July 13, 1937. M. B. JESTER 2,086,771

METHOD AND APPARATUS FOR COMPARING OILS

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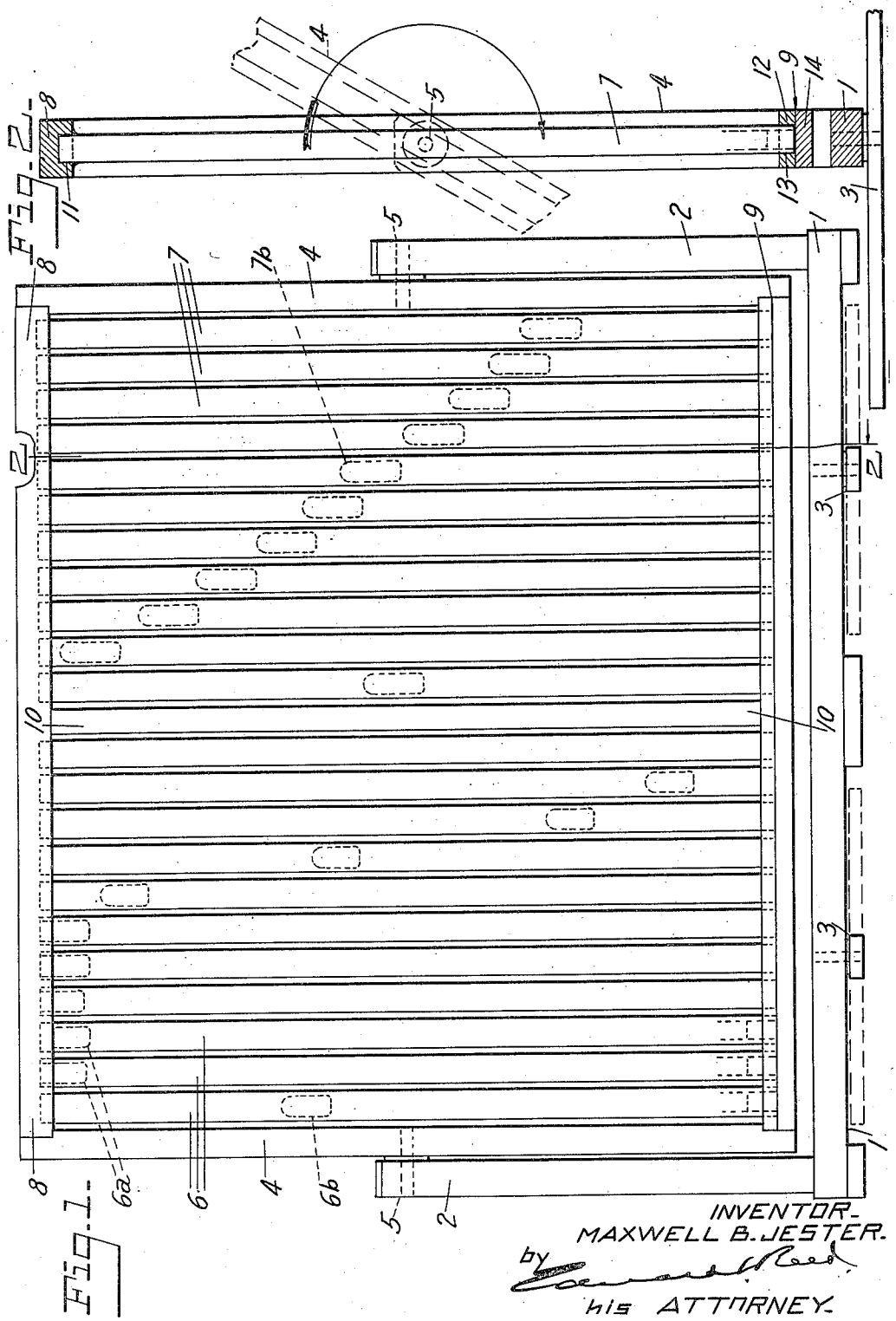


FIG. 2.

FIG. 1.

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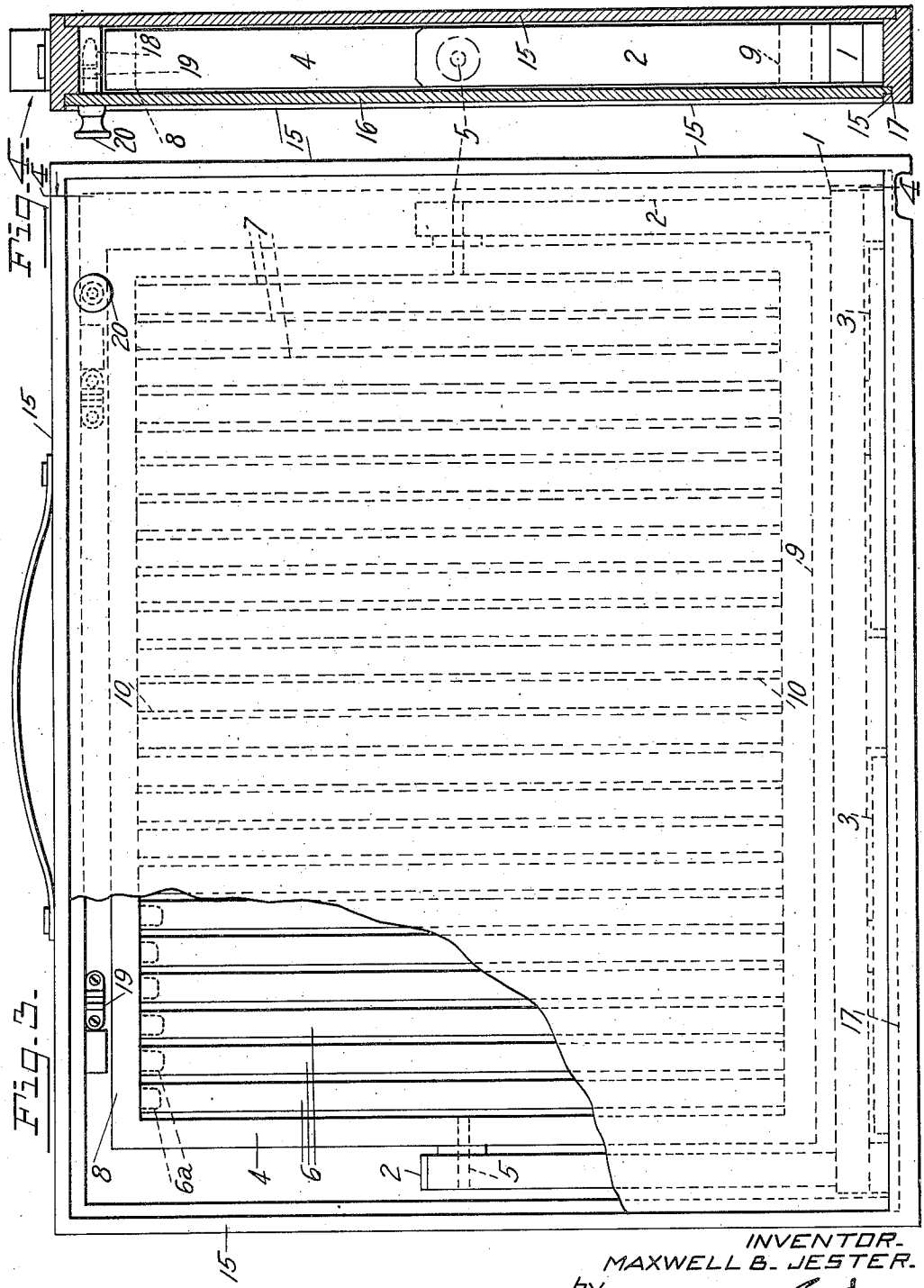


Fig. 4.

Fig. 5.

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METHOD AND APPARATUS FOR COMPARING OILS

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6 Claims. (Cl. 265—11)

This invention relates to a method and apparatus for comparing the characteristics of oils and the like and more particularly for visually demonstrating the differences in the characteristics of the two or more oils.

For the purpose of determining certain characteristics of an oil, such as a lubricating oil, it may be divided into a series of cuts by fractionating the oil into its component parts in what is known as a fractionating still. In the best grades of oil the cuts will be very narrow or finely divided and there would be an absence of decomposition products and of light and heavy ends, that is, each cut will have a relatively narrow range of viscosity. In lower grades of oil the cuts will have light and heavy ends, that is, light viscosity at one end and heavy viscosity at the other end and there will be products of decomposition at both ends.

One object of the invention is to provide a method of comparing the cuts of two or more oils to visually demonstrate the difference in the characteristics thereof.

A further object of the invention is to provide such a method of comparison which will not be confined to the laboratory but may be made on a simple apparatus at any desired place.

A further object of the invention is to provide a simple efficient apparatus with which the difference in the characteristics of two or more oils may be easily determined.

A further object of the invention is to provide such an apparatus which will be compact in form and of light weight so that it can be easily transported from place to place.

Other objects of the invention may appear as the method and apparatus are described in detail.

In the accompanying drawings Fig. 1 is a front elevation of an apparatus for carrying out the method; Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1; Fig. 3 is a front elevation of the apparatus enclosed in a carrying case, with a portion of the case broken away; and Fig. 4 is a section taken on the line 4—4 of Fig. 3.

In these drawings I have illustrated one form of apparatus by means of which my method may be carried out and the essential feature of that apparatus is two sets of tubes adapted to contain oils and a small quantity of air and so mounted that they may be inverted to cause the air to rise through the oil in the several tubes in the form of bubbles, the movement of which will be indicative of the character of the oil, thus enabling the oil in the two sets of tubes to be compared. This particular apparatus comprises an elongate base 1 having at its ends upright standards 2. The base is of narrow width and is provided at its lower side with supporting members 3 pivotally connected thereto, so that they may be moved into positions parallel with and beneath the base or into positions in which they will extend transversely to the base, as shown in Fig. 2, and thus support the same in an upright position.

Mounted on the standards 2 is a frame adapted to carry the tubes. In the present construction this frame is rectangular in form and is arranged between the standards, the end members 4 of the frame being pivotally mounted on the standards by means of pivot pins 5. Mounted in this frame are two sets of elongate transparent tubes 6 and 7, the ends of which are mounted in the upper and lower members 8 and 9 of the frame, the two sets of tubes being preferably separated by a frame member 10. The tubes are sealed at both ends and may be mounted on the frame in any suitable manner. As here shown, one of the longitudinal frame members, 8, is provided with a series of sockets 11 to receive the adjacent ends of the tubes. The other frame member, 9, is in two parts, the inner part 12 having a series of openings 13 through which the tubes may be inserted and seated in the sockets 11 of the other frame member. The outer part 14 of the frame member 9 is secured in place after the tubes have been inserted and closes the openings 13 to retain the tubes in place.

Each tube contains oil in such quantity as to leave within the tube a small air space which, when the frame is in an upright position, will be at the top of the tube, as shown at 6*a* in Fig. 3, and when the frame is rotated through a half rotation to invert the tubes this air space will be carried to the bottom and the air will rise through the oil in the tubes in the form of bubbles, as shown at 6*b* and 7*b* in Fig. 1. There may be any suitable number of these tubes and, in the present arrangement, there are eleven tubes in each set. One tube of each set, the left hand tube in Fig. 1, contains the whole oil while the other tubes contain different cuts of that oil, which is preferably fractionated in ten percent fractions. However, some oils are of such a character that they cannot be completely fractionated in ten percent fractions and under such circumstances the last tube of the set containing such oil may contain residue and the cut in the adjacent tube may be less than ten percent. When the two sets of tubes are simultaneously inverted the bubbles will begin to rise in all

tubes simultaneously and the speed at which the bubble in each tube rises is dependent upon the characteristics of the particular cut of oil in that tube and by comparing the movements of the bubbles in the two sets of tubes the characteristics of the oil may be determined when compared one with the other. Further, this comparison will indicate the characteristic of the cuts and the amount of residue, if any, in the oils.

As shown in Fig. 1 the tubes have just been inverted and the bubbles have not yet completed their upward movements. It will be noted that the bubbles in the first five cuts, following the whole oil tube, in the left hand set of tubes, have reached the tops of the tubes before any bubble in the cuts of the right hand set of tubes has reached the top of its tube. The remaining bubbles in the left hand cuts are spaced far apart and unequal distances, while the bubbles in the several cuts of the right hand set of tubes are spaced apart substantially uniform distances, each bubble moving upwardly at a speed only slightly less than the speed of the bubble in the preceding tube, thus clearly indicating that the cuts in the right hand set of tubes are sharply defined and without light or heavy ends while the cuts in the left hand set of tubes are not so finely distinguished one from the other and their movement is irregular, indicating the presence of light and heavy ends. This movement of the bubbles clearly indicates that the oil in the right hand set of tubes is of a quality superior to that in the left hand set of tubes.

The apparatus as a whole is of narrow width and is very compact in form and of light weight so it can be easily carried from place to place and demonstrations may be made, by salesmen or others, when and where desired. To facilitate the transportation of the apparatus I have shown the same, in Figs. 3 and 4, as removably mounted in a carrying case **15** of a shallow depth and of such proportions as to receive the apparatus when the pivoted supporting members **3** are parallel with the base. The front wall **16** of this case is removable to permit the insertion and removal of the apparatus and in the arrangement shown the lower edge of that front wall is seated in a groove **17** in the bottom wall of the casing and the upper portion of the front wall is provided with studs **18** adapted to engage resilient fastening devices or clips **19** to secure the front wall to the case, the former being provided with knobs **20** to facilitate its removal.

While I have described my method and have shown and described one form of an apparatus for performing the same I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of visually demonstrating the differences in the characteristics of two oils which comprises fractionating two oils in the same manner to divide each oil into a plurality of cuts each different from the others, sealing the several cuts of the respective oils and small quantities of air in separate sets of parallel transparent tubes, supporting said tubes in upright positions with the air at the top of each tube, simultaneously inverting the two sets of tubes to cause the air therein to rise in the form of bubbles and noting the relative movement of the bubbles in the corresponding tubes of the two sets.

2. In an apparatus for comparing the characteristics of two oils, two series of substantially parallel transparent tubes of substantially the same length and capacity, the tubes of one series containing different fractional cuts of one of said oils and the tubes of the second series containing fractional cuts of the other of said oils corresponding to the cuts of the first mentioned oil, each tube also containing a bubble of air, and means for supporting said tubes in upright positions and for simultaneously inverting the same to cause said bubbles to move upwardly through the oil in the respective tubes and to indicate by their relative movements the comparative characteristics of the cuts in the corresponding tubes of the two series.

3. In an apparatus for comparing the characteristics of two oils, two series of substantially parallel tubes, one tube of each series containing an unfractionated portion of one of said oils and the other tubes of said series containing fractionated cuts of the same oil, and one tube of the second series containing an unfractionated portion of the other oil and the other tubes of said second series containing fractionated cuts of said other oil corresponding to the cuts in the first mentioned series of tubes, each tube also containing an air bubble, and means for supporting said tubes in upright positions and for simultaneously inverting the same to cause the bubbles to rise through the oil in the respective tubes and to indicate by their relative movements the comparative characteristics of the cuts in the corresponding tubes of the two series and the relation of the cuts in each series one to the other.

4. In an apparatus for comparing the characteristics of two oils, a frame mounted for movement about a horizontal axis from one vertical position to another vertical position, two series of substantially parallel transparent tubes carried by said frame for movement therewith, the tubes of one series containing different fractional cuts of one oil and the tubes of the second series containing fractional cuts of the second oil corresponding to the cuts in the first series of tubes, and each tube also containing a bubble of air, said tubes being so arranged that the movement of said frame to simultaneously invert the two series of tubes from one vertical position to another vertical position will cause the bubbles of air to rise through the oil in the respective tubes.

5. In an apparatus for comparing two oils, a narrow elongate base, narrow standards at the respective ends of said base, two narrow supporting members connected with the lower side of said base for movements into positions parallel with or transverse to said base, a frame mounted on said standards for movement about a transverse axis, and two series of transparent tubes carried by said frame, the tubes of one series containing different cuts of one oil and the tubes of the other series containing cuts of a second oil corresponding to the cuts in the first series of tubes, each tube also containing a bubble of air, said tubes being supported by said frame in normally upright positions and being movable thereby to inverted positions to cause said bubbles to rise through the oil in the respective tubes and to indicate by their relative movements the comparative characteristics of the oils in the corresponding tubes of the two series.

6. In an apparatus for comparing two oils, a narrow elongate base, narrow standards at the respective ends of said base, two narrow supporting members connected with the lower side of said

base for movements into positions parallel with or transverse to said base, a frame mounted on said standards for movement about a transverse axis, and two series of transparent tubes carried by said frame, the tubes of one series containing different cuts of one oil and the tubes of the other series containing cuts of a second oil corresponding to the cuts in the first series of tubes, each tube also containing a bubble of air, said tubes being supported by said frame in normally upright positions and being movable thereby to inverted positions to cause said bubbles to rise through the oil in the respective tubes and to indicate by their relative movements the comparative characteristics of the oils in the corresponding tubes of the two series, a carrying case of shallow depth to receive said base and the parts carried thereby, said case having a removable front wall, one edge of which has interlocking connection with the adjacent edge wall of said case, and fastening devices for connecting the opposite edge of said front wall with said case.

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