and also for late marriage among the men, is the high cost of wives. It takes a poor man a long time to save up the necessary $62.50. For the same reason, he looks his prospective bride over much more carefully than a richer man might, who could afford any number of wives. Where so much money is involved, marriage is a very serious business indeed. What we would call "trial marriage" is a very common thing among the Yoruba —often insisted upon by the bride's parents as well as by the groom.

Usually Happy

Yet marriage among the Yoruba is by no means the sordid thing that might be imagined, from all this talk of cash involvements. Husbands and wives usually get along quietly and contentedly, Father Ward reports, and he saw some marriages that were almost idyllic, even after a number of years.

The matrimonial situation in Yorubaland has of course been complicated considerably by the coming of foreigners. Many converts have been made by missionaries of three faiths, Catholic, Protestant, and Mohammedan. Each has its own marriage rules, which often run counter to those of the original native religion. Even Mohammedanism, which permits a man the same number of wives that the Prophet had — four — would cramp the style of a really ambitious native chief. And now British civil law permits divorce—which many Yoruba matrons are finding to their advantage.

And the worst of it is, there isn't any refund on your $62.50. Even in Yorubaland, a man simply can't find any really good securities to invest his money in any more!

Science News Letter, June 5, 1937

The National Bureau of Standards has found a way of depositing iron from an electrolytic bath five times as fast as the usual rate.

TRANSPARENT

This young lady is photographed through nine and one-half inches of water-clear plastic made in the United States.

PHYSICS

Accurate Cheap Lenses Made From Transparent Plastic

Eye Glass Lenses May Be Made 1,500 an Hour Without Grinding When Water-Clear Plastic is Used

SPECTACLE lenses produced at a rate of 1,500 an hour instead of being ground slowly and laboriously by hand, are only one possibility of the new transparent resin molded lenses now being exhibited in America by two British inventors. Eye glasses for all who need them at a cost measurable in cents instead of tens or twenties of dollars may some day be the result of thus achieving a long-held dream of molding optical lenses instead of fashioning them tediously by hand.

Good quality lenses on low price cameras and binoculars are another possibility already realized on a small scale. The entire important movement of copying the world's scientific and historic literature on microfilm and making it cheaply available to anyone anywhere, is also closely bound up with securing an inexpensive optical viewing device which one could carry in the pocket or keep in a desk drawer.

The molding of lenses has intrigued industry, governments, scientists and engineers for years. Glass, with its high melting point and other characteristic properties has been abandoned as a likely molding material for any but the cheapest and poorest kind of optical equipment of 10-cent store quality. But ever since the discovery of the chemical plastic materials the dream of molding lenses has seemed nearer. The color and non-transparency of the plastics prior to a year ago was a hampering aspect. Lack of a technique for molding with accuracy needed for optical work was another.

In America, in England and in other countries plastics of remarkable water-clear transparency have been achieved.

Now from England come lenses of a transparent plastic known abroad as Perspex. And from it are molded lenses accurate enough for almost any use except in the finest of optical instruments. Particularly to the point, the accuracy of the lenses is more than sufficient for spectacles.

The transparent resins have one natural disadvantage compared with glass for the production of lenses. They scratch relatively easily and probably have nowhere near the lasting qualities of glass. But as one skeptical scientist at the National Bureau of Standards in Washington points out this shorter life can be tolerated if the cost is very much less. If 100 molded lenses cost only as much as a single one of glass made by grinding, the economy may be balanced against the shorter life. For military optical instruments—binoculars, periscopes and such—the life of the device is short at the best so that the British army, in particular, is interested in the new development.

Clearness and Molding

Thus the molded lenses rest on two things: the new transparent plastics and the new molding process for fashioning them accurately into a lens surface. It is the second factor which is credited to the two co-inventors from Great Britain: Arthur W. Kingston, research engineer, and Peter Koch de Gooreynd, Anglo-Belgian industrialist. In recent months of the five-year development program Dr. W. E. Williams of Wheatstone Laboratory, King's College, University of London, has acted as consultant.

The accuracy of molding the new plastic lenses is reported to be 1/500,-000th of an inch, by independent and reputable measurement. This is sufficient for any but the finest and most expensive of optical instruments, state scientists. In fact this is much better than the accuracy required for spectacle lenses although this should not be considered too impressive since the human eye is notoriously a poor optical instrument of itself. Spectacle lenses require an accuracy of 1/50,000th of an inch.

Free Glasses

One use suggested for the new molded lenses in the spectacle field is to supply all school children with free glasses if they need them. Among adults too it is estimated that two people out of 10 wear glasses but that seven out of ten need them. Where the high (but justified) cost of spectacle lenses is a factor, the advent of low cost glasses should materially aid this problem of better vision for the mass of the population. The high cost of present-day spectacles lies mostly in the often multiple grinding and polishing of the glass surfaces to fit individual prescriptions.

Since the new molding process will form both spherical and non-spherical surfaces the convex and concave sides of the resin lenses could be molded separately and joined. Thus 10 molds each for the front and back of a lens would yield 100 combinations of lenses. A hundred such molds would provide 10,000 possible combinations and only 500 different mold forms, with their 250,000 possible combinations, would probably provide for almost every possible individual need of the human eye which might be encountered.

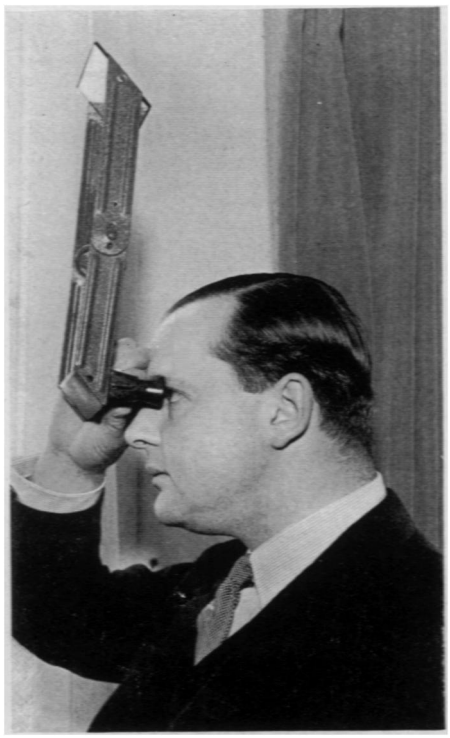
Beside the factor of the "life" of the molded lenses—how soon they would lose their shape, scratch or discolor with actual service—scientists are wondering how the inventors hope to overcome the problem of correcting for what is known as chromatic aberration. This technical phrase means the inability of a lens to focus, at a single point, all the different colors of the light ray spectrum. Glass lenses too have this trouble which is overcome by a combination of two or more different kinds of glass cemented together to compensate for one another.

Considered Possible

While no detailed data are yet available on the way the inventors hope to solve this problem it is understood that by combinations of different transparent resins it might be accomplished. If Kingston and Koch de Gooreynd can achieve this feat they truly will have solved a problem which will allow them to enter into the superior instrument field.

Chromatic aberration is not a barrier, however, to the use of the molded lenses in spectacles because the human eye has so much chromatic aberration anyway that the added aberration produced by a simple spectacle lens is too small for the eye to detect.

While the name may be unknown to



CHEAP BUT CLEAR

Peter Koch de Gooreynd, Anglo-Belgian inventor, shows how a periscope with binoculars containing transparent resin lenses may be used to watch distant scenes above the heads of a crowd.

the American layman, F. Twyman, managing director of the famous instrument house of Adam Hilger, Ltd., is widely known to scientists everywhere as an authority on optical systems and lenses. His report on the new molded lenses, therefore, is especially significant. Said Mr. Twyman after a detailed examination of the lenses:

"The lenses submitted to me are satisfactory for the cheap class of work for which they are intended. Further, I am of the opinion as a result of the tests made, that with care in preparation of the material and moulding, lenses could be produced of a quality good enough for such work as good camera lenses, binocular lenses and so forth.

Two Disadvantages

"The only defects of the material for such work as mentioned above are the obvious ones that it is not so hard as glass, and is thus more easily scratched and that it becomes plastic at temperatures much more normal, being easily moulded at 100 degrees centigrade."

Thus if one dipped spectacles with molded lenses in boiling water they would melt and run away.

The chemical name of the British resin employed in the lenses is methyl-methacrylate. There are equivalent resins known by different trade names, produced by the du Pont Company in America, and other countries. The molding process is controlled by the Combined Optical Industries, Ltd.

Science News Letter, June 5, 1937

Preliminary reports from the recent census in Soviet Russia give a population of 176,000,000.

A report from Turkestan says that a new region containing radioactive ores has been found.

CHEMISTRY-AGRICULTURE

Apathy Toward Pure Science Deplored by Dr. K. T. Compton

Farm Chemurgic Conference Hears of Efforts to Find New Uses in Industry for the Products of the Farm

SCIENCE has made possible a "new thing under the sun"—the more abundant life generally distributed, without one man's having to make his gains off another man's losses. Research in pure science must receive public support if this happy state of things is to be stabilized and extended.

These were the main theses of Dr. Karl T. Compton, president of Massachusetts Institute of Technology, in an address at the Third Dearborn Conference of Agriculture, Industry and Science.

The speaker took Government to task for spending so much time and money on regulatory and restrictive efforts in the field of existing technology and knowledge, and giving so little support, relatively speaking, to much-needed research for new. He said:

"I have frequently felt discouraged by the apathy, and sometimes almost antagonism which has appeared to exist in high places in respect to this scientific program. To be sure, I realize full well that the distress of unemployment must be relieved, that wealth must be properly regulated and distributed, and that curtailment of production of crops, oil and other commodities may need to be regulated in the public interest.

"My dissatisfaction is not because these things are being done, but because the other things, so pregnant with possibilities for the future, are neglected to the extent of only half of one per cent. of the budget of our federal government, and probably not more than this percentage of the active interest of our national leaders.

"But doubtless I am too impatient and critical. After all it generally takes a long time and much mental effort to reach conclusions which, after reaching, seem so obvious that we wonder why there was ever any hesitation. So I believe it will be in this case, for I am perfectly confident that in time the public will really put faith in science as the intelligent basis of adjustment and control of the environment in which we live."

Taught Negroes

White folks invent special names for making new uses of things grown on the farm. Negroes down South have for quite a long while now been doing something of that kind, though without any special name. One of their own race, Prof. George W. Carver, of Tuskegee Institute, most widely-known of American Negroes in scientific work, developed most of the methods in his own laboratory and then showed his people how to use them.

Prof. Carver told this dramatic story:

"Forty years ago, when I came to Tuskegee," he said, "I was met with innumerable facts such as these: terrific losses from soil erosion, soil practically a pile of sand and clay making a yield far below cost of production, poor preparation of land, no diversification of crops, practically no livestock, poor gardens if any at all, food for the family as a rule meager, of the worst type, and poorly prepared."

Against all these evils that beset the Negro farmers, Prof. Carver successfully pitted his hard-won scientific knowledge, only to find himself presently confronted with the same problem that has plagued agriculture everywhere: greatly increased production that outran the existing possibilities of consumption.

So Prof. Carver addressed himself to the problem of finding new uses for