are working at one-half capacity and the indirect expenses have increased from 18 to 30 per cent of the total cost. If two other manufacturers plan to obtain for themselves the full market the result may be that all four manufacturers will be producing, and therefore the cost of production will increase to 54.59 cents, the indirect expenses having increased to 40 per cent of the total cost.

Total Cost	I		II		III	
	Cost per Lb. Cents	Lb.	Cost per Cents	Lb.	Cost per Cents	Lb.
Production, pounds.....		1,200,000		600,000		300,000
Raw materials.....	\$248,420	20.71		20.71		20.71
Direct mfg. expense.....	108,620	9.00		9.00		9.00
Rent taxes, insurance.....	9,120	0.76		1.62		2.28
Depreciation, 15 per cent....	30,000	2.50	X ₁	5.00	X ₂	7.50
Obsolescence, 15 per cent....	30,000	2.50		5.00		7.50
Interest, 6 per cent.....	12,000	1.00		2.00		3.00
Other indirect expense.....	6,000	0.50		0.75		1.00
General admin. expense.....	7,920	0.66		0.66		0.66
Selling and shipping.....	35,640	2.97		3.00		3.00
		40.00		47.68		54.59

Indirect Expense

X₁—7.26 cents, 18 per cent of total cost
 X₂—14.27 cents, 30 per cent of total cost
 X₃—21.28 cents, 40 per cent of total cost

It may appear that this is an exaggeration, but it is a characteristic illustration of what has happened frequently in this country during the last few years. We have in the United States three manufacturers with a producing capacity of over 2,000,000 pounds of the intermediate referred to in the above illustration and a consumption of less than 600,000 pounds yearly; yet a fourth large manufacturer is seriously contemplating taking up the manufacture of this article. You no doubt realize that our industry is overexpanded in many lines. If it must live on the domestic trade alone, it is high time that we call a halt and begin considering our industry as a whole and not only certain individual units.

There are men with brains, there is energy and determination in every large organization in our industry, and no one organization can claim to monopolize these essentials for success. Our efforts should be directed toward coördination in our industry, for some day we shall face a competitor who knows coördination and elimination of ruinous duplication. If we do not learn our lesson now, our industry will unquestionably suffer later.

SUMMARY

1—We are unable to meet German competition as to costs and are therefore rapidly losing our foreign trade in coal-tar chemicals.

2—Contributing to high costs, outside of wages and other well-understood elements, are other factors such as obsolescence and depreciation, idle plant charges, etc., which are not usually sufficiently recognized by most chemists but which are to-day important items of costs because they are necessarily still figured on the basis of high war values.

3—We have to-day much duplication of effort in our organic chemical industry which still further adds to the burden of these indirect expenses. The consequence of duplication is over-expansion, inasmuch as we attempt to operate four plants where two could take care of our requirements. This condition doubles the depreciation, obsolescence, and idle plant charges.

If such are the existing conditions, what is the remedy?

Much can be said in discussion of what we should do, but it is needless at this time to discuss details which can be easily worked out, provided we recognize the necessity of a change in policy.

What we need is a different mental attitude. We must stop spreading out horizontally and instead we must dig deep down to establish better foundations. This new mental attitude which we must adopt is one of effective coöperation between American manufacturers, and it is necessary that chemists themselves adopt this mental attitude of coöperation, as they are and must be dominating factors in shaping the future of chemical industry of this country. By our intelligent advice and interest, manufacturers will be assisted in abandoning our war-time methods and will adopt a healthier plan of development, taking into consideration, first of all, the needs of our national industry. Instead of encroaching on fields already fully covered in order to satisfy local conditions or personal ambitions, the chemist can, where there is a desire to expand, lead the way towards virgin or neglected fields, of which there are still so many in this country. By so doing you will have done your bit towards minimizing a serious evil threatening our industry.

SOCIAL INDUSTRIAL RELATIONS

Food and Shelter

By H. W. Jordan

SYRACUSE, N. Y.

Food and shelter absorb from 70 to 90 per cent of the living expense of 85 millions of our 100 million people. Food originates from agriculture. Shelter, which is clothing, housing, and furniture, is in large part textiles, wood, and leather grown from the land.

As wages and salaries are consumed mainly to provide these essentials of life, the most effective way to maintain low cost production in the chemical and engineering industries, and in all industry, is to secure low cost production and distribution of these primary essentials while maintaining equitable profit to producers and distributors of them. Maintenance of efficient agriculture and forestry is infinitely more necessary to engineering industry than a tariff.

The extraordinary growth of the United States was founded on free land, cheap food, and ample shelter. Present social discontent and spread of confiscatory ideas spring from increasing cost of food and shelter. Distress of city unemployment is intensified by complete separation of the great majority of our people from direct contact with the land, and their consequent inability to provide food and shelter by their individual labor at the very source of these necessities of life.

In the period of village or small city industry, a depression in manufacture was not serious. The surplus workers went back automatically to the farms where there was plenty food, fuel, and housing. The normal reaction of depression that followed the Civil War was readjusted by flow of the unemployed to the Eastern farms and the free lands of the West. Little money was in circulation, but there was plenty food, fuel, and shelter back home on the farm.

In 1921, with a large proportion of manual and mental workers city born, with no home ties in the country whatever, and with money from wages or salary the only means of getting the essentials of life, the industrial worker, whether machine tender or chemist, soon becomes resentful when unemployed. He finds himself a product and victim of a complex economic system which caught him young and taught him only one or two narrow, special ways of earning his living. His condition is a result of applied science and of modern, specialized industrial efficiency.

THE LAW OF SPECIALIZATION IS AT WORK UPON HIM. Extreme specialization has led to such lack of adaptability that his chances of survival are greatly diminished unless he returns to a more generalized type. Accordingly, in many cases, he

reverts to the primitive occupation of buying and selling. But he stays in the city, because the country offers no appeal to him.

HOUSING IS AN EXAMPLE OF THE ACTION OF MODERN INDUSTRY. New England, New York, Michigan and all the industrial states had extensive timber areas fifty years ago, from which lumber was produced every winter in such abundance that a substantial house to shelter a family of five or six could be built for \$2500 from lumber that grew within ox haul. Wood for home fuel was equally cheap and plentiful. Building lots cost little, because free land in the West held down the price of all land.

In 1921 such a home costs \$5000 to \$8000 chiefly because Eastern lands are stripped of forests, and lumber for houses comes from Oregon, Arkansas, or Georgia. The freight on it is more than the cost of the dressed lumber at the Oregon saw-mills. Our annual freight bill on lumber from distant sources exceeds half a billion dollars. Wood for domestic fuel is not to be had at all. Home wood lots are as extinct as the buffalo. Building lots have multiplied in price.

SIMILAR CONDITIONS PREVAIL WITH FOOD. City industrial competition has so depleted farm labor that we no longer feed ourselves from nearby land. We import a substantial percentage of beef, wheat, and corn from Argentina and Canada, mutton from New Zealand, butter and cheese from Denmark, potatoes from Scotland, eggs from China, wool from Australia, lumber, pulpwood, and paper stock from Canada and Norway.

Butter, cheese, eggs and other dairy products used to constitute 30 per cent of our food. Now they are only 15 per cent. Although they are the most nutritious and essential foods, and can be produced within motor truck distance of our industrial cities in plenty, they have been replaced by white flour and sugar foods and by tropical fats and fruit that sustain long haul freight charges often in excess of their cost where they are grown. Declining use of dairy foods and excessive consumption of sugar and white flour is a main cause of loss of teeth, diabetes and widespread malnutrition of children.

Industrial employment managers deplore the inefficiency of workmen. Chemical operators are driven to distraction by the stupid mistakes of city born workmen. Frantic attempts are made to Americanize foreign born Slavic and Latin laborers by teaching them English, with a lot of patter about American institutions.

All the while industrial management makes no attempt to maintain or restore the single great influence that typified the former self-reliant American of Northern European stock and Anglo-Saxon speech. That influence was direct contact with the land and the production of one's own food by one's own labor; a process that compels the use of all one's wits.

INDUSTRIAL MANAGEMENT DOES NOT REALIZE that extreme specialization in city industry is producing equally extreme social discontent and economic helplessness of the individual because industrial management has evolved no method of co-operation between the land and city industry. Worse yet, industry has so drained the farms of labor that the farmer is forced to pay excessive wages, competitive with city industrial workers. Formerly he had abundant labor of boys and youths raised on the land, who worked for board and clothes, and a small, but adequate money wage. This low cost labor and the free land in the West made food wonderfully cheap, and so abundant that our exports were mainly food.

Agriculture and forestry cannot compete with city wages. They require low cost labor that must be provided through co-operation with city industry.

ANOTHER IMPORTANT FUNCTION OF THE LAND is that when nations shift from rural to city life, to the extent that the country is distressed for labor, and ownership of the land is transferred to non-residents so that farms with their food production are in the hands of tenants or financially cramped owners, those nations decline in social, economic, and moral influence. Re-

ligion dies as the people lose the idealism that springs from the land and close contact with nature. Rome fell under that influence.

The industries of applied science that chemists and engineers have created since 1880 are confronted by that condition. Modern industry has drained the land, the source of food and shelter, of its requisite share of manhood. Industry has conducted no research to co-ordinate the land with city, factory production. It has reared an entire generation of city born workers who know nothing of the land. Industry has cut itself off from its three most essential raw materials; self-reliant manhood, food, and shelter. And industry is burdened almost to collapse by excessive wages, taxation, and public charity costs that are part of the reaction from neglect of the land. The unemployed are on the payroll of industry even though the books show no charges to that account.

SUCCESSFUL INDUSTRIAL MANAGEMENT IN THE TWENTIETH CENTURY will be guided by the fact that the greatest profits to industry come from minimum cost of food and shelter that leave a margin of 40 per cent or more from which to accumulate new capital by personal thrift, and upon which to build and maintain superior standards of living. The superficial and gross public spirit that manifests itself by indifference to secondary education, by decline in the drama and rise in jazz, by mediocrity in political leadership and falling influence of religion is in large part the reaction from high cost food and shelter with too small a reserve for expression of the practical high idealism that differentiated America from other nations—the idealism that made America the biggest and best market in the world for manufactured goods.

Scientific physical and chemical research to evolve great industrial plants, new machines, and new processes has subsided. That early phase of industry is drawing to a close and is becoming routine. The great industrial research problems of the twentieth century must be those of human relations. Foremost among these will be the vital task of co-ordinating the land and its production of food with the applied science of city industry.

Are there no creative industrial executives, no forward looking men who see this vision? The task must be undertaken by the chemists and engineers to bring out creative leaders and engineering statesmen who will apply science to commerce, economics and government as they have applied it to industry. As Korzybski has said, "Neither engineers nor scientific men have any right to prefer their own personal peace to the happiness of mankind; their place and their duty are in the front line of struggling humanity, not in the unperturbed ranks of those who keep themselves aloof from life."

American Association of Textile Chemists and Colorists

About 150 representative textile chemists and colorists from all parts of the country gathered at Boston during the Textile Exposition, on November 3, and organized the American Association of Textile Chemists and Colorists. The following officers were elected: Professor Louis A. Olney, Lowell Textile School, president; William D. Livermore, American Woolen Co., Lawrence, Mass., and William H. Cady, United States Finishing Co., Providence, R. I., vice presidents; Walter E. Hadley, Clark Thread Co., Newark, N. J., secretary; Winthrop C. Durfee, consulting chemist, Boston, treasurer. The following members of the executive council were chosen: George A. Moran, Pacific Mills, Lawrence, Mass.; Walter M. Scott, Cheney Bros., South Manchester, Conn.; A. E. Hirst, American Printing Co., Fall River, Mass.; Elmer C. Bertolet, Philadelphia Textile School; James L. Amsden, Rockland Finishing Co., Haverstraw, N. Y.; W. K. Robbins, Amoskeag Manufacturing Co., Manchester, N. H.

Local sections of the Association are to be formed shortly, embracing the territory adjacent to Boston, New York, and Philadelphia.

A statement of the objects of the Association was printed on page 891 of the October issue of *THIS JOURNAL*, in connection with the account of the preliminary meeting in New York City in September.