$$(4)^* \quad p = \left(\frac{a + 2b + 5c + 10d}{6}\right)^2 + 2\left(\frac{a - b + 5c - 5d}{6}\right)^2 + 5\left(\frac{a + 2b - c - 2d}{6}\right)^2 + 10\left(\frac{a - b - c + d}{6}\right)^2.$$

In view of (2) and (3), the numerators in (4) are all even. Then, unless exactly three of a, b, c, d are divisible by 3, we can choose signs for a, b, c, d so that

$$(5) \qquad a - b - c + d \equiv 0 \pmod 3.$$

Then all the other numerators in (4) are divisible by 3.

In the exceptional case either a and b or c and d are divisible by 3. But the identity

$$(6) \qquad 9(A^2 + 2B^2) = (A \pm 4B)^2 + 2(2A \mp B)^2$$

(repeated if necessary) shows that any multiple of 3 of the form x^2+2y^2 can be expressed in that form with x, y prime to 3. Then (5) can be verified as above, and $q=1$. We have now proved the following theorem:

THEOREM 4. *Every positive integer is representable in the form*

$$a^2+2b^2+5c^2+10d^2.$$

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A MOMENT-GENERATING FUNCTION WHICH IS USEFUL IN SOLVING CERTAIN MATCHING PROBLEMS†

EDWIN G. OLDS

1. **Introduction.** In a book published several years ago, Fry‡ devoted considerable attention to various aspects of a problem which he called, "the psychic research problem." His introductory problem is the following: "A spiritualistic medium claims to be able to tell the

* Formula (4) and the rest of the proof of this theorem were suggested by Gordon Pall.

† Presented to the Society and The Institute of Mathematical Statistics, December 30, 1937.

‡ T. C. Fry, *Probability and Its Engineering Uses*, Van Nostrand, New York, 1928, pp. 41–77.