railway accidents, and the causes assigned for them, will serve to point out some of the inventions that are needed. One of the fruitful causes of winter railway accidents is snow and ice on the tracks. To remove this thoroughly and at the proper time would prevent a great many serious accidents, and although some very good appliances have been brought out for the purpose, there is yet room for valuable improvements in track clearers. As evidence of this, it will be mentioned that in the winter of 1882–83 there were 14 derailments from snow or ice and an equal number of collisions caused by colliding with snow-bound trains in blinding storms. To clear tracks from snow and ice requires two different appliances—one to remove the loose snow and more compact drifts from above the surface of the rails, and the other to clear the flangeway down nearly to the spike-heads. Another matter that inventors will do well to study is to provide some reliable signal by which disabled trains may warn other trains in time to prevent collisions, and also to prevent collisions at crossings. For the year ending Sept. 30, 1883, there were reported 634 collisions in the United States. Some of these were of such a nature as to their causes that no system of signals would have prevented them, but they were few.

There were 403 rear collisions, 191 butting and 39 crossing collisions, and one passing collision. Some of the rear collisions were caused by trains breaking in two, and were non-preventable, and the passing collision could only have been prevented by greater vigilance on the part of the operatives. A system of signals is wanted that will enable the crew of a disabled train to warn trains in either direction without relying on sending signal men, who too often fail to stop approaching trains in time to prevent disaster. In the same year were 44 derailments from cattle on the tracks. This is evidence that a better pilot, or "cowcatcher," is in demand—one that will render it impossible for any animal large enough to cause mischief to get under the wheels. In that year were 92 derailments from misplaced switches, although there are safety switches and many so-called safety signals in use. The general trouble with those appliances is that they are complicated and liable to derangement, and they are not reliable at all times. Besides switch accidents, there were 3 draw-bridge disasters from failures of the signals. Let us have reliable switch and draw-bridge signals that are not too expensive. For the same period 92 derailments are reported from spreading of rails, and from this it seems that something stronger than spikes and ordinary rail fastenings are in demand.

Accidents of this kind are usually serious in their results, and a rail fastening that will effectually prevent them and not shorten the life of ties is wanted. Many lives are lost by contact with overhead bridges. The most effective remedy for this is to build the bridges high enough to clear the head of the tallest man when standing on the top of the highest car; but as this matter is neglected by commissioners and other authorities, it remains for inventors to produce some better means of warning of the approach to such bridges than is in use. Accidents at highway crossings are frequent, notwithstanding the many alarms that have been invented to warn people of approaching trains. A reliable automatic alarm is still among the necessities. Connecting rods frequently break, and a new form of rod is in demand—one that will not weaken by its own weight. Washouts of road bed, cattle guards, culverts, and bridges are frequent cases of mischief. It seems as if it would not require a great exercise of ingenuity to provide some effective means of warning engineers of any displacement of embankments or other substructures by water, or destruction or weakening of bridges, culverts, etc., by fire. Land slides and bowlders come in for a share of causes of serious accidents, and perhaps many of them may be prevented by an arrangement of signals operated by wires so arranged that earth or rocks would come in contact with them on or before reaching the track. The foregoing will give inventors some idea of what is wanted, aside from the safety car-coupler; and although devices for all the purposes mentioned are in use, few of them are satisfactory in all respects, and to remedy the defects in these appliances is an inviting field for inventive minds. H.

THE DELAY OF BUSINESS IN THE PATENT OFFICE.

It has become a matter of universal complaint among inventors and patent solicitors, that business in the Patent Office in Washington is greatly delayed. Over thirty-five thousand patents per annum are now applied for. Soon the number will have increased to fifty thousand. In view of the immense number of interested parties, it may well be asked if there is no way of expediting the work of the Office, and the first remedy for the evil that presents itself is to increase the number of examiners. It is well known that there is a large annual surplus in the accounts of the Office, and it seems only just that this money, which is the contribution of patentees, should be used in furthering their interests. As it is now, it lies idle in the Treasury, and keeps on accumulating from year to year. But so much has been said on this topic that it has become a trite one.

If the Commissioner of Patents were a man of proved executive ability, one who had the power of systematizing work, and supervising its details as executed by a number of subordinates, it would probably make a great difference in the work. In selecting a Commissioner, other things being equal, a good lawyer is supposed to be the proper person. But while good legal attainments are desirable, the power of expediting work should not be underrated. With the same force an energetic business man, who would not oocupy himself with unnecessary disputation, could certainly do much more than one who was only a lawyer. In an old established department like the Patent Office, everything is done by routine that has resulted from years of habit. The question is whether the routine could not be improved upon, whether more work could not be done with the present number of examiners and clerks than hitherto.

To bring about any such result, it would be neccssary for the Commissioner to take charge of the whole system with its array of officers. He should consider himself the head of the examiners, not merely in a judicial, but in an executive sense. He should give personal attention to the work of each room, and try to bring on the most laggard, by transferring clerical or other aid; thus a great improvement might be affected. It is impossible to resist the impression that from a business point of view the office is allowed to run itself to too great an extent. The examiners are many of them old and tried servants of the government, whose long years of service have conferred upon them prescriptive rights. But the right of being left alone can hardly be included among these. They would undoubtedly resent any direction of their labors, even by their superior, the Commissioner, as an insult, or at least an unpleasant interference. But such interference should take place. The rule in all such offices is that a good shaking up is beneficial. The process should involve no hardship to any one beyond a disturbance of the mere sentimental part of human nature. That such a reorganization is periodically necessary in business offices is an old story. There seems little or no doubt that more could be done in the Patent Office without increasing the force.

The ordinary attorney's fee for soliciting a patent is twenty-five dollars. This is ten dollars less than the government charge for granting one. It does not seem probable that the Patent Office has as much work to do in the matter as the solicitor, yet the government receives nearly one-third more compensation. If a solicitor were to venture to conduct his business on the dilatory principle of the Patent Office, a very few months would be required to dispose of his *clientele*.

The examiner has simply to verify the general correctness of the solicitor's work, and make a search into the novelty of the device. He should be able to dispatch business unusually fast. Unfortunately, the rule of practice appears to be the reverse.

As the matter now stands, the letters patent granted give the merest *prima facie* evidence of novelty. They stand for very little in the courts, beyond a certificate of registration. It may, then, be questioned whether it would not be more satisfactory, and more in accordance with the spirit of the patent statutes, to abandon the long and dilatory search, and let every patentee do his own searching, or have it done by an attorney. If this course were followed, a patent would be just as good in the courts as it is to-day, and a very serious problem would be solved. For as the number of patents increases, not only does the work increase directly with the applications, but the magnitude of the records that are to be searched increases year by year. To add to this latter trouble, the English patents, under the new British law, are increasing almost as rapidly in number as our own.

If every patentee were allowed to be the examiner for his own application, he would have every inducement to do the work well, or have a competent attorney or expert do it for him. He would know, he knows now, that a patent for an invention not new cannot stand in court, and he would have every inducement not to waste his money on a worthless patent.

Color Printing.

The Universal Printing Company, London, have recently introduced a process, called after its inventor the Hoeschotype, for the photographic reproduction of colored pictures. Five colors are used in this process—yellow, red, blue, gray, and black; these five form the base of a large key map of tints, each one divided into five grades, containing, so to speak, respectively one, two, three, four, and five fifths of any of these colors. In combining these tints by printing two or more above each other, a large variety of over 1,600 shades are produced; the colors must, of course, be transparent for this purpose.

To reproduce a picture, for instance a portrait, the painted original is at first photographed and copies printed. One of these copies is now taken in hand by an artist, who by means of his color scale ascertains for each spot in the picture the amount of yellow contained, and he covers that particular spot with an equivalent shade of gray, painting out with white at the same time all those parts of the photographic print which in the picture are to contain no yellow. This process finished, a negative is produced from this painted sheet, and a print taken on sensitized gelatine mounted upon plate glass. It will be understood that this gelatine print only represents a picture of those parts in which the artist wishes yellow to appear, and in different degrees of density. In other words, after this gelatine is washed and rolled up with yellow transparent pigment, an impression can be taken from it on paper.

In a similar manner gelatine printingsurfaces are prepared of the rest of the colors—red, blue, gray, and finally black; they are all printed one above the other on one sheet in perfect register, and the result is a reproductiou of the original colored picture, as near as the skill of the artist who prepared the copies for the colored plates and the perfection of pigments will admit. Tedious though this process appears, and depending as it does on the skill of an artist, the result is admirable. The glass plates carrying the gelatine film are placed upon the bed of what appears a well built litho press. The ink used is very stiff, and the inking operation, performed in the usual way by rollers, is repeated twice for ever one impression to insure perfect distribution. The sheets are laid on to exact register, and printing by power is performed at the rate of about 100 copies per hour. The presses are capable of printing up to 25 inches by 35 inches in color, and if smaller subjects are worked, two or more can be placed on one plate.

Kinds of Horses Best to Raise Here.

At a recent meeting of the New York Farmers' Club, numerously attended by owners of fine stock, the after-dinner discussion was on the above subject. One member thought the Percheron horse, as one on which the farmer could be reasonably sure of making a little more than his expenses, was about the best for farmers to make a business of raising in the Eastern States. It was a breed which could be used at light farm work from two years old until fit for market, at four, and thus made to pay for its keep.

This breed of horses had the requisite size and muscle to be fit for city trucking work, and they had the peculiar power of impressing their stamp upon all sorts of mares, raising from even a small broncho of 600 or 700 pounds a colt that would sometimes weigh 1,000 at a year old, and be of admirable proportions. The animal is of great endurance, coming to maturity early, but should be broken to halter very soon after birth.

The Norfolk roadster was another horse suggested as admirably adapted for breeding purposes, being short-legged, short-backed, sloping-shouldered, thick-bellied, good-bowed, clean-footed, clean-breasted, with high action and good wind, and a horse which, so far from being exclusively English, could be found in Kentucky of a very high grade. Frenchmen themselves preferred such horses to the Percheron, and the governments of Prussia, France, and Italy had largely imported this breed to improve their own stock for cavalry purposes. Of English horses there are three general grades, the thoroughbred, the coaching animal, and the nag or roadster, the second being considered the most profitable for farmers to raise.

The feeding of ensilage to horses was adversely commented on by one member, who had lost eight horses thereby in a brief period, the cause of the disease being attributed to ergot in the corn of which the ensilage was made.

Boring Insects.

At the International Forestry Exhibition, in Edinburgh, Professor McIntosh recently delivered a very interesting lecture on "The Boring of Marine Animals in Timber." The lecturer stated that so far as we know at present sponges only bored calcareous substances, while annelids never bored wood. The purple sea urchin bores gneiss and granite by means of its teeth. The crustaceans and mollusks were the chief borers of wood. Of crabs, the *Cheluria terebrans* is even more destructive than the common Scotch crab or "gribble" (*Limnoria lignoram*), which Robert Stephenson found so injurious to the Memel beams supporting his temporary beacon on the Bell Rock. The gribble attacks all kinds of timber, and the piles of the Trinity Chain Pier at Leith had formerly to be replaced every four years owing to their ravages. It also bores into submarine cables, thus rendering them faulty. The xycophago, a small bivalve mollusk, is also very destructive of wood, entering it while young and growing to maturity inside. The teredo, or ship worm, is, however, the most fatal wood borer known, and occurs in every ocean. It bores tunnels into the wood from one foot to a yard in length, and is still more wasteful to Dutch and French harbor works than to British.

Two theories are advanced to explain the cutting of these creatures, one chemical, the other mechanical; but traces of acid solvents were only found in some calcareous borers, and they also occurred in animals which did not bore. On the other hand, silicious cutters have been found on some borers, such as the teredo. With regard to preventives, the Dutch Commissioners have recommended creosote for internal application to the wood, and metal sheathing for external. Professor McIntosh, while admitting the value of the Dutch investigation, pointed out that there was still much to be learned on the subject, and recommended it to the new marine laboratories now in progress. He also showed that the function of the borers was advantageous when it resulted in the destruction of sunken ships and waste timber floating on the sea.

The Purchasing Power of Money.

We notice the following in one of Mr. Atkinson's papers, read in 1882: "To the workman, or to the workwoman, it matters not what the measure in money is by which their wages or earnings are defined. The real question is, How good a house, how large a room, how adequate a supply of food and fuel and clothing can I purchase with that money? It therefore follows that every application of science to manufacturing industry, to mining, or to agriculture, by which the aggregate of things is increased while the labor is diminished, tends to increase the quantity of commodities to be divided among the laborers; and as this increase is progressive year by year, the proportion which capital can secure to itself under free contract becomes less, while the proportion which is assigned to laborers becomes greater."