PHYSICS

Mass Collaboration

Atomic bomb is a world-shaking example of what can be accomplished by pooling scientific resources. German racist policy, Jap isolation, now seen as suicidal.

➤ ATOMIC bombs, bursting over Japanese military and industrial key-points like Doomsday thunderbolts, herald a revolution in war such as has not been seen since the first use of gunpowder, and later on another revolution in industry probably greater than the one ushered in by the invention of the steam engine. Chemical energies heretofore used, as in the explosion of TNT or the burning of coal, have originated only by ripping molecules apart and rearranging the whole atoms of which they are made up; this new physical development of power involves splitting open the atoms themselves and loosing the vastly greater energies that tie together their electrons and protons.

The power development is new, but the idea back of it is old—old as the alchemies of ancient China and Arabia, that slowly crept towards the dawn of modern science through the solitary labors of primitive researchers like Roger Bacon and Albertus Magnus in the Middle Ages.

That it could be brought to realization now is due more than anything else to the fact that researchers are no longer solitary. American, British and Canadian scientists pooled resources, and enormous sums of money—probably more than has ever been spent on any research project in history—were made available to them in their race against time—and the enemy.

The enemy, for his part, played into our hands, partly because he couldn't help himself, partly through his own blind prejudices. The enemy was divided from the first: Japan was far from the rest of the Axis and had relatively few scientists and not much in the way of equipment and raw material for the particular kind of production required; Germany, much better off in both respects, deliberately threw away some of her best brains because of a lunatic distaste for the owners' racial or religious connections.

The Germans even lost aid that they might have gained from scientists in neutral countries, through their ruthless military policy. One of the world's leaders in the atom-splitting field, Prof. Neils Bohr of the University of Copenhagen, found it necessary to leave his country and take refuge in Sweden, later going to England and then to the United States. German scientists called in by the Nazis to take over his laboratory declined to receive such stolen property. Only since the close of hostilities has Prof. Bohr returned to Copenhagen.

Science News Letter, August 18, 1945

PHYSICS

Cars Will Run on Gas, Not Atomic Power

➤ YOUR first postwar car and its successors for a good many years to come will run on gasoline, not atomic power, it appears from the conclusions of a committee appointed to look into its possible peaceful uses.

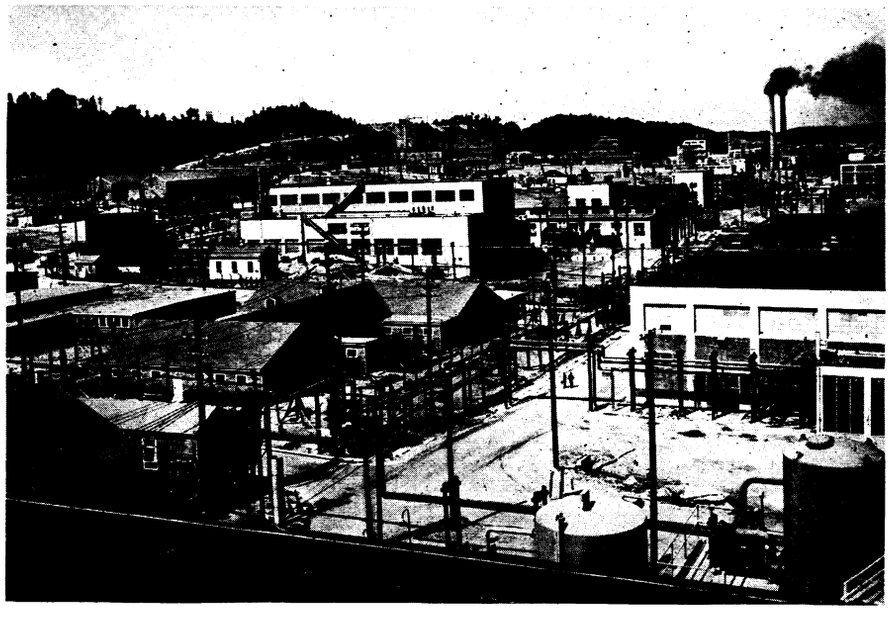
Within ten years practical non-military use of this power could be expected but only for "special purposes."

The committee's conclusions were released by the War Department with other technical information about the atomic bomb. Members of the committee, appointed by Maj. Gen. L. R. Groves in the fall of 1944, were: Dr. R. C. Tolman, California Institute of Technology, chairman; Rear Admiral E. W. Mills, USN, with Capt. T. A. Solberg, USN, as deputy; Dr. W. K. Lewis of Massachusetts Institute of Technology, and Dr. H. D. Smyth of Princeton University and author of the technical report.

"While there was general agreement that a great industry might eventually arise, comparable, perhaps, with the electronics industry, there was disagreement as to how rapidly such an industry would grow; the consensus was that the growth would be slow over a period of many years," the committee reported.

"At least there is no immediate prospect of running cars with nuclear power or lighting houses with radioactive lamps although there is a good probability that nuclear power for special purposes could be developed within ten years and that plentiful supplies of radioactive materials can have a profound effect on scientific research and perhaps on the treatment of certain diseases in a similar period."

Destructive possibilities of nuclear power were also considered. Improvements in processes of producing source material and in its use are believed reasonably certain. The energy released in splitting the uranium atom corresponds to the utilization of only about one-tenth



PRODUCTION PLANT—Seen in this official U. S. Army photograph, is an air view of the giant production plants at the Clinton Engineer Works at Oak Ridge, Tenn.

of 1% of its mass. This might be stepped up by the "conceivable" future discovery of totally different methods for converting matter into energy. On this point the committee warned:

"Should a scheme be devised for converting to energy even as much as a few per cent of the matter of some common material, civilization would have the means to commit suicide at will."

Science News Letter, August 18 1945

PHYSICS

New Responsibilities

If we are on the verge of an Atomic Age, in industry and in war, it is bound to be an age of federated powers, bound together by common necessity and purpose.

By FRANK THONE

➤ LYING on the wide stone balustrades that flank the entrances to the State Department building in Washington are some 18th-century bronze cannon. Similar pieces may be seen in some state capitals and in museums. Beautifully wrought, they are works of art as well as ordnance. They are trophies taken from old Spanish forts in Cuba, and they bear an arrogant motto in Latin: "Ultimo Ratio Regum—The Final Argument of Kings."

These monuments of the Age of Gunpowder, the twilight of which may even now be coming upon us, archaic though they are, may still have a modern lesson to teach. Gunpowder, we have often been told, spelled the end of the feudal period, in which every earl and baron was a little monarch in his own right, and the beginning of the modern state because armored knights could not stand up against their overwhelming blasts.

That is not strictly accurate. Armored knights were doomed in the field about the time gunpowder came in, but it was not primarily by cannon. The archers of Agincourt, with their strictly medieval longbows, had shown that the unarmored man on foot could defeat the armored man on horseback.

But the knight could retire behind the walls of his castle, where arrows could annoy him but not undo him. Here is where the cannon came in. Even the most primitive tubes, hurling stone balls instead of steel projectiles, could batter down the oaken gates or breach the stone walls for the final storming.

Cannon were costly, and the hire of cannoneers was high, so that only kings could afford to maintain one of these new-fangled siege trains. The resources of a baron, or even of a mighty earl, just wouldn't stretch that far. So the independence of the nobles went out in clouds of smoke from the "villainous saltpeter," and the modern state, typified at first by monarchy, rode in over the castle ruins.

What has all this medieval history to do with today—the day of the atomic bomb?

A great deal. Recall the bill for the production of the first atomic bomb: two billion dollars. And the pooling of the best scientific brains in two great world powers to think the thing out—not forgetting the rich free gifts we got from the enemy in the shape of eminent exiles. And the building of whole new cities to put it together. And the marshalling of the world's greatest fleets of aircraft and warships to bring it to the threshold of the doomed enemy.

No small power, no matter how intelligent or industrious or heroic its people, could have brought to a focus such a mass of material and intellectual resources as was needed to produce this weapon. No Denmark, no Belgium, no Switzerland could have managed the job: superb though such nations may be qualitatively, they are insufficient quantitatively.

If we are on the verge of an Atomic Age, in industry as well as in war, it seems bound to be an age of great powers—or of federated powers, bound together by a common necessity and a common purpose. If cannon were the final argument of kings, atomic power is the last word of great powers. This has apparently already happened without our realizing it in the case of the United States and the British Commonwealth. Whether we fancy it or not, these two great composite powers are now welded by a ring not of gold but of uranium.

What of the powers outside this ring? Well, were we fascists at heart, we know what would be their fate—or if we don't realize it yet we shall see it presently written in the ruins of Japanese cities. The USSR and China might eventually be situated to oppose us with equally dreadful weapons—they have, potentially at least, the numbers, brains and perhaps the necessary mineral resources to bring on what would undoubtedly be the world's Ragnorok. And they might pick up stray Nazified scientists to help them, if they should come to hate and envy us.

But it would seem the better part of sanity, to look and hope for a turning of all the powers, great as well as small, along the road of peace made possible at last by an abundance of power for all.

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