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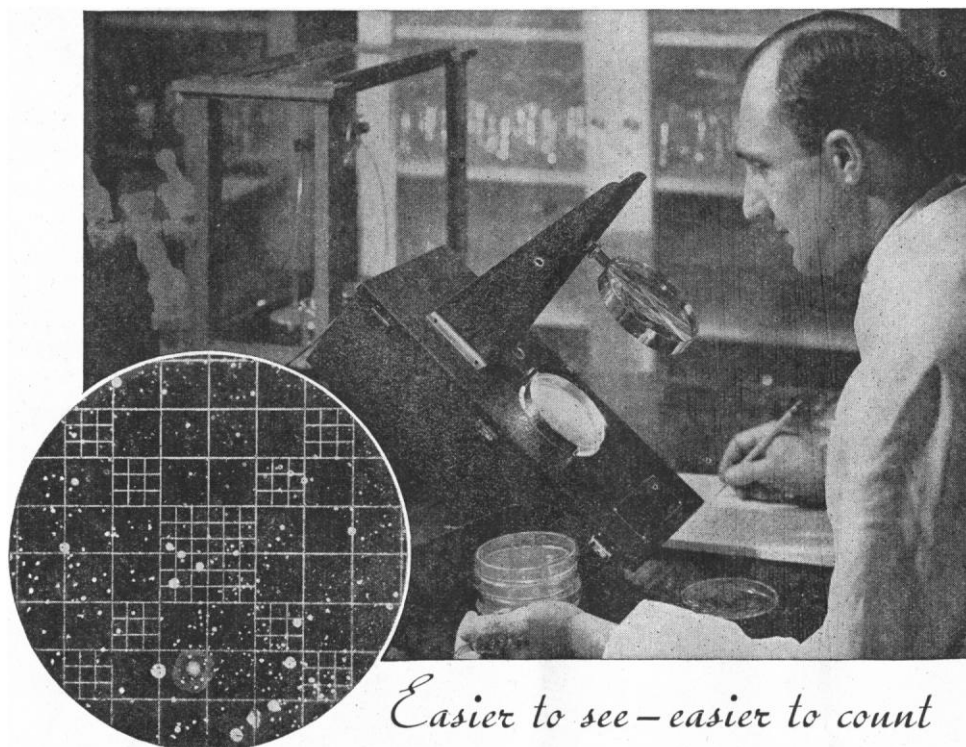
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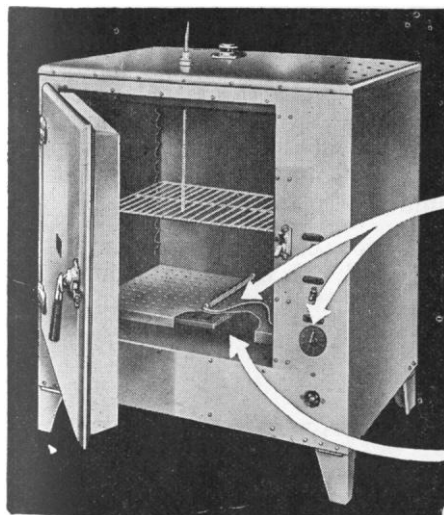
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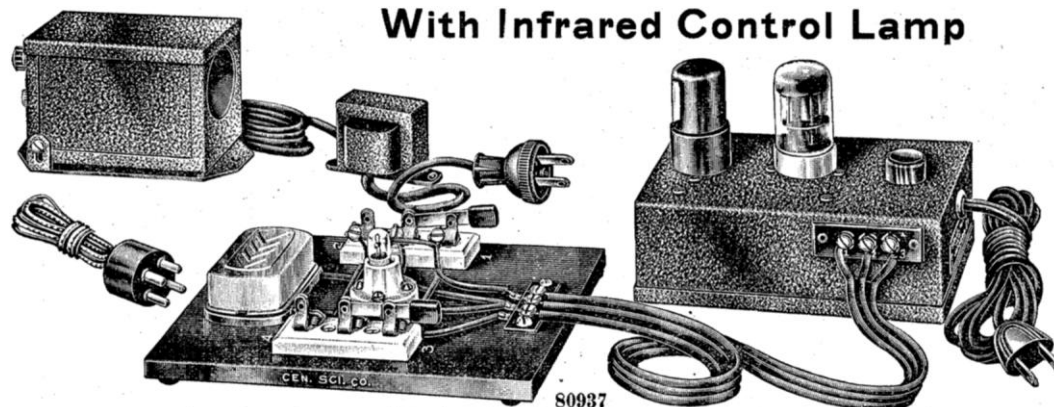


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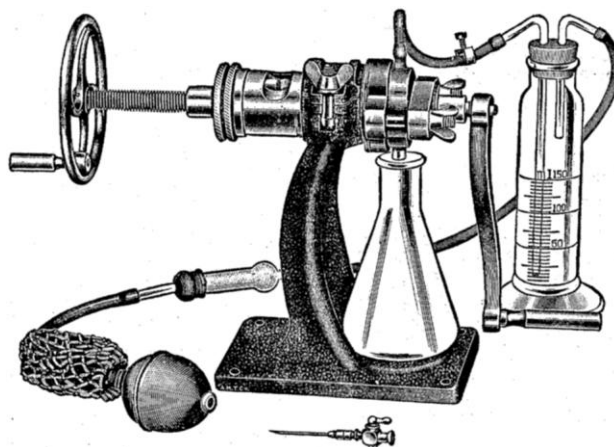
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THE ROLE OF REFUGEES IN THE HISTORY OF AMERICAN SCIENCE¹

By DR. C. A. BROWNE

U. S. DEPARTMENT OF AGRICULTURE

SINCE the time of the earliest settlements the flight of refugees from Europe has been a most potent factor in the development of American science. These migrations, which resulted from religious persecution, desire to escape imprisonment or military service, curtailment of political liberties, longing for a more congenial social environment and other causes, have come generally in successive waves of disturbance in which all sorts and conditions of men were affected. While the families of peasants and workmen were chiefly involved in these movements, merchants, physicians, scholars, artists and other groups were also concerned.

¹ The biographical notes on the refugee scientists mentioned in the present sketch were culled from various biographical cyclopedias. The new Dictionary of American Biography with its classified index of celebrities according to occupation and place of birth was found to be especially helpful.

The list of European men of science, who from time to time have sought in America refuge from persecution, is a long one and the stories of their adventurous careers would fill a volume of considerable size. In the present paper a few typical illustrations will be cited from the list of scientists who fled to America in the disturbances of the seventeenth, eighteenth and nineteenth centuries.

The earliest conspicuous example of an American refugee scientist is that of John Winthrop, Jr. (1606-1676), who in 1631, because of the persecution of the Puritans in England under Archbishop Laud, joined his father and other coreligionists in the founding of the Bay Colony in New England. "Laud's hand fell heavily on the English Puritans," writes J. R. Green, the eminent English historian. "Thousands of the best scholars, merchants, lawyers, farmers, were flying

substances flows off into the syphon chamber and eventually into the reservoir. In so doing the organic

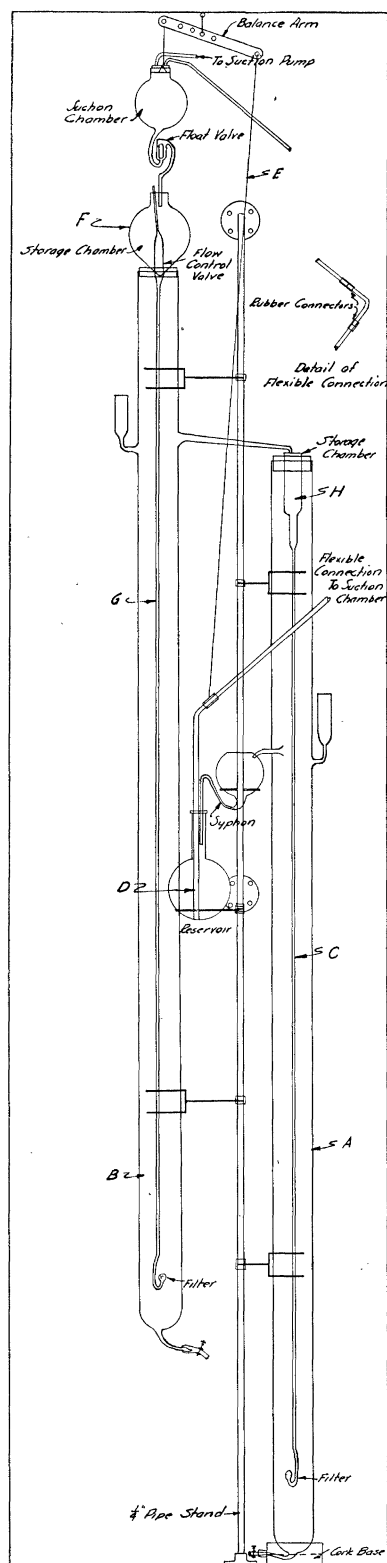


FIG. 1

liquid flows up the tube D due to suction created by the liquid sealing the end of same tube. The liquid flows up to the suction chamber on top to a level of about half. The weight of the liquid delivered in suction chamber trips the balance arm above and thus allows the left-hand side to be lowered a few inches and the right side to be raised by the same amount. This latter side is fastened to a wire E, which is connected to tube D. This above action lifts the tube D up out of the liquid, breaking the seal and allowing air up the same tube and releasing the suction in the suction chamber above. By releasing the suction on the system, the float valve rises and allows the liquid to flow out into storage chamber F. From here it flows down at a speed governed by means of flow control valve through the inner tube G through a porous glass filter into another aqueous solution, which reextracts the dissolved solute back into the aqueous phase again. The organic liquid rises in many small bubbles, separates at the interface and flows over to storage chamber H. From here the whole process repeats itself, going on continuously.

The apparatus could be built of any desired size, and it may be used for a variety of problems by simply using different solvents.

The writer is greatly indebted to Dr. S. J. Thannhauser, whose laboratory supported the building of the above apparatus, and also to E. Perkins, who helped overcome one of the mechanical difficulties. The glass blowing was done by J. Rossetti.

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Designed by Professor R. W. Wood



Outstanding Features:

"Brightline" type replica grating, 15 times more brilliant than all other commercially available replicas.

Spectrometric measurements can be made on a moment's notice—assured accuracy of less than 50 Angstroms. Quick observations possible in complicated laboratory set-ups. Brilliant brightline spectra easily observed from vacuum tubes or by ordinary flame method without darkening the room.

The scale is graduated in Angstroms from 4000 to 7500 and mounted on a ground glass plate giving a brilliant easily read scale. An adjustable slit is provided and on the same bracket is a holder for filters for studying absorption lines.

No. 3693.

Mounted on a separable base so that the spectrometer may be removed from the base and held by the convenient handle in any desired position.

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