

given above can be obtained by making the kinetic energy of this constrained motion a maximum for variations in the position of the pin. The constrained motion which corresponds to the motion of the free rod is that with the pin placed at the instantaneous centre. The same result applies, of course, whatever the point at which the impulse is applied. If, however, the impulse is applied at a point distant from the centre $>a/3$, then the instantaneous centre is a point of the rod, but if the distance of the point from the centre is $<a/3$, then the instantaneous centre of the motion is a point outside the rod, which makes the nature of the constraint applied in this case somewhat unreal. To say that a stationary property can be associated with Bertrand's Theorem as a general result, then one should be able to say that, no matter what the system, one can always impose *real* frictionless constraints on the system of such a nature that they may be so varied that the resulting constrained motion differs by as little as one pleases from the motion of the free system. Clearly this is not always possible. Thus, while Bertrand's Theorem can be associated with a stationary property in particular cases, one cannot say that it can be so associated as a general principle. This is the point of the statement in my book that Bertrand's Theorem involves no stationary property "since it does not follow that frictionless constraints can be imposed on the system in such a way that the \mathbf{v}_2 's and the \mathbf{v}_2 's corresponding to the different systems differ from one another by infinitesimal amounts" I feel, however, that this statement does not in itself make the position completely clear, and I am pleased to have this opportunity, arising out of the review of my book by Mr. Whitfield and correspondence with him, to clarify more exactly the variational implications of Bertrand's Theorem.

Yours etc., C. E. EASTHOPE

To the Editor of the *Mathematical Gazette*

DEAR SIR,

QUERY:—

A common form of crossword frame consists of a square, divided into rows and columns each containing 15 small squares, some of which are blacked out to form a centrally symmetrical pattern. Assuming that

- (i) No row or column is completely blacked out;
- (ii) No 'word' consists of more than 13 or less than 3 letters;
- (iii) At least one letter of every 'word' is shared by a 'word' in the other direction;

is it possible to determine just how many frames can be constructed?

Yours etc., B. A. SWINDEN

SAMUEL PEPYS AND JOHN WALLIS

1952. *From Samuel Pepys to Sir Godfrey Kneller, March, 26, 1702.*

I have long, with great pleasure, determined, and no less frequently declared it to my friend Dr. Charlett, upon providing as far as I could by your hand, towards immortalizing the memory of the person,* for