

going into these, cannot get out without becoming covered with pollen, and from them they go to another tree near by which bears true figs, and give to them the pollen; this fertilizes the ovaries, they grow and develop into luscious fruit. There are, therefore, three crops, as it were. The first two are called *capri* figs; the ancients knew them by this name; they sometimes hung branches of the *capri* figs upon the true trees, finding that unless they were brought together in some way, no fruit matured.

The secret of the insects' work has been a modern discovery. Mr. Gibson calls attention to this, one of the most curious examples of cross fertilization, along with those that he has himself made.

The soundness of judgment which the scientist must possess and the gift of expression which the poet has belong to the few, but their methods of observation we may all adopt. And as the resurrection miracle of the spring time is once more going on, there are inviting opportunities. A thrifty robin proved the truth of this a week ago. She was looking about in the grass before my window and had already in her bill what seemed a good load of twine, when she spied a rag which had probably been the tail of a kite. It was narrow, but fully half a yard long. Mrs. Robin evidently considered whether she should leave the twine for this larger prize, but decided to take both. She picked up the rag, dropped it, and took it up again, and again, until she had it so nicely balanced that she could take to her wings. The first flight took her only to a low bough of a tree near by; a little higher she stopped again; the third flight carried her out of sight among the topmost twigs. The precious rag could not have been more useful in the home the robin was building than were the lessons in perseverance and industry which she gave to her unseen observer.

Concrete and Cement Walling.

Cement concrete is now being extensively used for walling and arching purposes with eminently satisfactory results, having regard to its durability in water, earth, or air, and the high resistance it offers to compressive strain. Concrete made of one part by volume of Portland cement and three parts of clean sharp sand is capable of resisting a compressive strain of from 1 to 1½ tons per square inch, while it can with ease be moulded into blocks of any form or dimensions. There is, therefore, no reason why it should not be advantageously used in the lining of shafts, especially where the sand or ballast for the making of the concrete is conveniently procurable. The walling might be built of large blocks of concrete moulded to the radius of the shaft, or of concrete deposited *en masse* behind a properly constructed cylindrical tube, forming, as it were, a guide for the walling. An interesting account of the use of cement in shaft sinking on the Continent is given by Mr. Bennett H. Brough in a paper read before the Federated Institution of Mining Engineers, in which he describes the tubbing of shafts with cement blocks so made and laid as to be perfectly watertight. The blocks are moulded into segments provided on their upper and lower surfaces with grooves and tongues, in much the same manner as match boards, the groove being slightly deeper than the tongue, to enable the joint to be made good with cement. Each block has both its ends grooved out, so that when two blocks are joined together there is in the center of the joint a hollow tubular space, into which cement mortar is tightly rammed, forming, so to speak, a tongue, thus securing and rendering watertight the vertical joint in the same manner as the horizontal joint. In laying one tier of blocks upon another they are so disposed that the vertical joints of one tier are placed over the center of the blocks in the other tier, the intention being to break the joints. The blocks weigh from 1,543 pounds to 1,763 pounds each.

Mr. Brough recounts several instances of the successful application of this process on the Continent, notably the Serlo Colliery, belonging to the Prussian government, at Saarbrücken, where segments of 15·75 inches in thickness and 23·62 inches in height and length were employed, the diameter of the shaft being 9 feet 10 inches. Another instance is that of the salt mines of Leopoldshall, near Starsfurt, where a shaft 500 yards in depth and 17 feet 2½ inches in diameter was tubbed in this manner to exclude the enormous volumes of water met with in the saliferous strata.

In some cases a double ring of cement segments has been employed. According to the particulars given, the cost of the cement lining is considerably cheaper than that of brick lining. The cost of cement tubbing with a single ring of segments is 25s. 6d. per cubic yard, the estimate including the cost of material and labor for making the blocks, as well as the setting and filling with concrete.

It is estimated that a ring of 13 feet 1½ inches in internal diameter and 13·78 inches in thickness, containing 183·65 cubic feet, costs 7l. 7s. a yard. To enable a fair comparison of the respective costs of brickwork and cement to be made, it is necessary that the prices of bricks should be stated. Taking the average price

of bricks in our own colliery districts in England and Wales at 2l. 8s. per 1,000, the brickwork, inclusive of all labor and materials, would not exceed 1l. 5s. per cubic yard, so that there would really be very little difference between the cost of brickwork and cement.

Probably, in Germany, where the above estimate applies to, there is a greater disparity between the prices of materials operating in favor of the adoption of cement. The process, it is stated, has so far proved very satisfactory, and whatever its advantages and disadvantages may be, it is certain that cement concrete is destined to be an important factor in shaft work, as well as in engineering construction generally. —*Engineering.*

Unexplored Arabia.

Mr. and Mrs. Theodore Bent have just returned to England from their scientific expedition in the hitherto almost unknown Hadramaut district of Arabia. In an interview with a representative of Reuter's Agency the explorer gave an interesting account of his experiences. Mr. Bent said:

"Leaving Aden in November last, we proceeded by steamer to Makallah, the nearest point to the Hadramaut Valley, and after journeying for about three weeks, in the course of which we covered some 150 miles, we reached the interior district, our intended goal. The country from the coast to Hadramaut consists of a mountain range and an arid elevated plateau, calling for no special remark. It is practically uninhabited. Contrary to the general belief, the Hadramaut is not a district extending to the coast, but is merely a portion of a big valley in the interior. It is a long valley, in places as much as seven miles wide, but probably its whole extent is about 100 miles. It contains several towns of considerable size, the chief characteristics of which are the magnificent palaces of rulers and the palm groves which produce the splendid dates grown in Arabia. The Hadramaut is inhabited by Arabs and Bedouins, who are divided up into various sections, and are constantly at war with one another. My expedition spent a month in the palace of the Sultan of Shibam, one of the principal towns of the valley. From here we made excursions, often under the Sultan's personal escort, in various directions. The Sultan, who is a member of one of the most powerful and richest families of Arabia, had lived in India for a number of years. I found him to be a very enlightened and well informed man, and one who took a great interest in our work and in the exploration of the ruins in his neighborhood. With regard to the archaeological results of the expedition, we came across a number of inscriptions and sites of Sabæan towns. Owing to the kindness of the Sultan, we were able to visit one of the sacred places of the Arabians, which had never before been seen by Europeans. The country has, in fact, only been visited by two Europeans within living memory. Both these travelers were Germans. One visited the country forty years ago, and was driven out by the natives. The other, who penetrated last year, met with great difficulties from the tribes."

DECISIONS RELATING TO PATENTS.

U. S. Circuit Court—Eastern District of Pennsylvania.

L. DURAND, HUGUENIN & Co. v. GREEN, SCHULZE-BERGE & KOEHL.

Letters Patent No. 253,721, issued to Horace Koechlin February 14, 1882, for the manufacture of colors or dye-stuffs, construed, and held to claim and to cover a process only.

Judge Dallas, in his decision of this case, gives the following lucid explanation of the principles which must govern the court in construing patent claims:

It was directed by the act of 1836 (sec. 5), that the patent, although annexing the specification of what the applicant claimed as his invention, should "contain a short description or title of the invention or discovery, correctly indicating its nature and design," and should "grant the full and exclusive right to the said invention." It was with express reference to and upon construction of these terms of the act of 1836 that it was decided in *Goodyear v. R. R. Co.* that the patentee's monopoly was not, in that case, limited by his claim, but extended to the invention which was described, and the nature and design whereof were correctly indicated in the specification. After the passage of the act of 1836 the profession recognized the convenience and utility of formally stating the claim for which it made provision at the end of the specification, and, from the practice which ensued, as well as for other manifest reasons, the courts were led, as in *Goodyear v. R. R. Co.*, to give to such claims much, but not controlling, weight in determining the scope of patent rights.

I now turn to the act of 1870, under which the patent in suit was granted. It is, as to the subject under consideration, markedly different from the act of 1836. It mentions the specification and the claim as two distinct things, and requires an inventor, not merely to specify and point out, but to "particularly point out and distinctly claim" his invention. The change in

words is very slight; but the difference in meaning is obvious and important. By the one act he was instructed to specify what he alleged to be his invention; by the other he is told that the invention for which he desires a patent he must distinctly claim. The fact that, except as to the change just indicated, the words used in the two acts, when dealing with this matter, are substantially identical is quite convincing that the draughtsman of the act of 1870 actually as well as in presumption of law thus peculiarly varied the language of the act of 1836, not without reason, but with a definite purpose. Nor is the legislative design hard to discern. The practice of the profession and the opinions of the judges, to which I have adverted, had suggested that the embarrassments attendant upon the efforts of the courts to construe vague and indefinite patents might, without doing injustice to patentees, be much alleviated by denying protection for anything, though original, new, and useful, which was not also distinctly claimed.

In brief, it was prescribed that the claim must be taken as defining precisely what the invention covered by the patent is, and hence the true question is not what the patentee might have claimed, but what he has claimed, the latter, not the former, being made the measure of his right. The rules for determining what is claimed in any case are few and simple and are not peculiar to the patent law, except as respects the doctrine of liberality in construction in favor of pioneer inventors. The benefit of that doctrine is claimed by these complainants, and without pausing to examine their title to invoke it, for it cannot avail them, I concede, for the present purpose, its applicability to the achievement of Koechlin. As to the rest, it is sufficient to say that if the language of a claim has a plain and distinct meaning, that meaning must prevail. That which is to be ascertained is, of course, the intent of the claimant, not, however, that intent as elsewhere or in some other manner disclosed, but as expressed in the claim itself. If the meaning of the claim be uncertain—that is to say, if the claim be ambiguous—but still be reasonably capable of elucidation by reference to the specification, the latter may be resorted to for interpretation of the former, but never to change the plain meaning of its language nor to extend it beyond the limits imposed by its own terms, and, *a fortiori*, not so as to create a separate or additional claim.

The National Zoological Park.

The preservation of certain species of American animals, now nearly extinct, was the primary object for which Congress was asked to establish a national zoological park at Washington. The appropriations asked for were very moderate, but in all cases they were cut down. Thus: \$36,850 was asked for to erect the necessary buildings; Congress reduced this estimate to \$18,000. In this connection it may be noticed that, in Philadelphia, the amount expended for buildings and inclosures was \$194,705. The result of this parsimony has been that expedients of a temporary character were adopted, which have proved far from economical. Notwithstanding the inadequacy of the appropriations, the results achieved are highly satisfactory and reflect great credit upon the Smithsonian Institution and its officers. The park, which occupies 40 acres, can be reached by Ontario Avenue. The total number of animals in the park is 448, of which 340 are indigenous to North America. Fifty-five of the animals were obtained by purchase. The animal house, a stone structure, is the principal building. The bear yards are in an abandoned quarry. As Congress has saddled a portion of the expenses both for construction and maintenance upon the District of Columbia, it is little wonder that the new park is largely frequented by residents of the District. Strangers are, however, beginning to visit the park in fair numbers.

Skins of Fruit.

The skins of fruit should never be eaten, not because they are not palatable or digestible or are unhealthy in themselves, but on account of the danger arising from microbes which have penetrated into the covering of the fruit. Everybody has noticed that at times a slight scratch will create a considerable sore on the human body. It is generally ascribed to an unhealthy condition of the blood, but a close microscopical examination will show that it is due to the presence of microbes thus introduced into the system. So with an apple, a peach, a pear, or a grape. The fruit may be perfectly sound and healthy, but on the skin or covering may be microbes, which, introduced into the human system, will breed disease. These germs are not uncommon, neither are they always present. It is possible to eat this covering without injury, but the danger is such that it is best not to incur the risk.—*St. Louis Post-Dispatch.*

A New Southern Comet.

Mr. Gale, of Sydney, discovered a comet in R. A. 37° 42', Decl. 55° 35' S., on April 3. This was the second comet of this year, and will therefore be known as comet *b*.