop and borders are raised, while the "practicable" (to use stage parlance) staircase is lowered. The construction of the bridges is such that a trap can be inserted anywhere while they are down, a great improvement over the old fixed traps where you know in advance exactly where Mephistopheles will go down or Hamlet's father's ghost come up. Special movable traps run in the spaces between the bridges and can be located at any point.

The side-scenes, or wings, are also worked mechanically. They are secured to movable trolleys or chariots which run on the floor of the first story of the cellar. This enables the stage to be kept clear and also facilitates the rapid and accurate setting of scenes. The three bridges at the back are counter-weighted and are adapted to rise up 23 feet above the stage to imitate rocks, etc. They can also be run up in sections and fulfill a very useful purpose. While it may appear that all these devices are very simple, yet they are interesting for the reason that everything, even to the panoramas, is worked manually. Herr Lautenschläger has built some very complicated stages, including six revolving stages. He is inclined to think that a stage like the present, or a revolving stage, is best adapted to the needs of grand opera. A revolving stage is to be built at an early date in New York city.

## AN INGENIOUS MACHINE WHICH GREATLY SIMPLIFIES THE PROCESS OF PRINTING.

*(Continued from page 116.)*

and the other to draw it axially from the right to the extreme left. A series of ten pins are arranged at the left end of the type roll, and a similar series is arranged at the right end, the former serving, when raised, to limit the axial movement and the other cooperating with pins on the axis to limit the rotary movement. As stated above, each character is represented by two perforations on the tape; one of these makes contact with a corresponding pin at the right, and the other with a corresponding pin at the left. Now, if, for example, the eighth pin at the right were raised, and the third at the left, the sleeve would rotate three character spaces and slide axially eight character spaces, bringing the predetermined character on the sleeve in line with the printing hammer of the machine. The latter is thereupon actuated to strike the paper against the sleeve and make the required impression. This done, the type sleeve is restored to normal position by two cams and is ready for the next operation. At the same time the carriage which carries the transfer paper is moved laterally a distance corresponding with the width of the character just impressed. As soon as a word is completed, a space perforation is encountered on the tape which causes the carriage to move the distance predetermined by the justifier. And herein lies another very ingenious little mechanism. The carriage moves only in even multiples of a unit; whereas the justifying mechanism is measured in tenths of units. For example, a space of 3.4 units might be required between each word. In this case the first space would measure three units, and an accumulator device would retain the fraction of unit space. The next space would again be three units and .8 would be retained in the accumulator. The third space, however, would measure four units and .2 would be retained in the accumulator. Thus, the operation would continue, the accumulator retaining the fractions of space until they accumulated to an entire unit, when that unit would be applied to move the carriage an extra unit of space. At the end of the line the accumulator is restored to normal, the carriage is returned by the line trip and moved up one space for the next line, and the spacing mechanism is reset for the new line by the new justifier combination of perforations. These operations, though seemingly slow, are nevertheless very rapid. The machine illustrated has been operated at 10,000 ems an hour, or twice the speed at which the average operator manipulates a keyboard. Thus, the transfer machine can handle the output of two perforator machines. Mistakes of the operator can be corrected by pasting strips of paper with the corrections thereon over the faulty matter on the transfer paper.

The general advantages offered by the lithotyping process may be briefly summed up as follows: It does away with the use of type and the process of stereotyping. It makes use of light aluminium plates as against heavy stereotype metal on the presses. The life of the plate is unlimited, whereas the stereotypes must be changed at every 40,000 impressions. In the Lithotype, fonts may be changed simply by slipping on a new type wheel on the printer. A number of small rolls of tape will contain the perforations for a whole book and may be very conveniently stored or mailed. The machine is very compact and takes up little room. We show an ordinary sixteen candle power incandescent globe in each of the illustrations to indicate the size of the machine.

### The Commerce of the United States and Russia.

Exports from the United States to Russia in the year just ended aggregated practically 20 million dollars. This is more than double the amount of our exports to Russia in 1901, the year in which duties were advanced upon merchandise from the United States entering Russia, and is also double the average for many years preceding that date. Imports from Russia have also greatly increased since that time. In 1903 they were $10,907,315, against $7,263,874 in 1901. Thus the total commerce between the United States and Russia in the calendar year 1903 exceeds 30 million dollars, and is double that of 1901, the year in which such alarm was felt with reference to our commerce with Russia, and is three times as great as in 1893.

This increase in the trade with Russia is especially marked when compared with the growth in trade with other European countries. Comparing conditions in 1903 with those of 1901, it may be said that exports to Europe as a whole show a slight decrease, while those to Russia, as already indicated, show an increase of more than 100 per cent. To the United Kingdom our exports in 1903 are 55 million dollars below those of 1901; to Netherlands, the reduction in exports, as compared with 1901, is more than 12 millions, and to Belgium, more than 5 millions. To France our exports in 1903 show a slight increase, and to Germany an increase of nearly 40 million dollars; but in each case the percentage of gain is small, compared with that in our exports to Russia, which show a much larger gain proportionately than those to any other European country, while in our imports from Russia a material increase is also shown.

The chief growth in our exports to Russia, in the two years in question, has been in cotton, agricultural implements, copper and its manufactures, and naval stores. In iron and steel there has been a slight reduction, and in flour a considerable reduction. Raw cotton, of which our exportations to Russia in the fiscal year 1901 were less than 2½ million dollars, showed in the fiscal year 1903 a total export to that country of over 8 millions. Agricultural implements have grown from $1,692,597 to $3,636,145; copper and manufactures thereof, from $790,724 to $1,364,272, and naval stores, from $281,616 to $432,792. Iron and steel, which in the fiscal year 1901 amounted to $1,636,894, was in the fiscal year 1903 $1,198,139; and flour, which in the fiscal year 1901 was $1,261,122. was in 1903, $1,028,590.

### The Arrival of Smithson's Body.

The coffin containing the body of James Smithson, the founder of the Smithsonian Institution, who died many years ago in Genoa, was removed from the dispatch boat "Dolphin" on January 25 and carried to the Smithsonian Institution, where it will remain until Congress authorizes its final burial in the grounds of the Institution.

The party that witnessed the transfer included Acting Secretary Loomis, as the personal representative of President Roosevelt; Sir Henry Mortimer Durand, the British Ambassador; Senators Cockrell, Frye, and O. H. Platt; Representatives Hitt, Adams, and Dinsmore; J. B. Angell, of Michigan; J. B. Henderson, of this city; Prof. S. P. Langley, secretary of the Smithsonian Institution, and Dr. Alexander Graham Bell. The coffin was draped in the American and British flags. As it was lowered from the "Dolphin" to the caisson, the United States Marine Band played "Nearer, My God, to Thee." Troop F, 15th Cavalry, served as escort. At the Institution the body was formally received, and the Rev. Dr. R. H. McKim, of Washington, delivered a eulogy of Smithson.

### Wireless Telegraphy in Germany.

Wireless telegraphy is rapidly coming into commercial utility in Germany, and large numbers of "spark messages," as such telegrams are called, are transmitted daily. There is a service in operation between Denmark and Prussia, while two German steamers running between Kiel and Korsoer are equipped with instruments and maintain continuous communication with both the German and Danish land stations. The system employed is the Slaby-Arco. Private messages are accepted at the two offices at Bülk near Kiel, and the other on the Isle of Fehmarn. A fee of 17 cents is charged for every message transmitted from one station to the other, irrespective of the number of words it contains, and it is thence dispatched to any part of Germany or Denmark at a cent per word.

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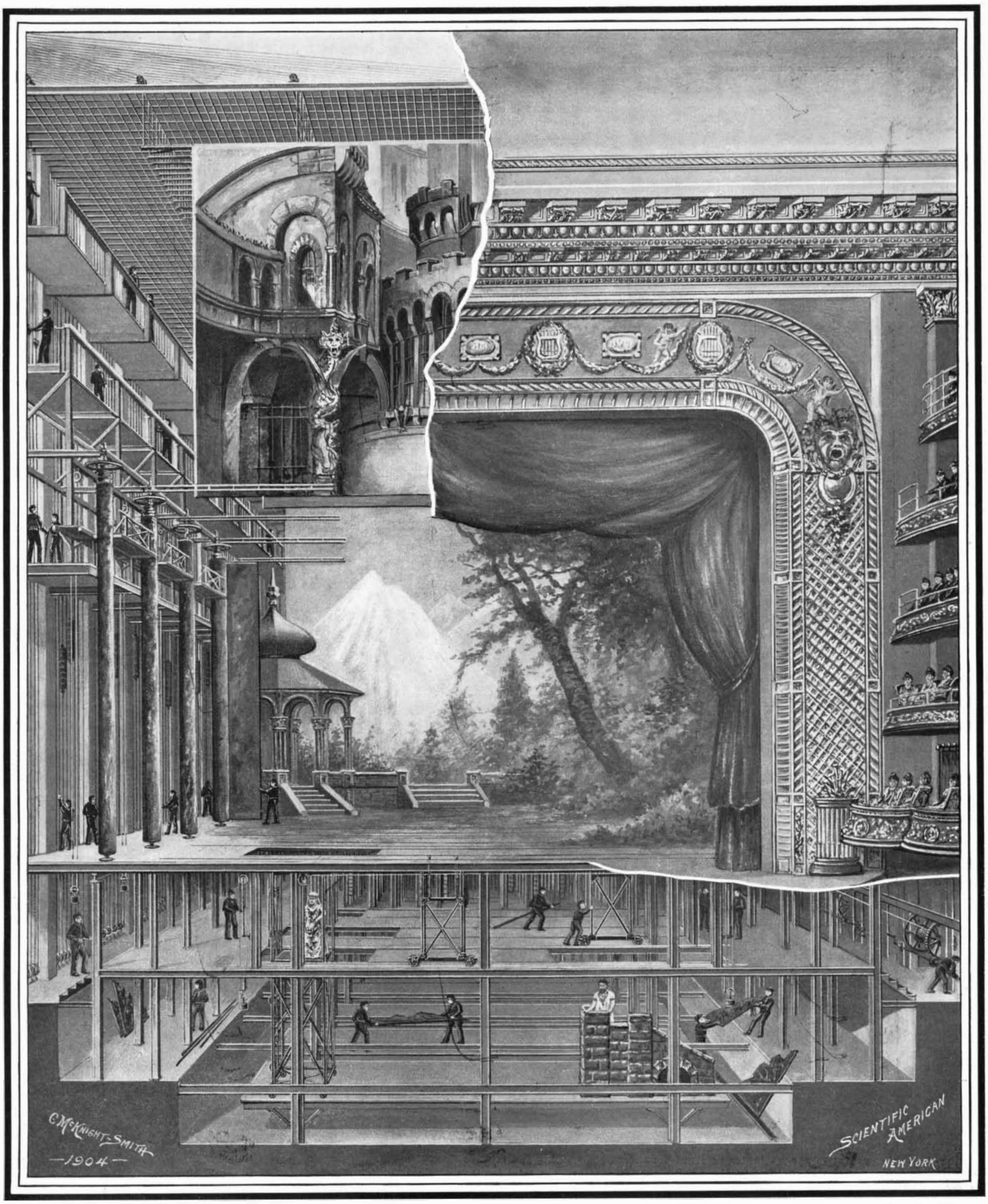


Working Drop Scenes. Moving Panoramas. Drop Scene, Klingsor's Tower is aloft. Movable Trap on Bridge. Section of Klingsor's Tower, lowered into the cellar by a movable bridge. Bridge Winches.

Set Scene, Klingsor's Magic Palace and Enchanted Garden.

**THE NEW STAGE OF THE METROPOLITAN OPERA HOUSE, REBUILT FOR THE PRODUCTION OF "PARSIFAL."**—[See page 117.]

**The stage is divided into sections, the floor is removable and its place can be taken by "bridges," which can be raised to the level of the stage, carrying set scenery. The wing scenes are operated from the cellar.**