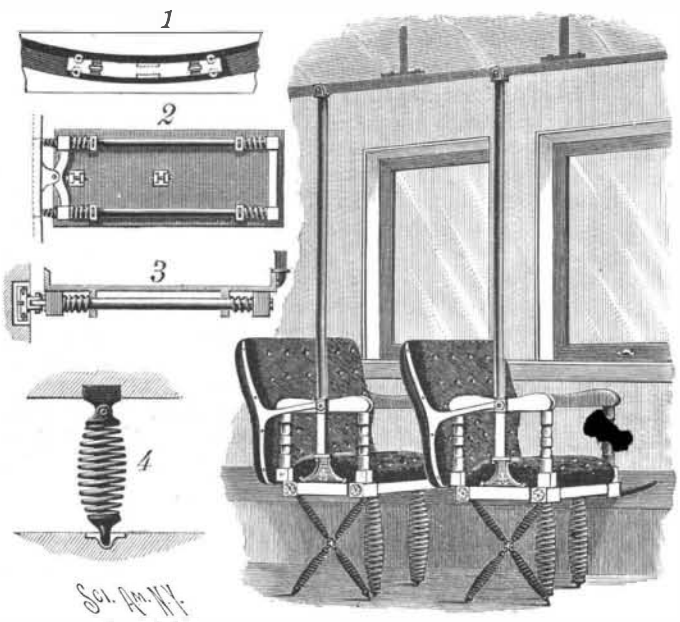
AN IMPROVED CAR SEAT.

The illustration herewith represents a novel construction of railroad passenger car seats, in which the seats are ordinarily held in fixed position, but are caused to swing in case of collision, thus retaining their occupants from being thrown out of their seats or from being jammed or crushed by contact with adjacent seats. Each of the seats is carried, at its end farthest from the side of the car, by a pendant rod pivoted to the car roof, while a curvilinearly grooved plate, shown in Fig. 1, is secured in the side of the car body, with a roller slide fitting therein, to support the car seat at its other



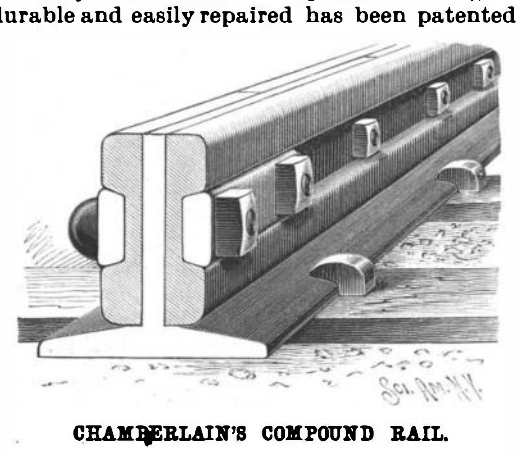
ENEQUIST'S CAR SEAT.

end. Figs. 2 and 3 represent an under side view and section of one of the seats, with its attached frame, composed of back and front longitudinal rods and cross bars, this frame being connected to the under side of the seat by lugs, so as to allow a slight movement of the seat in the direction of its length, springs being interposed between the lugs and the ends of the cross bars of the frame. The cross bar next the side of the car is connected with the roller slide moving in the grooved plate by being pivoted intermediately of its length to the slide, small springs being interposed to keep the seat square and prevent twisting. The seats are ordinarily held stationary, in part, by upright springs, as shown in the perspective view and in Fig. 4, and in part by a series of diagonally arranged springs permanently attached to the frame of the car seat and the floor of the car. The upright springs have an upward pressure, and are jerked out by a violent shock only, being fitted in the floor by sockets. The diagonal springs also serve to restrain the seats from swinging too violently while returning them to their normal position afterward. The construction is also designed to add to the comfort of railroad travel by mitigating the severity of the sudden jerks and shocks so frequently experienced on trains traveling at high speeds, while the car floor can be readily scrubbed and cleaned.

For further information relative to this invention address the patentee, Mr. Erik Enequist, in care of L. Feuchtwanger & Co., Long Island City, N. Y.

AN IMPROVED COMPOUND RAIL.

A railway rail made in three parts and designed to be durable and easily repaired has been patented by



CHAMBERLAIN'S COMPOUND RAIL.

Mr. Edward G. Chamberlain, and is illustrated herewith. It is preferably made of steel, and has a central strip with flanged base, side bars being clamped to the central strip by means of bolts and nuts. The side bars rest upon the base and extend to the top of the central strip, while they are of similar shape at the top and bottom, so that they may be reversed when one edge becomes worn or injured. To form a continuous rail and prevent "pounding" of the car wheels the parts may be made to overlap and break joints, the side bars breaking joints midway between the ends of the rails.

For further information relative to this invention address Mr. Edward G. Chamberlain, in care of the Consolidated Ice Machine Co., Chicago, Ill.

Anti-fouling Paint.

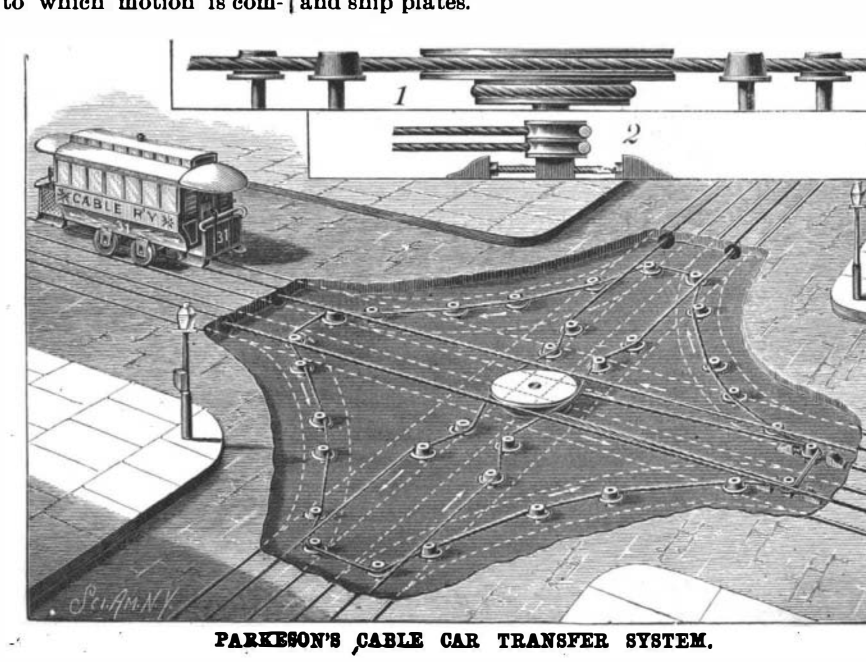
An important experiment with anti-fouling paint has been brought to a conclusion with the docking of the Indian troopship Crocodile at Portsmouth on her third and final passage from Bombay. It was the custom formerly to dock the Indian troopships at the end of each voyage to India and back, for the purpose of inspection and repainting. Subsequently, in consequence of improvements in the nature of the compositions used, they were enabled to perform two voyages out and home without docking. More recently, as the inventor of the paints, Colonel-Commandant Crease, C.B., Royal Marine Artillery, contended that the three passages to Bombay and back could be performed without the necessity of intermediate docking and repainting, the Crocodile was selected by the Admiralty for trial. Her bottom was coated early in September last with one coat of anti-corrosion and one coat of specially prepared anti-fouling paint, and she started on her first trip to India on the 18th of that month. She concluded her third voyage, without having been docked in the meantime, on the morning of April 25 last, each voyage having been made in good time, although during her last trip she suffered, in consequence of an accident in the Suez Canal, an unavoidable delay of a day and a half. By special order from the Admiralty, she was docked on April 26, with the result that, with the exception of a belt of grass, tapering from six feet wide below her central water line on the starboard side, and a little more on the port side, to nothing at all at the extremities, her entire bottom was perfectly clean, being free from weeds, barnacles, and other incrustation, and also quite protected in every part. This excellent result, obtained with a single coating of anti-fouling composition, has been pronounced by the dockyard authorities and the experts sent specially down to inspect the ship from the Admiralty to be the most satisfactory hitherto obtained. It was remarked that the fine grass on the Crocodile's bottom only grew where she had been scrubbed with brushes by the ship's company, and where, it is assumed, the skin had been denuded of paint.

Filling for Nail Holes.

The following method of filling up nail holes in wood is not only simple, but said to be effectual: Take fine sawdust and mix into a thick paste with glue, pound it into the hole, and when dry, it will make the wood as good as new. Frank Christin, Jr., in *Stoves and Hardware*, says he has followed this for thirty years, with unvarying success in repairing bellows, which is the most severe test known. Often by frequent attachment of new leather to old bellows frames, the wood becomes so perforated that there is no space to drive the nails, and even if there was the remaining holes would allow the air to escape. A treatment with glue and sawdust paste invariably does the work, while lead, putty, and other remedies always fail.

AN IMPROVED CABLE CAR TRANSFER SYSTEM.

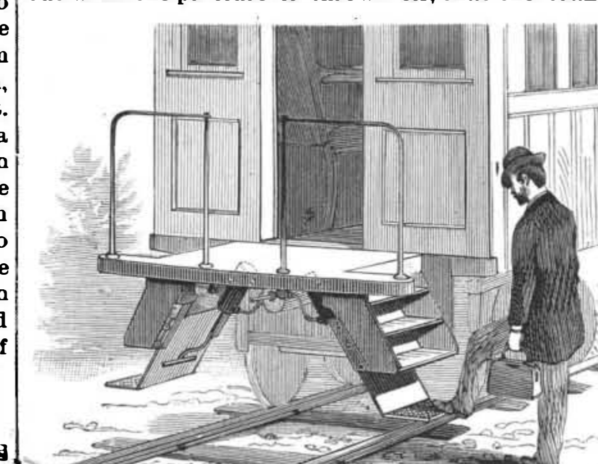
A means of transferring a car from one propelling cable to another, at the intersection of cable railways, and wherein the propelling cable is utilized to effect such transfer, is illustrated herewith, and forms the subject of a patent issued to Mr. Allen R. Parkeson, of Monongahela City, Pa. Each of the surface tracks has the usual underground propelling cable, but these cables cross in direct lines at their intersection, as shown by the arrows, and do not extend around the curves conforming to the turnouts. In the conduit at the center of the crossing or intersection of the tracks is journaled a large pulley, to which motion is communicated by two or more of the propelling cables, such cables being brought in sufficient contact therewith by means of guide rolls, as shown, or considerably greater frictional contact of the cable with the pulley may be obtained by crossing the cables at each side of the pulley. A smaller pulley is secured below the large driving pulley, as shown in Fig. 1, and an auxiliary cable from this smaller pulley is carried thence around tightening guide rolls journaled below the grip slots of two of the intersecting tracks, and around other guide rolls, to form a loop and an approximately four-sided figure, as shown by the arrows, with curved sides and ends projecting into the four lines of tracks forming the crossing. The tightening guide rolls are shown in Fig. 2, and are journaled upon a block which slides in suitable guideways, and has a screw by means of which it may be adjusted longitudinally in the line of the loop branch of the auxiliary or transferring cable. By adjusting the tightening rolls away from the main driving pulley, the loop and the entire auxiliary cable are tightened. The latter cable travels with less speed than the main cables, on account of the smaller size of the pulley from which it receives motion, thus carrying the cars with proportionately less speed around the curves than their rate of travel upon the straight tracks, while an increase of power is obtained to overcome the greater frictional resistance of the track.



PARKESON'S CABLE CAR TRANSFER SYSTEM.

AN IMPROVED EXTENSIBLE CAR STEP.

A car step mounted to slide in ways secured to the under side of the permanent car steps is shown herewith, and has been patented by Messrs. James F. and John F. Wood, of Wilmington, Del. To the casings which support the permanent steps are secured castings formed with ways, serving as guides for a diagonal leaf rigidly connected to a tread, anti-friction rolls being carried by the leaf within the ways. To the rear under face of the leaf is secured an arm carrying a piston working in a cylinder connected by means of a tube with the compressed air reservoir of the air brake system, there being a spring above the piston. The arrangement is such that when pressure is on, as when the cars are running, the auxiliary treads are held up, but when the pressure is thrown off, that the brakes



WOODS' EXTENSIBLE CAR STEP.

may be applied, as in approaching a station, the springs force the steps down to convenient position for use, the steps again returning to their raised position after the brakes are thrown off. The steps can be worked independent of the brakes, if so desired, by having a separate pipe from the main compressed air reservoir at the engine, by means of which the engineer can lower the steps whenever he chooses.

For further information relative to this invention address Messrs. James F. Wood & Co., Wilmington, Del.

Copper-Steel Alloy.

Schneider & Co., of France, manufacture steel containing a variable portion of copper, which is to be used in making artillery of large caliber, armor plates, rifle barrels, and projectiles. Ordinary copper is used for the purpose, care being taken to prevent it from oxidizing before it is mixed with the steel in the crucible, and the composition contains two to four per cent of copper, the alloy being capable of far more resisting power and more elastic and malleable than simple steel would be. This new material will also probably be valuable for making girders for building purposes and ship plates.

[GENTLEMAN'S MAGAZINE.]

The Quest of Gold.

Independent researches in many parts of the world have conclusively shown that much so-called "alluvial" gold has not been deposited by flowing water, but by water in its solid form, viz., by glaciers. In British Columbia, in the Northwest Territory of Canada, in Nova Scotia, and in New Zealand are many gold placers formed by glacial action. In North Carolina, Professor Kerr, the State geologist, attributes square miles of auriferous gravels to "frost drift" or "earth glaciers," *i. e.*, to the effects of repeated frost and thaw in decomposing the rocks, and then by alternate expansion and contraction causing their detritus to rearrange its component parts. Even in tropical Brazil, the golden *canga* represents what is left of the glacial moraines and *debris* of a past geological epoch. Finally, to come nearer home, gold is found in the "till" on the flanks of the celebrated Lead hills of Scotland. Quite recently it has been claimed that some of the Californian "gravels" are not gravels in the true sense of the word, but that they are partly due to mud volcanoes, much of the accumulated matters being angular instead of rounded, as they are in riverine deposits.

Whatever the means by which the placer gold has been conveyed to its present bed, it can only have had one source—mineral veins. At one time it was the fashion to suppose that vein gold would be found only in quartz rocks of Silurian age, but though such formations do afford a large proportion of vein gold, there are many other minerals which carry gold—notably calcite—and scarcely a rock formation in which one could safely predict its absence. As to how the gold got into the mineral veins there are many plausible theories—in solution, by decomposition, by condensation of vapors, etc. Probably all these may have had their share in its production. Certain it is that gold has been found in solution in sea water, and in native crytals, in the pores of lava which has been ejected within historic times.

Vein mining entails greater expense than gravel mining, because the underground workings are more extensive and more difficult, and when the vein stuff has been mined, the hidden gold can only be got out by the aid of costly machinery, designed to execute in a few hours that which, if left to natural agencies, would occupy many years. Thus a percentage of gold that would be remunerative in a placer would not pay in a vein, but veins are more enduring, and now afford the chief supplies of the precious metal.

When all the circumstances are favorable, gold mining and milling are sufficiently simple operations, but a vast number of enemies arise to trouble the mill man. Two of the worst are known as "float gold" and "floured mercury," and so many shareholders have been robbed of their dividends by these obstructive agents that they will probably be glad to know something of their birth and history. It must be told, then, that sometimes the gold occurs in particles so infinitesimally minute that they will actually float on running water, and thus get carried away with the refuse, despite all contrivances devised to arrest them. In the case of vein gold, this evil is often increased by the hammering action of the stamps, which flattens the grains and augments their buoyancy. By the stamping process also the surfaces of the grains get covered with a silicious coat, due to impalpable quartz powder which is hammered into the yielding metal. This skin prevents proper contact between the gold and the mercury, hence such grains escape amalgamation; even gold which has been simply hammered shows, for some inscrutable reason, a very reduced affinity for mercury. Much gold is naturally coated with oxide of iron, or contaminated with a talcose mineral, or with shale oil, or with steatitic matter, all which are more or less inimical. Even dirty water used in the mill will cause an objectionable sliminess which must be guarded against. Then no ore is quite free from sulphurets (compounds of sulphur with the base metals—iron, copper, lead, zinc, antimony), which rapidly destroy the activity of the mercury by dulling its surface and causing it to break into tiny particles, known as "flouring" or "sickening." Frequently these sulphurets form a considerable portion of the product and contain much of the gold, whose extraction from them is no longer a mere mechanical process, but involves roasting, treating with chemical solutions, and other intricate and delicate operations known to metallurgists. Many a mine really depends for its success upon the adoption of the most suitable method for dealing with the sulphurets, and that method is not always discovered in time to save the company from liquidation.

Sufficient has been said to show that modern gold mining is a highly scientific industry, demanding capital and skill. A rich ore is by no means synonymous with large profits. The presence of gold is a necessary element of success, but equally essential elements are the tractable character of the ore, the situation of the mine, the supply of water and fuel, and the labor question. The problem is a commercial one, how much gold can be got from a ton of ore, and at what cost? To illustrate this by one example. Many mines assaying over 1 ounce (20 pennyweights) of gold per ton have failed to pay. On the other hand, a well known Australian mine since 1857 has raised over a million tons of quartz, the bulk of which averaged only 6½ dwt. per ton, and some less than 4 dwt., yet it has yielded gold to a value approaching two million pounds sterling, and has repaid the original capital many times over in dividends.

One of the great charms of gold mining as an investment is that the market value of the product is constant, there are no fluctuations in the price of gold as there are in those of other metals, hence a soundly established undertaking can never fail through depressed markets. Only get your gold, and it will sell itself.

The Edison Exhibit at the Paris Exhibition.

PARIS, May 15, 1889.

The Edison exhibit forms a most important and attractive display, the more so as it is already practically complete. No one who examines this remarkable display can fail to be struck with the wonderful versatility displayed in the inventions of Mr. Edison. That one man alone should be the originator of no less than 493 patents, besides the 300 more applications for patents in his name, which are still pending, is marvelous enough, but the wide range of applications covered by the patents is still more astounding. The exhibits comprise the most recent apparatus in all the leading branches of Mr. Edison's inventions, and may be classed under the following heads: Telegraphic, telephonic, phonographic, physical, electric lighting, underground conductors, lamp manufacture, the electrical separation of metals, and electric meters. We will first take a rapid glance at the principal objects of interest, deferring a more detailed examination until a later date.

In the telegraphic section we find at work the latest bridge quadruplex system, now adopted in this country; the duplex system, the phonoplex system of signaling, in which a form of telephone is used as a sounder; train telegraphs, the automatic telegraph, by which a speed of 1,500 words per minute has been obtained. The last named instrument is capable of transmitting either Roman letters or Morse characters, the former requiring five and the latter three wires. The five-wire system is the most generally adopted, the message being put into the transmitter by a punched slip moving over a metal roller. The roller is rotated rapidly by an electric motor, and the contacts between the battery and line are made through the perforations in the slip. At the distant end the currents produce by chemical action corresponding symbols to those transmitted. This system was operated for some years between New York and Philadelphia and New York and Washington by the Automatic Telegraph Company and the Atlantic and Pacific Telegraph Company; and later, upon the absorption of these companies by the Western Union, it became the property of the latter. There are also exhibited the harmonic telegraph, stock printers, district messenger system, motograph relay, carbon relay, and rheostat. The motograph relay, which operates a local sounder or Morse circuit, is a marvel in itself. The contact closing the local circuit is attached to a spring resting on a rotating chalk cylinder, and the principle of the reduction of surface friction between the spring and the cylinder on the passing of a current through them, which was applied by Mr. Edison to his loud-speaking telephone, is here applied, the spring responding in lateral movement to the successive currents received. The cylinder is driven by a small electric motor with worm gearing, rendering the instrument, therefore, self-contained.

In illustration of the same principle we find several instruments in the physical section which have been made specially for the show, among which we may mention one in which the experimenter holds a brass spring with a palladium tip, and slides the tip along a surface composed of blocks of various metals in succession. The current being passed through the metallic surface and the spring, a difference can be felt in the surface friction according to the different metals in contact with the spring. In this section also there are experimental incandescent lamps fitted with a central platinum wire between, but not touching the sides of the carbon filament, to show the "Edison effect," which is, that, while the lamp is burning, a galvanometer, or even a sounder, inserted between the positive terminal of the lamp and the isolated platinum wire is actuated every time the sounder circuit is closed. In this section is also shown the megophone, which is an apparatus for concentrating waves of sound and rendering speech possible at a distance of three miles. There are two large cone-shaped receivers, 7 feet long, and tapering down from 2¼ feet diameter at one end to 1 inch at the other. A speaking trumpet, with an orifice 6 inches diameter, is fixed between the two receivers.

In the electric lighting section is exhibited a complete central station plant on the three-wire system. Everything will be installed according to the latest methods. The two similar dynamos to be run with this station are each of 125 volts and 240 amperes, and run at 1,200 revolutions. Each machine weighs 4,340 pounds. The machines are shunt wound, and can be regulated as to their potential by an adjustable resistance inserted in series with the shunt wire. The three mains, or "omnibus" wires, are conducted from the machines to the distributing board, whence the connections to the various feeders are made.

These details of the central station system really demand separate treatment, and we must defer our description until we can enter exhaustively into the subject with the aid of diagrams. For the present we may say, however, that the underground conductor system is very fully shown, the conductors leading from the central station actually being laid down in pipes according to the latest method. Mr. Edison's original method was to inclose the bare copper mains in iron pipes, and retain their distance apart by passing the mains through pieces of thick millboard placed at intervals along the pipe. It was found, however, that it was necessary to connect together the millboard supports by string, in order that they should retain their relative positions during the running in of the insulation compound. The improvement effected and now employed consists in wrapping each conductor of bare copper round with a separate spiral of rope, which acts as a separator between the mains, and afterward an outer wrapping of rope round the outside of the conductors, which keeps their position central in the pipe and separates them from contact with it.

The process of lamp manufacture and the Edison electrolytic meter system is shown in great completeness by means of specimens of the actual materials throughout the various stages.

Mr. Hammer, to whom the design of the huge model Edison lamp and the flashing effects in incandescent lamps which are to be exhibited on its pedestal are due, intends, we are glad to hear, to reproduce the marvelous effect of transformation of sound through the medium of two Edison phonographs, two carbon telephones, two motograph receivers, and two induction coils, which he demonstrated with such success at his lecture in the Franklin Institute, Philadelphia, between that place and New York.

I may mention that over the American Section, in the Machinery Hall, an inscription has been put up stating that the United States possess steam engines of 450,000 horse power, the power of which is transformed into electrical energy; and that, apart from transmission of power, this energy is used to supply current nightly to 2,000,000 incandescent lamps and 250,000 are lamps.—*Correspondence of the London Electrician.*

Phosphorescent Powders and Luminous Paints.

E. Becquerel (*Comptes Rendus*) has lately added to his former communications upon this subject some very interesting observations of a practically useful kind. It is now well known that although a slightly phosphorescent powder may be obtained by calcining together in a closed vessel sulphur and pure carbonate of calcium, yet the presence—as "impurities" or otherwise—of extremely small proportions of other substances, often greatly enhances the "lighting" powers of the resulting compound; again, traces of certain metals seem to destroy or greatly diminish the phosphorescent effect. We may usefully condense some of the author's results in the following manner, thus: 1. Sulphur and pure carbonate of calcium give very slight phosphorescence. 2. Sulphur and pure carbonate of calcium, plus 0·5 to 1·5 per cent soda, give brilliant green phosphorescence. 3. Sulphur and pure carbonate of calcium, plus traces manganese or bismuth, give little or no phosphorescence. 4. Mixture as No. 3, but with 1 per cent soda, gives strong yellow or blue phosphorescence. 5. Mixture as No. 1, plus traces of lithia, gives intense green phosphorescence. 6. Sulphur and oyster shells, etc., give red phosphorescence. 7. Mixture as No. 1, plus traces of rubidium, gives red phosphorescence. 8. Sulphur and pure carbonate of strontium give very faint bluish green phosphorescence. 9. Sulphur and pure carbonate of strontium plus soda give bright green phosphorescence. We see from the above, for the first time, something of the reason why marine shells give such good results. They contain traces of rubidium, and Becquerel shows that the salts of this metal exert a powerful effect. From the real cause of the luminosity of these impure sulphides, however, how they act in "bottling up sunshine," and why certain other substances influence this property so much, we are as far off as ever. The entire subject of phosphorescence is, at present, not "luminous," but very obscure.

A PHOTOGRAPH of a curious hen's egg has been sent us by C. G. Moore, of Crawfordville, Ga. It was a double egg. It appeared to be an ordinary egg united; it was cooked and broken open, when, to the surprise of everyone, instead of finding a yelk, it was discovered that there was a perfectly formed egg within the outer shell. The inner egg seemed to be perfect, and contained the usual white wall and the inner yelk, which was, however, quite small. It was considered such a curiosity that Mr. Moore had a photograph taken and sent us.