

## On spectacle-frame fitting, and face measurement

This content has been downloaded from IOPscience. Please scroll down to see the full text.

1900 Trans. Opt. Soc. 2 13

(<http://iopscience.iop.org/1475-4878/2/1/302>)

View [the table of contents for this issue](#), or go to the [journal homepage](#) for more

Download details:

IP Address: 136.186.1.81

This content was downloaded on 06/09/2015 at 12:20

Please note that [terms and conditions apply](#).

## ON SPECTACLE-FRAME FITTING, AND FACE MEASUREMENT.

By MR. W. A. DIXEY, *Member.*

*Read before the Optical Society on December 13th, 1900.*

IN coming before you to-night to read a paper on frame fitting, I feel that some excuse is due for the simplicity of my subject. But although the questions and conditions that are involved in the subject of frame fitting are not directly connected with the science of optics, they have a certain indirect connection; and I think I may at any rate assert that they are of great interest and importance to that large percentage of practical Opticians who have to do with spectacles.

I say that this subject is an interesting one: we must all of us have ideas about frame fitting. Take the most ignorant pedlar of spectacles in the country; he will at least aim at the best fit his means allow; while the man who is skilful and careful in his work will spare no trouble, but will devote all his energies to securing a good fit; for such a one will have learnt to recognise that there are few pleasures keener than the satisfaction which comes of a bit of work (however trivial) entirely well done.

But frame fitting is not merely an interesting subject, it is an important one. Hours may be spent and much thought devoted to the diagnosis and correction of a pair of defective eyes; and all the labour may be thrown away, and all the thought wasted, if the spectacle frame does not fit. An eighth of an inch one way or the other, the difference of ten degrees in the set of a side or a placquet, may make all the difference between success and failure. I wish this were more generally recognised. I often think that some people attach more importance to the fit of a coat than to the fit of their spectacles. At the worst a badly fitting coat fulfils its function of giving warmth and protection; it only looks bad. But a pair of

badly fitting spectacles not only looks bad, it is injurious to the sight, and may even affect the health. May we not then confidently assert that the subject of frame fitting and face measurement is one of importance ?

Now I am going to lay it down as axiomatic that the only way to get a perfect fit with a spectacle frame is to measure the face, and make the frame from the measurements. Much may be said in favour of a reach-me-down coat, but if you want a really correct fit, you must get your coat made to measure. So it is with a spectacle frame. If you will consent to follow me in this enquiry into the conditions that are necessary to a well fitting frame, you will without doubt admit that the possible variations are altogether too numerous to admit of a stock so large as to meet every case. But if I ask you to accept this, I want you to understand that there, for to-night, my dogma ends. In describing to you my method of face-measurement, I would represent it (I hope with becoming diffidence) as one merely of several possible means for reaching the desired end. In my case my present method is the result of a gradual evolution. Twenty years ago I began at the very beginning. We used to have a certain number of ready made frames in stock ; from them we picked out a few that looked about what was required ; one or two were put on the face, and one selected which seemed about right. We used even in those days, not infrequently, to fit a customer with a ready glazed frame, in which case the selection was made from a necessarily smaller number. At the most, if no fit was effected, and a frame had to be made, we were content with giving the workman the centres, and such indefinite directions as a reading bridge, wide or narrow crank, well bowed sides and so on.

It would be interesting did time allow, and my recollection suffice, to follow the gradual evolution of my present method during the twenty years I have been engaged in frame fitting. I will content myself with saying that every year has brought new methods and modifications ; I have adopted many appliances, and discarded almost as many ; I am still adopting and discarding—it is because I am conscious of this that I speak of my diffidence—I cannot even now regard my methods as final ; but at least I have reached this point ; that I can—simply and expeditiously—from a few measurements easily taken, convey to my workmen in some eight or ten figures the dimensions of a frame which will fit the face I have measured, provided only that I have done my part carefully and with intelligence.

Moreover, not only do I use this method with satisfaction to myself, but, and this is saying a great deal more for it, I have induced the gentlemen who assist me to use it, and I think modesty will allow me to assert that in their case the results are eminently satisfactory.

I now propose to examine in detail those measurements of the face that are necessary to the production of a well-fitting spectacle frame.

We will begin with the interpupillary distance, or, as it is commonly called, the centres. The first thing to note is that it is not convenient to measure from centre to centre of the eyes; if you try to do so, you have to guess the centre of each pupil, and a small error is most probable. A better point to take is the edge of the iris. If you work right-handed, measure from the nasal edge of your customer's right eye to the temporal edge of his left. These edges are better than the other two, because at these points the eyeball presents a surface more nearly normal to your line of sight. Subject to one little correction, which I will explain later, these points give you the exact distance between the pupil centres, except in the rare case of the diameter of the two irides being of different size. In such a case you may get absolute accuracy by taking two measurements, first at the near side edges, then at the off side, adding the two results together, and dividing by two. The other correction to which I have alluded is more important, and refers to the error due to parallax. You may avoid it by measuring your customer's right eye with your left, and his left eye with your right, though this method is open to obvious objections, and I think it best to take both measurements with one eye, and allow for the error in your reading. The error is not great if you are careful in your manipulation. Allowing two feet for a working distance, a pupil distance of two and a half inches, and the distance of the rule from the eye a quarter-inch, the error due to parallax works out at about one-fortieth of an inch; so that if you are a bit generous in your reading, it will nearly enough meet the case. At the same time, this error should always be kept in mind, as there are cases where, from one cause or another, as you can easily imagine for yourselves, a larger allowance has to be made.

Having carefully measured the interpupillary distance you are in a position to write down the first figure of your frame measurement—the desired centres of the frame. This will not always be the same as the pupil distance; for a variety of reasons (for which I refer you to my recent paper on "The Centring of Spectacle Lenses"), it may be desirable to make the spectacle centres wider or narrower than the

pupil distance, *e.g.*, the allowance for the convergence of the visual lines in reading is generally best made in the frames; though, of course, the frames may be made to the correct pupil distance, and the allowance made by decentering the lenses. Sometimes the construction of a face makes a divergence from the pupil distance desirable, as in the case of a thick nose in conjunction with eyes near together, when the frame may be made with wider centres and the error neutralised by a corresponding inward decentration of the lenses. So that it is well in making your notes during the process of face measurement to make some mark by which you can distinguish between the actual pupil distance and the desired centres for the frame. My own habit is to put a circle round the pupil distance; in fact, I use this circle round a figure as a symbol of a direct measurement, and find it very useful on other occasions as well.

Having written down the centres of your frame, the next dimension to consider is the width of the front. I know of no better method of arriving at this measurement than by the use of some such simple instrument as the one I have here. This consists of a spectacle frame made, you will notice, with ordinary sides, joints, and eyes, which last are glazed with flat glasses. I emphasise the fact of these parts being of an ordinary kind, because I consider that essential to a good result. It is also furnished with a mechanical bridge, of which I will speak later, and, for the purpose of front measurement, with an arrangement for altering the width apart of the joints (or sides). The method of using the instrument is as follows:—Practice enables you to judge with approximate accuracy the desired width. Set the sides accordingly and put the instrument on the face. If correct, good. If not, a single alteration generally suffices. There is a scale inside the straight bar, so that one need not delay operations by writing down the width immediately. Moreover, you must consider the width of your front, in connection with the curve (or bow) and character of the sides; and here again there is occasion for discretion; but the measurement you have taken with this instrument will in every case serve as a basis. I always work with the sides, which are 5 inch ones, bowed  $\frac{3}{8}$  of an inch. Obviously, if I bow the sides of my frame a  $\frac{1}{2}$  inch, I can have my front  $\frac{1}{4}$  inch narrower, and *vice versa*. It is in this adjustment of sides and front that the discretion of the frame fitter is most exercised; and although nothing but the commonest of common sense is required, the success of the frame depends very largely upon that discretion. Thus a square head will

require a full measure for the front, and a slight bow for the sides; a round bullet head will take a deep bow, and a correspondingly narrow front. The maximum allowance for the front will be given by the instrument, as it is not wise to reduce the bow beyond  $\frac{3}{8}$  inch; the minimum is fixed by the width of the centres and the size of the eyes; so that the narrowest front must at least measure the centres *plus* the major axis of the eye, and in this case turn-up joints must be fitted; with ordinary joints  $\frac{1}{2}$  an inch should be added.

For an average effect a good general rule is to make the front  $\frac{1}{8}$  short of two inches more than the centres, *i.e.*,  $2\frac{3}{8}$ -inch centres;  $4\frac{1}{4}$  front;  $2\frac{1}{2}$  centres,  $4\frac{3}{8}$  front; and so on. Cosmetic effect should be studied in this connection, but it is impossible to lay down rules; tastes differ, and ideas are bound to vary as to the most beautiful type of spectacles. You will even find some people so blind to the beauty of spectacles as to condemn all alike. Enough that it is in these relations of eyes to front and front to facial contour, that the cosmetic effect of spectacles mainly lies.

Having correctly set the instrument to the proper width, we must proceed to the adjustment of the bridge—a very important item in the constituents of the frame. To define the bridge three dimensions are necessary; height, projection, and spread. The instrument is already on your customer's face, and you proceed to adjust the mechanical bridge, first for height, and then for projection. The height of the bridge regulates the position of the eyes, and the use to which the spectacles are to be put must be considered. Thus for general outdoor use the bridge must be lowered until, the eyes looking straight forward, the visual lines pass through the centres, or perhaps a little above the centres of the spectacle eyes; while for a reading frame the bridge should be raised till the eyes assume a suitable position for the downward direction of the sight in reading. Having fixed the height, proceed with the projection; the bridge must be adjusted forwards or backwards till the glasses assume their proper position, as near as possible to the eyes, but clear of the lashes. In making this adjustment direct your customer to turn sideways, and do not forget to allow for the curve, convex or concave, of the surface of the lens which will be next the face. Having completed this adjustment, after noting the position of the sides, of which more anon, you may take off the instrument, and lay it aside; subsequently you will measure off the two dimensions of the bridge with the spectacle rule. In writing down these two measurements, we take as zero positions

the horizontal axis of the frame, *i.e.*, the level of the crack of the joints; and for projection, the plane of the back edge of the eye-wire. Dimensions below the first or inside the other may be written with a negative sign.

A third bridge measurement remains to be taken, and that is the curve or spread. This is of more importance than some are apt to think. Most people have a bony swelling towards the top of the nose, and if the bridge is so curved that it lies closely upon the eyeward slopes (so to speak) of this bony excrescence, it serves largely to keep up the spectacles in their proper position, and to prevent them from slipping down the nose. To take this measurement I use this spread-measure, a plain piece of boxwood or vulcanite with six graduated curves cut out of it, which, as a general rule, give sufficient variety, though if a nicer gradation be required half numbers may be used. A complement to the spread-measure is a bridge block, a valuable aid to the workman, over which he bends his bridge wire before it is soldered on to the eyes and tempered. In connection with the spread the character of the bridge may be considered, *i.e.*, whether crank, arch, or the so-called sweeping W. Why this bridge is called sweeping I don't know, and I think we might well drop the adjective and call it simply a W bridge; the more so, as this is the type of bridge which is best in nineteen cases out of twenty; mainly for the reason that with it you can always regulate (1) the rake so as to get it at an angle of about  $45^{\circ}$  to the sides, and (2) the depth which should be about  $\frac{3}{8}$  of an inch. These two dimensions of rake and depth may be taken as standards, not to be deviated from unless you specify otherwise.

This completes our measurements for the bridge, and we now pass to a consideration of the eyes. There are two qualities which we must specify, shape and size. The shapes which I find most useful are round-oval, oval and half-oval. Oval, I suppose for cosmetic reasons, is the most generally accepted shape. You may vary your ordinary oval if you like, by having a deep oval or a shallow oval. Round-oval is a useful shape where large scope is required, *e.g.*, in spectacles which are worn both out-of-doors and for reading, etc., as well; spectacles for shooting, billiard playing, and so on. It is also a good shape for children's spectacles. Half-oval is a practical shape for presbyopes, as it enables the sight to be directed over the lenses, when a distant object is looked at. So much for shapes. Each shape must have a certain number of sizes, and you will see at once that

this question of size is an important one in connection with our subject of frame fitting, as it affects the width of the front.

The controlling dimension of the eye is the horizontal or major axis. Whatever system of sizes you use, it is incumbent, if you are to be a good frame fitter, that you should carry in your head this dimension for each size. My own practice has been to arrange all sizes with reference to this consideration. I number my eyes from one to four. Whatever the shape, each number has the same major axis. No. 1 has a major axis of  $1\frac{1}{4}$  in., No. 2 of  $1\frac{3}{8}$  in., and so on. So that no matter what the shape, I always know at once what proportion of the spectacle front the eye will occupy. Four numbers seem enough, but here again, if nicer gradations are required half numbers may be used.

Perhaps this is the place to allude to a mistake that a beginner may easily make; that of leaving insufficient space for the nose between the eyes. A thick nose will often require  $1\frac{1}{8}$  or  $1\frac{1}{4}$  inches of interval. Centres *minus* eye gives the space. So that with centres  $2\frac{1}{4}$  and with such a nose to deal with you cannot prescribe No. 3 eyes.

Centres, front, bridge and eyes have now been dealt with, and there remains only the consideration of the sides. In single sides the length should be given. They should go about an inch beyond the ear. I work, as I told you, with a 5-inch side on my measuring instrument. Any desired addition to or deduction from this length can be gauged by eye, if the position of the side is noted when you have your customer side-face. For turnpin sides the sides of the measuring instrument may be touched with a yellow pencil, and the length of a curl-side, or rigid hook-side, may be gauged in the same way, or by the bent side with scale attachment with which you are doubtless familiar. In using this last, the mechanical frame should be on the face and the measure made to the crack of the joint. A deduction of  $\frac{1}{8}$  to  $\frac{3}{8}$  inches must be made from the reading so taken, proportionate to the pliancy of the side—I have already alluded to the bow of the side; there seems nothing more to add, except that in writing down the bow it is convenient to use brackets as a symbol, thus ( $\frac{1}{2}$ ). The last point for consideration is the angle at which the sides are set to the front. As a rule the best angle for spectacles for general use is a right angle, and that angle may be assumed unless another is specified. For reading, writing, and generally for close work, the best inclination for the sides is at an angle of from  $70^\circ$  to  $80^\circ$  with the front. The position to aim at is that the front may be as nearly as possible

normal to the average direction of the visual lines. Exact measurement is unnecessary. But before experience has taught accuracy, the measuring instrument may be tilted till the desired position of the front is obtained, and the angle which the sides then make with the line from joint to ear may be noted or, if necessary, measured.

This concludes the measurements that are necessary in an ordinary case for the specification of a properly fitting spectacle frame. The process is so simple that I am myself rather astonished at the length to which the description of it has run. I propose now to demonstrate to you its simplicity and the expedition with which these measurements are made. The complete series of measurements can easily be taken in  $1\frac{1}{2}$  minutes; and to a practised man another minute is ample to write out the working specification for the frame.

It was originally my intention to give hints as to how to deal with exceptional cases, but I think it may be more interesting for you to suggest difficulties and to let me explain my method of meeting them by way of reply. Another interesting subject of study which I will not deal with at present is face measurement with reference to the fitting of eyeglasses. Perhaps on some future occasion, if I have not exhausted your patience, you will allow me a few further observations on that subject.

---