

Coal and Iron from the Arctic

Spitsbergen's Vast Mineral Wealth and the Question of Its Future Government

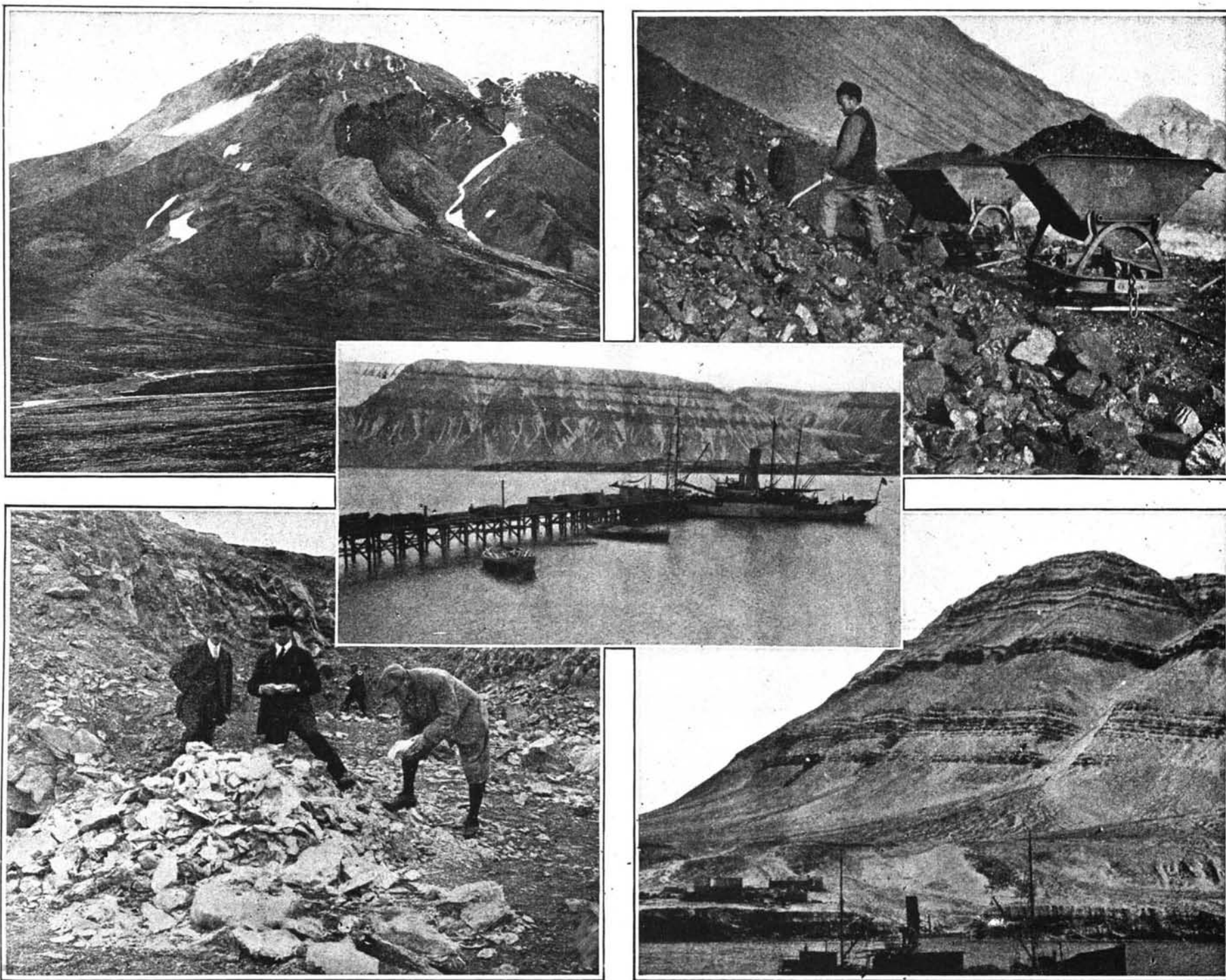
By Harold J. Shepstone, F.R.G.S.

IT IS a significant fact that while the British Government are worrying over their dwindling coal supply and threatened with demands by the miners likely to make the price almost prohibitive, two powerful British syndicates, controlling 3,800 square miles of coal and mineral lands in the Spitsbergen archipelago, are making strenuous efforts not only to exploit all the coal that is possible from their own extensive fields, but to increase their holdings as well. Indeed, as I write one of

modity on to the British market at prices which should secure them a ready sale for all they can supply.

Then quite apart from this aspect of the question, there is the political status of Spitsbergen to be considered. To grasp thoroughly the unique conditions which Spitsbergen and its recently discovered mineral wealth—for in addition to coal it is evidently rich in iron ore, while copper ore, oil shale and possibly free oil exist—present to the powers of Europe, its strategical

warmer and much more habitable than other parts of the group. The climate on the west coast is, in fact, a very healthy one, and it is along these coasts and the inland regions adjoining that exploration has chiefly taken place, and it is here that the inception of mining operations has followed. The strategical position of the islands is obvious. Any strong power holding them dominates the Scandinavian peninsula immediately to their south, the approach to the Russian port of Archangel



The Mineral Wealth of Spitsbergen

1. A mountain of iron seventeen miles long. 2. Shoveling coal from its beds into trucks. 3. Braganza Bay with a coal mountain in the background. 4. Asbestos field at Recherche Bay. 5. Coal outcrop at Lowe Sound.

these syndicates have despatched an expedition to these islands to survey other tracts and secure them if found rich in coal or other minerals.

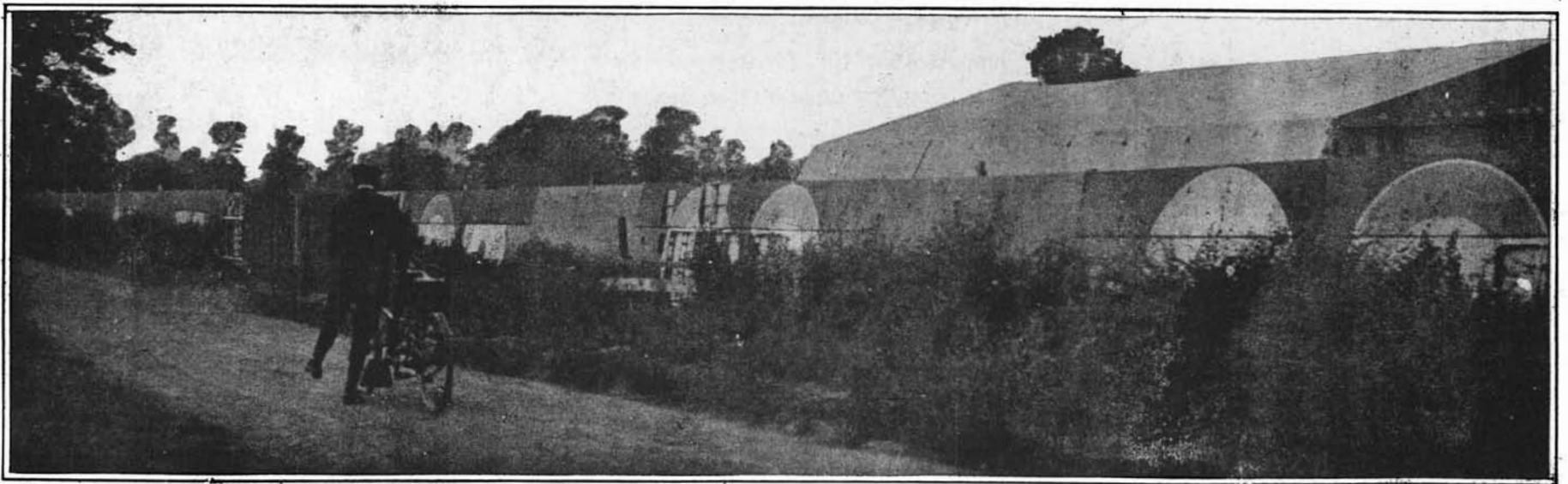
This is the second expedition this company has sent to these Arctic islands of northern Europe since the war. The one despatched in the summer of 1918 received the material and moral support of the British Government. This official recognition is probably explained in the fact that one of the objects of the mission was to take over or destroy the wireless station and Zeppelin shed the Germans had erected in these islands. As it is for the most part surface coal that is being produced in Spitsbergen, the syndicates can place it on board ship at a cost of about three dollars a ton, and as their fields are only some twelve hundred miles steaming from British ports, it looks as if they can dump the com-

position must be taken into account and the claims of the rival companies now operating there. Spitsbergen is a group of islands situated about 400 miles north of Norway and lying halfway between Greenland and Nova Zembla. They have a total area of about 24,000 square miles. The two largest, West Spitsbergen and North-east Island, are 15,260 and 4,040 square miles in extent respectively. The group is well within the Arctic Circle and New Friesland (the north-east angle of the largest island) is covered by a permanent ice-sheet like that of Greenland, as is also North-east Land, the island adjacent and more to the north. The colder and more distant regions are not too well-mapped and defined, their investigation presenting more difficulties than the country on the long western side. These western shores are washed by the Gulf Stream, which renders them much

to the east, and the British Isles and the Atlantic trade routes to the west.

The islands were discovered by the Dutch navigators, Barents and Heemskerke, in 1596, but it cannot be said that the Dutch Government evinced any great interest in the new lands at the time. In 1607 the British explorer, Henry Hudson, drew his employer's attention, the Muscovy Company of London, to the whales and walrus that frequented the bays of Spitsbergen, with the result that for nearly half a century whalers from London and from Dutch ports flocked to the shore waters on the north, west, and south coasts of Spitsbergen every summer. Eventually excessive whaling frightened the whales from the inshore waters, and the whalers had to desert the bays for the open-sea fishing.

After this Spitsbergen had a short period of compara-



Copyright, Keystone View Company

This shed and fence are made of discarded airplane wings with their original markings

tive neglect, but early in the eighteenth century Russian trappers appeared on the scene, and for over a hundred years they virtually colonised the country. They used to come in the autumn and spend the winter in rude huts at various places along the coast for the purpose of obtaining the winter skins of bears and foxes. They were eventually driven out by the Norwegians, who remained trapping the game of the country till 1910, when the scarcity of wild life led them to retire.

The whaling and hunting periods may be said to be closed, and Spitsbergen is now entering upon the third
(Continued on page 376)

Airplane Wings Turned Into Houses

AIRPLANES are common in Great Britain, just as they are common in the other great countries that took a major part in the recent war. Not only airplanes but parts of airplanes are to be found in abundance, and it is interesting to note what use is being made of these parts and discarded aircraft in general. Automobiles, motor boats, small power plants, and other automotive and power devices are being made from what were once airplane power plants.

It would be difficult to find a more novel application of discarded airplanes than that shown in the above illustration, which shows a shed and a long fence near London, England. It will be noted that the shed and the fence are entirely constructed of airplane wings, with the familiar markings still on them.

Electric Exploration for Buried Water-Pipes

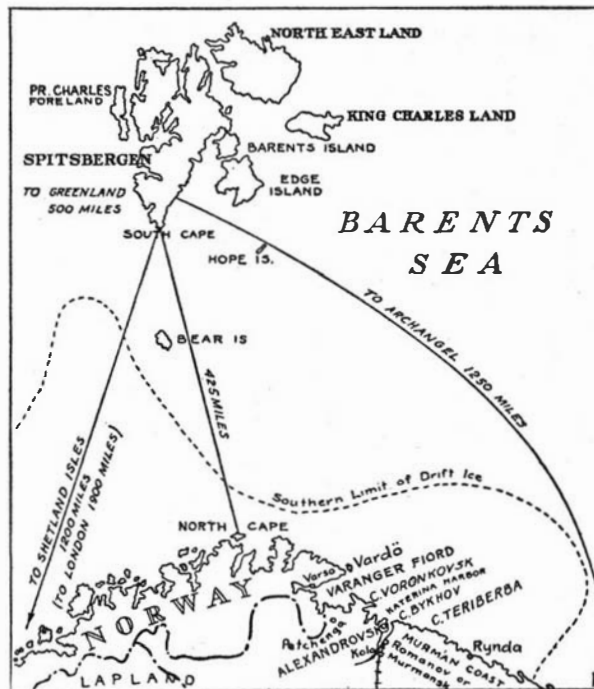
DURING the war, as our readers doubtless will recall, a French scientist developed an apparatus for locating shells buried beneath the surface of the field in which they had struck; and both before the armistice and after, this device was employed to very good effect both in the army and in the service of restoring northern France to a condition where cultivation should be possible again. In the latter application it represented one of the most

important peace-time uses for a war-time invention. It now develops, however, that it is susceptible of an even more general utilization, and one which is even more strictly a peace-time activity than is the clearing of old

business of locating underground water pipes, there can be no doubt that Mars has hung up his sword and turned, if not to the plowshare, at least to something as unwarlike.

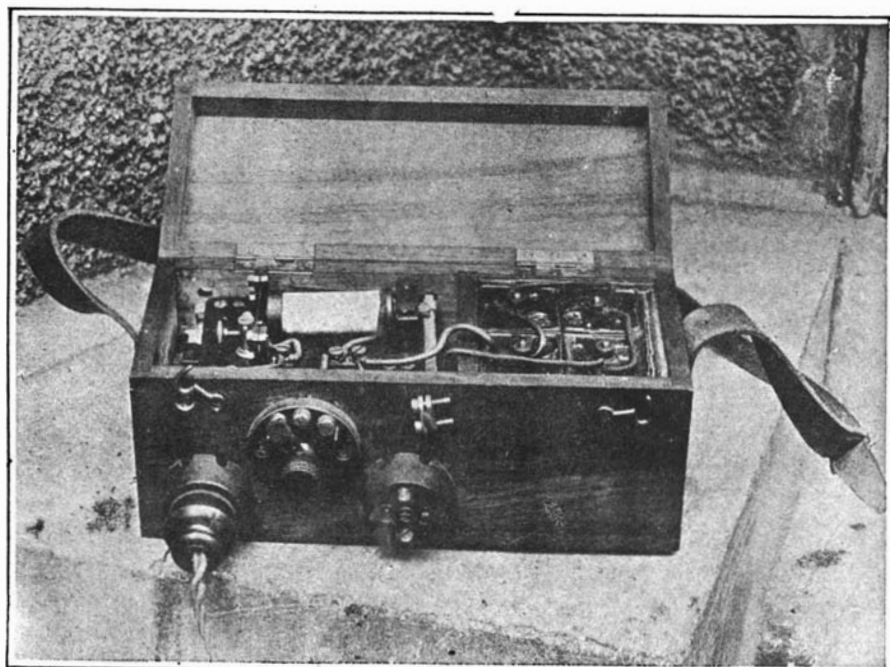
The principle of the Hughes induction balance, if not of itself familiar to our readers, has already been explained in connection with the locating of buried shells. In a word, it consists of two induction coils attached to a telephone circuit, and subject to the inductive action of a single alternating current. Obviously, with the two coils identical and affected by this common induction source, the currents induced in both will be exactly equivalent. The coils, however, are so arranged that these equal currents are in opposite sense; so they balance each other off exactly, and there is no effect in the telephone circuit. But, as Hughes, after whom the apparatus is named, discovered, if the coils are brought near an external piece of metal, the induced current in each is modified, and this effect is proportional to a power of the distance from the metal to the respective coils. It is therefore not the same in the two coils; and the telephone at once speaks, recording the fact that the balance has been disturbed and that there is metal in the neighborhood to have effected this disturbance. Then the coils are manipulated about until silence is once more restored in the telephone, after which it is plain enough that the source of the disturbance is to be sought at some point equally distant from the two coils. The loudness of the original noise indicated the distance of the external metal to begin with, so that with the new data of equidistance it is simple enough to locate it exactly.

The installation for hydraulic work is a trifle different from that employed on old battlefields. For one thing, it is more portable, since it is designed with the idea that one man shall be able to carry it on his back while a wheel. With this outfit, the exact location of water pipes that antedate careful surveys, or whose position has otherwise become a matter of doubt, is easy to determine; and a good deal of experimental digging in search of them is thus obviated.



Map showing relation of Spitsbergen to the Arctic coast of Europe

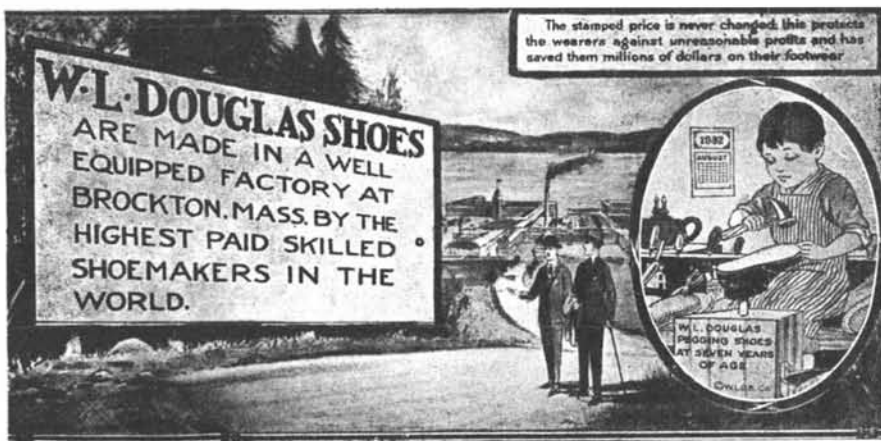
shells from abandoned battlefields. The latter, even though we do it after the war is finished, is really a part of the war—a sort of hang-over from the debauch of destruction; but when we use the electric balance in the



Copyright International.



The electric details of the induction balance that locates buried metal, and the manner in which the apparatus is used



W.L. Douglas
"THE SHOE THAT HOLDS ITS SHAPE"

\$5.00 \$6.00 \$7.00 \$8.00 \$9.00 & \$10.00

You can save money by wearing W. L. Douglas shoes, the best known shoes in the world. Sold by 106 W. L. Douglas own stores and over 9000 shoe dealers. W. L. Douglas name and the retail price stamped on the bottom guarantees the best shoes in style, comfort and service that can be produced for the price.

The stamped price is W. L. Douglas personal guarantee that the shoes are always worth the price paid for them. The prices are the same everywhere — they cost no more in San Francisco than they do in New York.

W. L. Douglas shoes are sold through our own stores direct to the wearer at one profit. All middlemen's and manufacturing profits are eliminated. By this method of marketing our shoes, W. L. Douglas gives the wearer shoes at the lowest possible cost.

W. L. Douglas \$7.00 and \$8.00 shoes are absolutely the best shoe values for the money in this country. They are the leaders everywhere. W. L. Douglas \$9.00 and \$10.00 shoes are made throughout of the finest leather the market affords, with a style endorsed by the leaders of America's fashion centers; they combine quality, style and comfort equal to other makes selling at higher prices.

W. L. Douglas shoes are made by the highest paid, skilled shoemakers, under the direction and supervision of experienced men, all working with an honest determination to make the best shoes for the price that money can buy.



CAUTION
Insist upon having W. L. Douglas shoes with his name and price stamped on the bottom.

If W. L. Douglas shoes cannot be obtained in your vicinity, order direct from factory by mail, Parcel Post charges prepaid. Write for Illustrated Catalog showing how to order by mail.

W. L. Douglas

Pres. W. L. Douglas Shoe Co.
108 SPARK STREET,
BROCKTON, MASS.

Coal and Iron from the Arctic

(Continued from page 363)

era in its commercial development, its mining period. Although its existence there was known to the earliest explorers, it is only during the last few years that coal has been exported from Spitsbergen in any quantity. Indeed, the first claim to coal-bearing land was not made till 1900, when a Norwegian firm extracted a few tons of coal from their estates at Advent Bay and sent it to Norway as a sample. At that time the Norwegians could have taken every coal bed in Spitsbergen without opposition, but they let the opportunity slip.

The two largest land-owners in Spitsbergen to-day are the British syndicates, one of which lays claim to about 2,000 square miles of territory, and the other to 1,800 square miles. Only mining companies in Great Britain, Norway, Sweden, and Russian own land in Spitsbergen to-day. The two British enterprises together own over one-seventh of the whole country, and this proportion seems likely to be increased this year. The Norwegians own some 800 square miles, Sweden about 350 square miles, and the single Russian company about 60 square miles.

The question of titles to land is most important. So far the practice has been for a mining company, on taking land, to erect notices to that effect, and to notify their own Foreign Office, where the claim is registered, if no previous claim invalidates it. This notification constitutes the real title-deed, and the British Foreign Office several years ago promised British mining companies that their claims would be safeguarded. All land titles of the two British companies named above are perfectly valid and beyond dispute. The same is true of the Norwegian, Swedish, and Russian estates. But Spitsbergen has already attracted adventurers, and complications are bound to ensue owing to attempts to jump claims.

The question of the establishment of some form of government over this Arctic archipelago is therefore of paramount importance. During its earlier history it has been claimed by Holland, Britain, Denmark, and Norway. Holland claimed it by right of discovery, while in 1614 it was annexed by Great Britain who for many years maintained a colony there. Both these claims were no doubt valid in their day. Denmark also laid claim to the islands on the contention that Spitsbergen was a part of Greenland, and therefore Danish. The King of Norway, based his rights to the islands on the plea that he was lord of the northern seas and therefore was sovereign of the lands therein. When the whaling and fisheries declined all these rival claims were forgotten. Russian never bothered to claim Spitsbergen in the days when Russia trappers colonized it.

Little then was heard about the ownership of the islands until the separation of Norway and Sweden in 1905. But the sudden and rapid opening of the country to mining brought the question prominently to the fore, and in 1909 Norway came forward with proposals which had a distinct bias towards Norwegian control, while purporting to maintain Spitsbergen as a No-Man's Land. But nothing was achieved, largely because of the mutual jealousy of Norway, Sweden, and Russia. The matter was not dropped. Subsequent conferences met in 1910 and 1912, and made such good progress that a larger conference, at which all States interested, including Great Britain, the United States, and Germany, were represented, met at Christiania in June, 1914, in the hope of coming to a final decision. The discussions, however, were protracted, largely due to the obstruction of Germany and no conclusions were reached when the conference broke up on the outbreak of the war in August.

At the request of Norway the subject was brought up again in connection with

(Continued on page 378)

LEGAL NOTICES

PATENTS

IF YOU HAVE AN INVENTION which you wish to patent you can write fully and freely to Munn & Co. for advice in regard to the best way of obtaining protection. Please send sketches or a model of your invention and a description of the device, explaining its operation.

All communications are strictly confidential. Our vast practice, extending over a period of seventy years, enables us in many cases to advise in regard to patentability without any expense to the client. Our Handbook on Patents is sent free on request. This explains our methods, terms, etc., in regard to Patents, Trade Marks, Foreign Patents, etc.

SCIENTIFIC AMERICAN

contains Patent Office Notes. Decisions of interest to inventors—and particulars of recently patented inventions.

MUNN & CO., SOLICITORS OF PATENTS
626 Woolworth Bldg., NEW YORK and 625 F Street, WASHINGTON, D. C.
801 Tower Bldg., CHICAGO, ILL.

Annual Subscription Rates Scientific American Publications

Scientific American (established 1845) one year \$5.00
Scientific American Supplement (established 1876) one year 5.00

Postage prepaid in United States and possessions, Mexico, Cuba and Panama

Foreign Postage

Scientific American \$1.50 per year additional.
Scientific American Supplement \$1.00 per year additional.

Canadian Postage

Scientific American 75c per year additional.
Scientific American Supplement 50c per year additional.

The combined subscription rates and rates to foreign countries, including Canada, will be furnished upon application

Remit by postal or express money order, bank draft or check

Classified Advertisements

Advertising in this column is \$1.00 a line. No less than four nor more than 12 lines accepted. Count seven words to the line. All orders must be accompanied by a remittance.

BUSINESS OPPORTUNITIES

SUBSTANTIAL Manufacturing Corporation wants capable men to establish branch and manage salesmen. \$800 to \$1500 necessary. Will allow expenses to Baltimore as explained. Address, Treasurer, 416 N. Howard St., Baltimore Md.



EXPRESS SERVICE

MASON'S NEW PAT. WHIP HOIST

Comparative cost 40 foot lift:
By elevator—5 men, 50 bales of wool per hour
By Mason's Whip—3 men, 90 bales of wool per hour
One rope hoists, lowers and holds the load

Manufactured by **VOLNEY W. MASON & CO., Inc.**
Providence, R. I., U. S. A.

WELL DRILLING WELL

Own a machine of your own. Cash or easy terms. Many styles and sizes for all purposes. Write for Circular.

WILLIAMS BROS., 434 W. State St., Ithaca, N.Y.

A 96-PAGE CATALOGUE

OF

Scientific and Technical Books

listing 2500 titles on 500 subjects, may be secured by addressing

SCIENTIFIC AMERICAN PUBLISHING CO.

Woolworth Bldg., New York

Automobile Welding with the Oxy-Acetylene Flame

By M. KEITH DUNHAM

167 Pages Price \$1.25 By mail \$1.30 Fully Illustrated

This is the only complete book on the "why" and "how" of Welding with the Oxy-Acetylene Flame, and from its pages one can gain information so that he can weld anything that comes along.

No man can afford to be without this concise book, as it first explains the apparatus to be used, and then covers in detail the actual welding of all automobile parts. The welding of aluminum, cast iron, steel, copper, brass and malleable iron are clearly explained, as well as the proper way to burn the carbon out of the combustion head of the motor.

SCIENTIFIC AMERICAN PUBLISHING CO.
Woolworth Building

223 Broadway

New York

Drop-Forgings vs. Castings



WHEN a manufacturer builds up a reputation for his product through long years of hard, conscientious work, nothing that tends to detract from that jealously guarded prestige can be tolerated for an instant. If a part in

the product of such a manufacturer proves defective, he is not satisfied with mere replacement; the future must be considered and assurance against further trouble provided.

Perhaps a casting has given way, resulting in a bad accident—an accident which never would have occurred had the part that failed been a drop-forging with its wonderful toughness and high tensile strength.

Dependable forgings may cost more than unreliable castings, but if additional expense is involved in their use it is never a serious factor in the consideration of the manufacturer, determined to make only the best.

And if forgings are to be used, Williams' Superior Drop-Forgings with a record of nearly half a century of dependable performance, offer assured reliability. Inquiries solicited.

J. H. WILLIAMS & CO.
"The Drop-Forging People"

28 Richards St., Brooklyn, N. Y.
28 S. Clinton St.
Chicago, Illinois

28 Vulcan St.
Buffalo, N. Y.

Coal and Iron from the Arctic

(Continued from page 376)

the Peace Conference, and the future of Spitsbergen was discussed without active German participation. Press despatches of late August represented practically all powers as ready to withdraw in favor of Norway; in fact, a Spitsbergen Treaty on that basis had actually been drawn at this date, and the only nation which seemed likely to withhold signature was Sweden. The document was passed along to the Supreme Council during the last week of August, after which it was to be sent to Norway for examination. Ratification by the great powers was expected to be complete before the New Year; and while the smaller nations were to be given opportunity to ratify, their action was not regarded as necessary to put the Treaty into operation.

The difficulty in solving the problem of control lies not so much in deciding what State shall be given the mandate as in devising adequate safeguards for the pre-existing estates belonging to the nationals of other countries. Obviously companies which have been in Spitsbergen for many years cannot be expected to submit to control prejudicial to their interests: they will not submit to laws which hamper their operations, especially if those laws emanate from a State other than their own. Unless the controlling hand rests lightly in Spitsbergen, either British or Norwegian estates will have to be extra-territorial in so far as they ante-date the new order of things. The Treaty as passed up to the Supreme Council provided for the protection of the rights of all nationals having rights in Spitsbergen through an International Arbitration Tribunal, which would also settle all disputes and claims. Whether this scheme is open to the objections which hold against explicit internationalization can probably only be determined by trial.

The resources of the country are considerable both in minerals and building stones, and in fur. About fur, little need be said, since the hunting of fur-bearing animals, reindeer, foxes, and polar bears, at least in the more accessible parts of the country, will not again be a profitable occupation until some game laws have been instituted which will allow the game to recover from the excessive slaughter by so-called sportsmen and Norwegian hunters.

The mineral resources include coal, iron ore, copper ore, oil shale and possibly free oil: further examination will probably reveal others. The coal is Carboniferous, Jurassic, and Tertiary. All these kinds occur in enormous quantities and mostly in seams easily worked within a few hundred yards of deep water anchorage. The Tertiary coal is the best, and in practice has been proved to be excellent steam coal. No one knows the amount of coal available in this Arctic archipelago, but it has been estimated at 8,750 million tons.

Magnetic iron ore of high quality has recently been discovered on the British estates. One of the "plums" is a mountain, 2,000 feet high and stretching for miles along Recherche Bay, which is nothing less than a mountain of iron. It is probably the largest iron-ore deposit in the world and one of the richest, the analysis showing an average of 66 per cent of pure iron. As far as it is known this high-grade ore does not occur on any Scandinavian estate. The British estates also contain enormous quantities of pure gypsum and some promising oil shale, asbestos and molybdenum and per ores, and marble of fine quality.

An essential need in Spitsbergen mining to-day is the adequate examination of the estates by qualified geologists and mining engineers. Trustworthy reports from men of standing are required in order to give sufficient confidence to allow the development of a country which suffers in reputation from its far northern position, its association with the Arctic regions, and its heretofore anomalous political status.



"Lend me
Your
Pencil?"

"Neither lender
nor borrower be",
—hold fast to your
ELDORADO. But
have you found
your

**DIXON'S
ELDORADO**
the master drawing pencil

—the pencil that
makes your fingers
feel fit and puts a
pleasant pep in
your pencil work?

Our pencilogue
"Finding your Pencil"
tells you how to find
it: a free copy to every-
one who wants to ease
and quicken his pencil
work. Write for it to-
day. And if you wish
samples worth double
the money, enclose
15c, stating the work
you do.

Joseph Dixon Crucible Co.
Pencil Dept. 121 J. Jersey City, N. J.
Canadian Distributors:
A. R. Mac Donnell & Co., Ltd. Toronto

There's a Dixon-quality Pencil,
Crayon and Eraser for
every purpose.



Now Ready! A New Book on a New Subject Behind the Motion-Picture Screen

By Austin C. LeCarbours



HERE, at last, is the wonder book of the screen. It takes the reader into that marvelous land where films are made, and where the camera reigns supreme. Every step in the making of a photo-play is taken up in proper turn, from the planning and writing of the scenario to the projecting of the finished film on the screen in the picture.

Talking pictures, natural-color pictures, microscopic pictures and all phases of the motion picture are treated upon in due turn. This book is printed on the highest grade coated paper. It contains 428 pages and over 300 illustrations. Bound in an attractive cloth cover. Send for four page circular giving sample page and full table of contents.

Size 8 1/4 x 9 1/4, \$3.50; postage—15c in the East, 20c to Chicago, 30c to the coast

One of the Most Attractive Books Ever Issued

SCIENTIFIC AMERICAN PUBLISHING CO. 233 BROADWAY, NEW YORK

THE RIGHT WAY

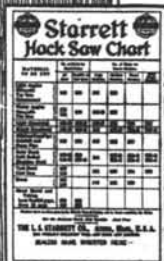
Follow the chart. There's never any question then about what blade will do that job of cutting easiest, quickest—and cheapest. And remember this—uniformity is one of the strongest points of Starrett blades. Send for Catalog and Chart B.

The L. S. Starrett Co.

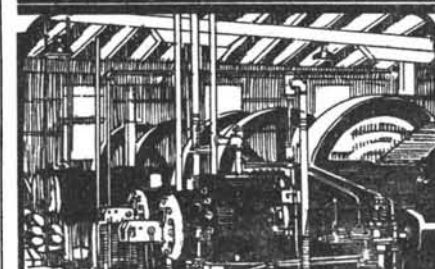
Athol, Mass.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

42-980



BESSEMER OIL ENGINES



Lighting the Wonder City of Texas

WHEN Ranger, wonder city of Texas, grew up overnight its suddenly increased street-lighting demands became a serious problem. Bessemer Oil Engines successfully met the emergency. The original installation of one developed into a battery of three Bessemer Oil Engines, which today are economically and dependably lighting Ranger. Wherever—whenever—low-cost trouble-proof power production is a vital essential, Bessemer Oil Engines, operating on any of the cheaper fuels, offer the logical solution. 15 to 180 H.P. Write for literature. THE BESSEMER GAS ENGINE CO. 14 York St., Grove City, Pa.