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NINE CHAINS TO THE MOON

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39. Scientific Dwelling Service

THERE are four overlapping applications and conflicting interpretations of the phrase, MASS PRODUCTION HOUSE:

1) Building on the site a number of houses after any one tradition-evolved master pattern, perhaps with inconsequent variations, such as in Queens Village, N. Y., or in Edison's poured concrete houses. This scheme has obvious economies over building one house, but it is limited to technics, units, materials, power means, and tools consistent with craft building in the open fields.

2) The "knock-down" mail-order houses, consisting of factory reproduced sectional assemblies of a variety of tradition-evolved designs with essential compromise skimpings inherent in transportation, assembly, and price considerations.

3) The currently displayed models of would-be mass-production houses, such as the "Motohome," sponsored by the large basic materials and equipment corporations, or groups of the latter, in which a style "moderne," an unadorned simplification of the traditional box house, is rendered in new, more expensive, seemingly more lasting materials, and substitutes in its developer's scheme for the earlier "knock-down" mail-order wooden house of Category 2. The scheme of development of both 2. & 3. is predicated on a sliding-scale price from one to a hundred houses and is self-supporting in small quantities, though hopeful of profit through larger numbers. Its overhead on shop investment is small and cannot include and is not predicated on a moving line production. The *moving line* production in the automobile industry is limited to a profitable low of 125,000 cars *per annum*.

4) A competitive shelter service industry, similar to the hotel

industry, and of the mechanical standard, scope, and integration of the automobile industry, engaged in furnishing on a RENTAL basis complete scientifically-evolved individual-family dwelling machines, whose design, economy, standard of adequacy, equipment, production, erection, land rent, service, maintenance, moving and removal, improvement and replacement rate are THE ENTIRE RESPONSIBILITY OF THE INDUSTRY'S CENTRAL COMPETITIVE CORPORATIONS, and are all included in one monthly rental charge.

Common to the first three of the four categories "Mass Production House" meanings outlined above, are the following elements:

They are designed to be dependent primarily upon arterial hook-ups with politically or privately monopolized power, light, water, sewage, and communication lines, and are, therefore, limited to placement within the environs of urban developments, and therefore subject to superimposition of high realty costs and town assessments upon the original quotations.

They are compromisingly designed as DOWN adjustments to any and all impositions of finance, politics, labor, and ignorance, rather than being designed to eliminate such impositions.

They are designed and erected on the theory of their being permanently affixed to the specific spot at which they are mounted upon their permanent foundations, thus legally constituting, in most states, indivisible permanent improvements of the underlying land property.

Counter to economic trend, they are designed and financed to be SOLD, despite the current admission of the president of the National Association of Real Estate Boards, that only 3% of all dwellings in the U. S. are now owned outright by their occupants.

As soon as they are "sold," even though it be only on a second mortgage contract, responsibility of the builder, manufacturers, or the former "real" property owner ceases completely, and there is no guarantee of satisfaction backed by an industrial reputation to be sustained.

They have no turn-in value against a new model to replace them on the site.

None of them is designed with a predetermined longevity, but,

conversely, they are expected to last for indefinite generations, good, bad, or indifferent, community and posterity be damned.

The best of them weighs twenty times as much per useful interior cubic foot as does the useful cabin space of PAA's "China Clipper" relative to the weight of the enclosing hull, despite the luxurious comfort of the Clipper's cabin, and the fact that it has climatic and sound proofing and stress requirements far in excess of the house.

They start with an arbitrarily predetermined aesthetic of design, rather than counting upon the inevitable design beauty that develops with pure economy in a plane, boat, or flower, in which not an ounce of excess warpage for predetermined "looks" occurs.

Being but superficial rearrangements of bed, living, dining and bath rooms with the same old standing lamps, sofas, stoves, chairs, windows, *et cetera*, they may be stated as being the most dangerous places in the world. Five out of ten million disabling accidents to humans recorded in 1936 in the U. S. occurred in homes (in contradistinction to automobile, occupational accidents, *et cetera*), and a number of *fatalities* equal to those caused by automobile accidents occurred within homes through falling, cutting, burning, electrocution, *et cetera*.

It is admitted that "The Houses of the Future" (Category No. 3) have added novelties such as air-conditioning, dishwashing machines, and so on, but these added conveniences without economy gains elsewhere, despite publicity to the contrary, place them in a price class almost double that of the individually built old handicraft house with standard equipment. The three "Motohomes," sponsored by General Electric through its subsidiary, "American Houses, Inc.," that were erected in Westchester County, N. Y. (1936), cost \$41,000, or \$13,666 each, a cost 1000% above the mass consumer's ability to pay.

Inasmuch as the individual parts of these "Houses of the Future" were products of mass production and inasmuch as they all took better than a month to assemble on the site, even with special field equipment, it cannot be said that IF these houses were put into production they would cost less than the old fashioned single-built house.

Vast crowds have inspected these houses, which have received

wide publicity due to fictitious price rumors, mechanical novelties and the constant universal appeal of possibilities of better ways of living. For instance, in one month alone 125,000 people inspected the "New American" home placed at Marblehead, Mass., a rather inaccessible spot. This was but one of 315 "New American" homes put up by General Electric in nine months in 1935, as part of a program to "spot" one to every 100,000 of population in the U. S. More people inspected these 315 houses in the nine months than attended college football throughout the U. S. during the entire season of 1935. The 315 had an average price of \$10,000 each, i.e., a house requiring a \$5,600 annual income.

These *quasi*-novelty "Houses of the Future" have been employed primarily as vehicles of display and proposed outlets for the particular products of profit of their backers, which products have usually been highly inappropriate as applied.

Such popular-credit-exploiting and damaging shows as the "Motohome" have proven in every case to be failures as mass producible units. They are "damaging" because the failures by prominent backers tend to discredit the whole theory of mass production as applied to housing in the minds of other industrialists and of essential capital.

For instance, these houses when sold unfurnished, the furnishings in the model house being but camouflage to the shell and decoys of the local electrical, furniture and other stores having exclusive local sales rights from the basic equipment manufacturers, are like automobiles without seats, lights, carpets, self-starters, *et cetera*.

All of these houses have been many times in excess of the weight of a product feasible in sustained mass production. All industrial products are calculated on a weight and number of parts basis, and on the energy and time efficiencies involved in handling such weights and parts. The average automobile weighs 3000 lbs. and has 5000 parts. The "House of the Future" attempts at would-be mass production have all incorporated the same old 300 lb. bathtub and 21 avoidable connections, despite the fact that a scientific factory-reproduced house may readily have a bathtub stamped integrally with the wall and floor panel and conduit manifold (if old accessory design notions and sources are abandoned) of not more than 50 lbs., or a 14 lb.

chrome-nickel-copper toilet seat, in place of the 54 lb. porcelain receptacle, the former being of far more attractive and useful design and vastly safer than these prime causes of all fatal home accidents have been.

The Briggs Auto Body Manufacturing Company is now producing fixtures somewhat along these lines, but the latter require the identical costly plumbing connections of the old fixtures, for they are still luxury "accessories" of the 5000 year old shelter shells, not part and parcel of a scientifically interdependent design such as is represented by the spokes, axle, and rim of a wheel. The designing and fabricating evolution of the latter now makes possible their integral stamping. The function of self-cleaning *might* be carried out *in an entirely new manner* as with the "fog gun" of the Dymaxion House, doing away with all heavy plumbing inlets, drains, and water waste; for a pint of water would thereby suffice for a far more effective 15 minute bath and massage, whilst the water, being atomized, would pass off into the air circulation requiring no drain.

DWELLING MACHINES OF THE SCIENTIFIC INDUSTRY OF SHELTER SERVICE

Without centralization of responsibility true scientific economy of design, not only of the house, but also of the PRODUCTION, SERVICE and REPLACEMENT MEANS and METHOD, will never occur in housing.

This shelter service industry must first conduct conclusive research tests on master models of dwelling machines, even though these cost millions of dollars. They must be evolved WITH DETAILED AND RIGID REQUIREMENTS OF WHAT THEY MUST DO, and without the slightest preconception of what they are to look like, or whether people are going to like them or not. (See "Universal Requirements of Shelter," Chapter 5.)

The dwelling machines as briefly described in the fourth category must be so light, simple, integrally complete, independent of arterial hook-ups (though equipped for coupling when advantageous arterial service is available, as ocean ships are equipped for dock facilities hook-up), and so rapid in site-as-

sembly as to be efficiently subject to constant shifting, as are army tents, in adjustment to seasonal, industrial, vocational and vacational migration of the populace, but WITHOUT ANY COMPROMISE IN HIGH STANDARD LIVING CUSTOMARILY ASSOCIATED WITH THOUGHTS OF MOBILITY AND TRANSIENCY. In other respects, the infant trailer industry fulfills embryonically the "Universal Requirements" of the true Mass Production House.

A successful solution within these terms and those of the "Universal Requirements" will certify to industrial-capital a potentially high-use occupancy: provided, further, that the dwelling machines are so complete and efficient in their mechanical satisfaction of man's highest standard of needs as to be OPERABLE on an over-all cost (including heat, light, power, etc., and rent representative of 10 year amortization, and general industrial operating cost) of less than 25% of the average popular income. Currently this would mean a total operation rent of \$25 to \$30 per month.

All this must be accomplished with greater comfort, safety and drudge-free growth for the occupants than has heretofore been available even in the most preposterously expensive homes (the same comparison as between the comfort and ability of a new Ford and that of Louis the XIV's draughty, bouncing, shaking coach of state).

All this obviously calls for COMPLETELY NEW, SCIENTIFIC, MECHANICAL, AND STRUCTURAL SOLUTIONS OF THE REQUIREMENTS. Well-checked research indicates that this may be done. When this industry has succeeded in developing a satisfactory master model and industrial tool-up plan, which if set in operation with an initially produced equipment of 200,000 dwelling machines, could be rented for \$x, provided that they were in use occupancy 10 months out of the year, and the rent figure of x allows of decent living at a lower over-all year round cost than in any other way, THEN INDUSTRY MAY SAFELY ASSUME THAT NOT ONLY WILL IT BE ABLE TO RENT EVERY LAST UNIT FULL TIME, BUT ALSO THAT IT WILL BE UNABLE TO MANUFACTURE ADDITIONAL UNITS FAST ENOUGH TO KEEP UP WITH THE DEMAND FOR A CENTURY TO COME.

The fact that the new dwelling machines may look utterly

different from anything man has ever thought of living in before will be inconsequential SO LONG AS MAN IS NOT ASKED TO BUY THEM. He will be no fussier about looks than he would be over the novelties in rigging on the *Normandie* if given a chance to make a round trip to Europe in her, first class, for \$50, or the novelty in design of a telephone instrument *which he has need of using*, and *can* use for five cents.

To establish mass production of housing in this way, the only way *true* mass production of housing will ever be established, will need all of the courage and foresight that inspired Mr. Ford to undertake the mass production of automobiles. It will also require vastly more initial capital, due to the automobile industry's having advanced the industrial mechanism to its present intricate state. (Ford's initial capital was \$20,000; his tool-up cost for his model "A" was \$45,000,000.) Furthermore, although mobile to a degree, the dwellings can never be as inherently mobile as automobiles, which may be driven away from the production line. Wherefore, dwellings will require vastly more transport equipment investment.

As this dwelling-machine-service industry calls for an "assumption of consumption," a full year's production and operation without rent income must be written, plus additional capital to tool-up anew at the end of the year for improved models designed to correct the faults apparent from the experience of the first year.

At least \$100,000,000 will be required to commence, but within a decade of its inception the mass production housing industry will be doing a worldwide \$100,000,000,000 gross annual business, owing to rapid competitive improvement. (This represents on a monthly rent basis of \$25,—a service to only 33 million of the 400 million families of the world.)

Housing production has been, and always will be, man's most sizeable activity, but man has been too close to his house to gain perspective and develop it effectively. He started crawling about on its floors, *et cetera*. Man had dynamic perspective in viewing his transportation which moved in front of him at varying distances. Because of the vast enterprise involved in bringing dwelling production up to date (too large to have been hitherto conceived in the maze of the myriad of small problems caused by the very inadequacy of housing itself), this

industry is still 5000 years behind the efficiency of the motor industry, the current leader in science benefacted coöperative labor.

Ninety per cent of the populace (granted the price in their pocket) would "walk out" of any "modern" hotel that would dare to book them in quarters characterized by design, equipment and service conditions on a par with the average private living quarters of people in even the top 20% income group, let alone on a par with the average private quarters of the whole populace.

So long as the individual is unscientifically "used" by the building world as the ultimate liquidation point of natural resources and is compelled to saddle himself apparently for a lifetime with the irresponsibility tonnaged-up-for-profit outpourings of basic material monopolies, unscientifically agglomerated under the romantic title of "individualistic homes"; with an utter inability to move his "home" (representing the investment of a lifetime's savings) geographically in adjustment to the employment requirements of an ever more rapidly shifting, decentralizing physical industry,—just so long will individual man adhere habitually to hodge-podge, whimsy-and-notion designed houses, which represent, in reality, industrially obsolete solutions of his every requirement. The average U. S. citizen today covers annually 34 times as much environment territory as he did at the turn of the century at which turning point his area of annual coverage was approximately the same as in the stone age.

The smug propaganda of revenue-property proprietors that "own your own home" victims make the best citizenry is true only if "best citizen" means a punch-drunk moron who will buy "things" *ad infinitum* that MAY, but never DO, make life a little sweeter: who, moreover, has to foot non-dodgeable taxes (to refund public borrowing from factually obsolete private credit):* and, who, in order to maintain social standing in his irrevocable

* If today the U. S. Government, on the one hand, and the amalgamated bankers of the U. S., on the other, went into the world wide securities market to see which could obtain the larger loan, on the longest terms, at the lowest interest rate, on uncollateralized debenture, it is probable that the U. S. Government would obtain 100% more favorable terms than the bankers. Wherefore, "Supply and Demand" (Fincap's Hamiltonian *coup d'état* of perversion of constitutional dogma at the time when he was administrative trustee of an infant and bona fide democracy) would "come home to roost."

lifetime community, howls at ANYTHING he is told to howl at, WHENEVER told. No wonder only statesmen and politicians, not engineers, handle the populace. If all U. S. families were forced, despite mobilized industrial requirements, into static home owning, it would necessitate a neurologic genius as President and a Congress of Psychiatrists to manage them.

The telephone industry would be an amusement park novelty if its growth had been dependent upon the subscribers pro-rated PURCHASE not only of the contact instruments at non-transferable FIXED locations (with individual aesthetic design choices that might have developed Venuses atop Doric columns holding conch-shell mouth pieces, and horn-of-plenty receivers) but, also, of the equipment of the inter-communicating web. It is impossible to imagine the howl that would have gone up from Boston's coterie of "Cape Cod style" telephone station owners if assessed a million dollars for a long distance line between Chicago and Kankakee, or in protest against millions appropriated for "preposterous" research.

The happily accepted standardization of general principles and resultant liquidity of investment in automobiles, their mobility, rapid amortization, specific longevity, annual design advance, universal flat-rate service, and parts replacement, *et cetera*, while admittedly having much room for improvement, is responsible for Americans having more cars than individual dwellings at the beginning of 1938, investing \$15 in automobile purchase for every \$1 in dwelling purchase, undaunted by the fact that cars are outmoded in two years and wear out in eight years. In most instances, they would not have put even the one dollar into dwelling purchase if the money had not been loaned to them on attractive government nursed terms. They "smoked away" 2½ times this amount of dollars in cigarettes. The truth is that Americans, although not voicing it very audibly even to themselves, have no use for "old world" houses, let alone for BUYING them. Despite the proffer by private and government lenders of tribillion dollars for the financing of homes in 1936 the U. S. populace bought more trailers (mobile dwellings) than fixed dwellings. 1936 is selected for comparison because that was the first year of semi-trailer production when the purchase of trailers was virtually without benefit of finance. It is of no use for industrialists to say, "We'll leave it to the govern-

ment, the realty boys and the building material manufacturers to work out this housing problem." The latter cannot; they are licked.

SING-FAM-DWELLS

Ninety per cent of American families live in single family dwellings, despite the visual impressiveness of the cities' multiple dwellings. Therefore, it cannot be said that the sing-fam-dwell is unpopular or not in demand. A consensus of estimates of all authorities (private and governmental) on housing economics invariably indicates a current demand of from one and one half to six million units, whether old or new fashioned, merely to adjust for obsolescence and population increase due to the million marriages a year, and not adjusting for the demand for better dwelling by thirteen million families now existing in subdecency houses.

It is unquestionably true that the 1929 break in industrial expansion, which was led off by dwelling which reached its fabrication peak in 1925 and sales peak in 1927 of the speculatively completed houses (1927's peak having been a non-demand, speculative miscarriage inasmuch as seven years were required to sell the houses built that year ultimately at one half their \$ cost), was caused by the paradoxical fact that the most important production item of all, from a volume, cost and necessity viewpoint, the sing-fam-dwell, unlike every other item of man's requirement, had not yet been industrialized.

A comprehensive picture of the reason why the old business of building tailoring is impotent, if not dead, is to be seen in a comparison between the automobile business, a true industry, and the building business, a 99% non-industrialized, illiterate mess, to-wit: In 1935 three highly integrated, scientifically mechanized automobile companies produced more than 4,000,000 cars, an average of 1½ million each, whereas more than 200,000 nonintegrated, general housing contractors in the U. S. produced only 55,000 houses or one house to four producers; science *vs.* hodge podge, industry *vs.* tailoring. (The annual payments for the house and the car—the former amortizing in 19 years, the latter in 2—are approximately identical.)

Permanent recovery in industrial expansion must wait until this new and last item of industrial importance has been maneuvered into practical design and process status, at which moment industry will march forward again to an unquestionably prosperous world conquest. The trailer may well be the beginning of this march.

HOUSING was the PRIME CAUSE of the DEPRESSION. It did not merely take a mysterious beating along with other industries.

INDUSTRIALIZE HOUSING, and the TELESCOPING SERIES OR DEPRESSIONS WILL BE OVER. Procrastinate, and the depression agonies will be prolonged at an ever increasing cost. Nothing is to be gained by complaint about governmental spending. "Depressions" are the responsibility of all business and industry. They are no one man's job. Their ramifications include every establishment of industry and business.

Mining followed housing in the "break," and metals manufacturing took the next worst beating. Therefore, for any basic metal producer to contend (as some do) that dwelling industrialization is a fanciful possibility and inconsequential is to admit not knowing the controlling economics of his business.

Dollars are relative to satisfaction and performance efficiency. The very heart of industrial economics is centered on dollarability satisfaction. Compare a \$100 second-hand Ford with \$100 worth of the horse and buggy of our ancestors and you will have a comparison of transportation dollarability between an industrialized and a non-industrialized product. What do we receive today in efficiency in new houses, when we can afford them, compared to what our ancestors received? Practically the "same old thing." A bare house costs us more than it cost our ancestors and we can do no more with it than they could. The vehicle for travel costs very much less and will do a thousand-fold more. The distance and speed ability of a current 5¢ air mail stamp is 1000: 1 that of the 1900 5¢ stamp. Houses of 1638: houses of 1938 .'. 00:00.

On the whole, however, the IDEA of true mass production of dwellings has developed rapidly, considering its vastness. It has received a strong impetus from such current events as the Chicago World's Fair, the report of the National Resources

Board which predicted housing as one of the six largest industrial developments of the next decade, and the present social and economic revolution. The New York and the San Francisco World's Fairs of 1939 will possibly advance it still further.

Opposed to the stimuli, there have been political, economic, psychological and exploitation vicissitudes, the most important of which in order of occurrence and eradication have been as follows:

First, architects as a whole (with notable exceptions) tried hard to kill off the idea of industrialization. The once well organized traditional architectural profession, well funded by their retainers in the 1919-1929 decade of four-to-seven-billion-dollar annual productions, and secure in their stronghold of aesthetic nonsense, under the protection of the tonnage material sellers who controlled the large building projects, fought against their own ultimate salvation through industrial adoption and validation. Architects trained in beaux-arty-rococo, and proud of their lack of "commercial characteristics," controlled the spending of 50 billion dollars from 1920 to 1928. Business, which then beamingly patronized them, now protests over the government's spending four billion in attempts to patch the wreckage of this absurdity.

As the death of the old building racket has become more and more evident, since 1929, architects have espoused, one by one, the mass production idea, often surreptitiously and without the slightest conception of mechanical art and, in consequence, have developed a myriad of ineffectual end designs completely devoid of industrial process considerations (only 40% of Ford's worldwide army of workers serve in direct assemblage of the final automobile). Simultaneously, building contractors and members of the materials producing fraternity have taken over command of the abandoned architectural organization, deeming it a dignified lobbying cloak.

In 1927 the author offered the American Institute of Architects permanent custodianship of the basic patents of his mass production house (known as the Dymaxion House) with the dual intention of:

First, preventing a subsequent shelving monopoly of the development by interests that might deem it injurious, and

Second, provoking an intelligent coöperative development of the new industry by the architectural profession so that it might be emancipated from the uneconomic and constantly plaguing demands of the erratic whimsy patronage inherent in the tailoring of custom buildings.

The offer was flatly turned down. So the author allowed his basic patent applications to lapse, never taking "issue" and thus preventing publication, in order to prevent their being exploited by any selfish interest when the idea should have obtained significance. This was well, for subsequently many patents in the art have been issued to "fast workers" which in suit would be invalidated by the "prior art" disclosed by the earlier applications.

The Dymaxion House was simply an attitude and interpretive principle,—a principle of doing the most with the least in consideration of a mobilizing, integrating society necessitous of breaking its exploitable bondage through science. That the principles could be mechanically interpreted and that this was done for preemptive patent purposes did not infer that its research arrangements and mechanical and structural interpretations required by patent law as "typical" were frozen against time evolving reinterpretation and adaptation. What the architects always missed, due to their fixation on end product, was that even the industrial manufacturing process is subservient to a distribution-and-maintenance service, which by its very nature must be world wide in design and scope, involving, if ever to succeed, the broadest of scientific attack.

The *second* vast obstacle to the new shelter industry was the 21 billion dollar mortgage debt structure and the "realty" investors' hope of value inflation, fostered by value increases in the scarcity days prior to industrial mobilization. Evolution, through bankruptcy of this mortgage structure in a decentralizing and mobilizing industrial expansion and potential abundance, which overnight depleted the intrinsic value of land in the old centers, has debilitated this obstacle. It is being finally removed by the mortgage underwriting of dwellings by the people through their government. Fortified as proprietors of the final basic tax lien, these government agencies are fast taking over the equity, having already absorbed approximately 33% authority which, in view of a 50% "obsolete" appraisal of all U. S. dwellings, means

that the U. S. is now basic underwriter of two-thirds of the still adequate dwellings of the nation.

The *third*, and one of the most tenacious obstacles to a scientific housing service, has been the dominance by the building crafts of the politically all-powerful American Federation of Labor, whose units have bitterly opposed the mass production idea. The A. F. of L., together with realtors, architects and material manufacturers, has prevented recognition by the government during the last ten years of constant world wide discussion of the housing problem, as well as any official discussion by the government of the potentials of industrialized housing during a period when billions of dollars were spent to resuscitate the beyond-resuscitation tailored building business that crafts organizers themselves were highly responsible for maneuvering into a growth-proof strait-jacket.

At the beginning of 1937, after four years of marked industrial recovery, with twelve important industries establishing all-time highs, the dwelling business was still at the diminished proportion of 15% of the volume of its average for 1920-1930. It would have been almost completely obliterated had it not been for the pulmotoring activity of the government in underwriting "reconditioning," "slum clearance," "public works" grants and long-time dwelling mortgages unprecedentedly based on combined value of land and structure, offering a 10% or even no-cash-down build-your-own proposition.

The labor obstacle to the establishment of mass production dwelling has been potentially disposed of through the Lewis-sponsored breakaway of the industrial unions from the crafts unions of the A. F. of L. The latter's ranks have been severely if not fatally crippled through the desertion of members to industrial employment, loss through death and old age, and the lack of apprentice training to fill the ranks anew owing to building inactivity. The industrial unions obviously favor the mass production house, and as they become supreme they will accelerate the new shelter service industry by creating a Housing Workers Union that will not distinguish between types of work performed, in factory or field.

The three obstacles enumerated, namely, architects, the mortgage debt structure, and labor, have had to do with reactionary forces. The fourth obstacle in the INDUSTRIAL LAG is one

less of reactionary nature than one of confusion, misunderstanding, fear, size-born inertia and lack of imagination concerning the solution of the problem. It has had four phases representing attitudes on the part of:

Basic materials producers and primary form fabricators such as the U. S. Steel, Aluminum Co., copper companies, and others;

Mechanical use-form fabricators and assemblers such as General Electric, Westinghouse, Ford, and others;

Final use-form assemblers and marketers (wholesale and retail); and

Industrial policy coördinators of the superficially divided interests of the first three groups who may be classified as follows:

1. *Bankers*, whose credit of the new industry was essential to the financing of its vast tool-up;

2. *The government*, by subsidy in lieu of private bankers' underwriting of the new industry; and

3. *The advertising and "public relations" industry*, which, after the War, took over the function of determining industrial production and marketing policy for banking interests due to the latter's inability to comprehend post-War technological intricacies of industry. Without a coördinating production and marketing plan, evolved by the advertising industry, the myriad establishments of the basic materials producers, mechanical use-form fabricators, and final use-form assemblers, could not be co-ordinated or financed in a new form or item of industrial attack. Wherefore old Fincap has probably "missed the boat," and first, governmental, then later, industrial credit will be employed to underwrite this scientific dwelling service.

The attitude of the producers of basic materials such as steel, copper, lumber, *et cetera*, has been one of tolerant interest toward mass production housing, but it has been characterized by a stupid attempt either to substitute their products for other traditional products in the structural members of traditional design, i.e., steel frames for wood frames, designed after the manner of nailed lumber houses, or, equally stupid, to evolve a master plan house for mass production which would utilize their product in every possible structural and mechanical solution regardless of functional inadaptability. (The all-steel, all-copper,

or all-asbestos house analogous in fallacy to an all-rubber automobile.)

The fallacy of economic philosophy most detrimental to the intelligent participation by this group in mass production housing is contained in the formerly workable, but now increasingly less tenable, notion that basic materials producers are concerned only with source possession, extraction and primary form fabrication of their basic materials, and not with those materials after the first sale. This attitude has made it impossible to take into consideration the ultimate liquidation and recirculation of their highly valuable product. Houses of yore were not only the largest consumer of their product but were supposedly built for eternity. Therefore, housing imposed no consideration of the re-circulation of materials. Six and one half million tons of copper, or one fifth of all the copper ever produced and equivalent to the ore body reserve of Canada (the world's fourth largest ore body), are latently disposed in the world's buildings.

In consideration of the recirculation phenomena, as outlined in the chapter "Scrap," the basic materials producers will have to organize coöperatively to satisfy economically the demands of industrial liquidation, or else industry will take over the function of basic materials recirculation, as Ford, the telephone and railroad companies have done already to a certain extent.

The mechanical USE-FORM fabricators have contributed thoughtlessly to the "industrial lag" in launching a mass production housing program as a result of two factors: first, a lack of coördination of their activity by advertising agencies, bankers and government, and, secondly, the automobile manufacturers, the General Electric and related companies have suffered least in the economic revolution. In fact, they have been banner carriers in highly-industrialized scientific development and have, therefore, been too "busy" to be greatly impressed by the need of a mass production house.

Nevertheless, they have been unconsciously paving the way for a scientific shelter industry by evolving a parts production out of which mass production houses eventually will be assembled. Their activity has been analogous to that of the producers of motors and other mechanical parts of the automobile. While the latter were determining the forms of progressive automobile production, the now almost extinct buggy makers continued

vainly to try to dominate the young auto industry simply because they were the temporary custodians of the vehicle market. No matter how sumptuous and clever their buggy designs were, they did not evolve internal combustion engines and differentials. Unable to think beyond a horse, the buggy boys could little envision one man's developing an annual production of 2,000,000 horseless vehicles, safe and comfortable at 70 miles an hour, and the production within his life time of a total number equal to that of the total of families in the U. S. Their demise was inevitable, as must be that of the producers and designers of externally superficial, structural shells of houses who fail to see and move with the inside-outward trend.

Almost every major use-form fabricator and assembler has been making some attempt at researching and promotion of "pre-fab" housing, thoroughly profiting thereby (due to free publicity implicit in the development) by sales of current products interwoven with experimental development.

Quite unwittingly, electrical and mechanical parts fabricators, serving first the automobile industry and now evolving vital mechanical parts of the new mass production house, have been reducing the period of longevity of houses. At the beginning of the century, the average longevity of a house was about 140 years. One thousand years ago, buildings (some requiring 300 years to erect) were intended to last for ever. The longevity of houses built during the 1920's was estimated as 42 years, the limitation being due largely to the inclusion of mechanical constituents unknown before the 20th century and which become obsolete with wearing out.

Prior to the War, the mechanical accessories of housing represented 15% of the total cost. By 1929 the average was 25%, and today it is 30%. Some, indeed, have already reached 50%. In the new mass production house, devolving directly from mechanical constituents, the figure will be 75%.

Due to technological acceleration, mechanical equipment becomes of ever less efficient longevity. By the time the mass production house has been evolved as an enclosing protective complement to dwelling mechanisms, the specific longevity of housing will have decreased from the 42 years of 1920 to a 10 year span. The undeniable trend in diminution of longevity of buildings is toward complete deflation of the equities of the 21

billion dollar mortgage debt structure which is as sound as an 18 year 50% mortgage on a 1908 Locomobile.

The populace, intuitively aware of the collapse of the debt structure inherent in the accelerating cycles of mechanization, discounted this collapse between 1928 and 1932, and the bankruptcy was taken over by the government to be written off as painlessly as possible, indicating a national debt rapidly increasing to 60 billion. With this write-off, the whole of collateral in intrinsic equities is doomed. Concurrently, economic interest will be freed to concentrate on the SERVICE employment of property rather than on its sale. Fincap will exert ever less pressure upon industrial management from the property tonnage dumping angle, as represented by raw materials and land monopolies. Conversely, the pressure will be toward efficiency of turn-over and profit through mechanical ingenuity of alloying and instrument investment.

The contribution of final use-form assemblers and marketers to the industrial lag has been willful. Companies like the American Radiator Company, selling their products through the plumbing crafts, have been reluctant to incur the opposition of their customers (95% of the craft plumbing trade) through admitted participation in a mass production housing industry. In spite of their reluctance, however, some companies have surreptitiously participated in developments through obscure connections with subsidiary research organizations, patenting and pigeonholing as rapidly as possible any developments discovered by them in the trend. Their grudging and subversive coöperation may prove to be their own undoing. The Briggs Auto Body Company's new stamped bathroom fixtures and the air-conditioning industries' copper-finned radiators have made relatively obsolete the American Radiator Company's standard-sanitary cast iron vitreous enameled tubs and cast iron radiators, *et cetera*. Integrated bathrooms threaten them still further.

For many years inventors have urged American Radiator Company to back these and similar developments, and the Company has conducted experiments for patent shelving purposes. It was, however, "too smart" for such "theory" as to undertake a marketing venture. Wherefore, the auto parts and electric manufacturing industries have stolen the march. The present status of this company to the new housing industry is similar

to the relationship that existed between the old horse coach crowd (Brewster Body, Locomobile and others) and the automobile manufacturers, because the former blindly adhered to the economics of vanity and stability based on sheer weight and size.

The advertising industry and capital credit group, although well aware of the potentialities of a mass production housing industry, have withheld support under the impression that its promotion was inimical to the interests of their *best* accounts. It is only because the currently apparent beneficial inter-relationship between the service and products of their clients and the development of the mass production house reveals that their interests will be best served by promotion of the completely newly designed mass production house that they are about-facing and are now timidly supporting the development. In illustration, we cite the fact that advertising firms handling the U. S. Steel and General Electric accounts have definitely taken note of the very satisfactory profits being developed from air-conditioning equipment, kitchen cabinets, *et cetera*, implying the evolution through competition (which involves ever greater efficiency of operation) of a complete new design so that buildings will be scientifically suitable for such improvements.

There are ramifications of this evolving scientific dwelling service that would and already have filled volumes. The particular items and factors herein stressed represent those upon which attention should be currently focussed and dramatized by as much clarifying discussion and understanding as it is possible to conjure up.

There is distinctly discernible the dawning of that era for which science and true art have struggled throughout the ages.

Deftly cited, specific contradictions to the over-all trend herein outlined will always turn out, upon investigation, to be the inevitable and inconsequential back eddies of the major stream flow. If the back eddies were not discoverable, then the existence of a major river of trend might be questioned.

40. The Nine "Chains"

IN FULL consideration of the working of teleology as recited in Chapter 6, wherein it was seen that a cursory knowledge of a house or man which the house shelters is all that the average person sustains of these extraordinary mechanisms abstractly controlled by the phantom captain; and

In consideration of our observation of earth's tiny position in the sensorial universe and of man's tiny physical position on the earth's crust; and

In consideration of the fact that the amplification of the MAN phenomenon is not only directly resultant from star energy, but that the variegation of species is due to the cosmic ray "hits" (Hit me with a cosmic ray, darling); and

Considering that all physical phenomena are now becoming reducible to a specific radiation study, and

Whereas the scientific study of radiation is apparently unlocking the door at least to the secret of physical life, if not in due course to that of universal mind as well; and

Whereas radiation studies make possible accurate event prediction just as one may scientifically predict, on throwing a stone into the water, the exact time and general characteristics of impact-and-degree-of-agitation of a floating cork caused by the radiant waves in turn caused by the plunging stone; and

In consideration of the contribution to the study of radiation and the degree of its scientific authority by the currently most eminent mathematician, Mr. Einstein, and his thoughtful nomination of LONGING and FEAR as the two primary motivating forces of human activity in the bi-polar world; and

In consideration of our tracery of the effects of longing and fear, the longing into a general inspiring of the creative and